

21994

March 2001

Uganda's Recovery

*The Role of Farms, Firms,
and Government*



EDITED BY

RITVA REINIKKA

PAUL COLLIER



Uganda's Recovery

Uganda's Recovery

*The Role of Farms, Firms,
and Government*

**Edited by
Ritva Reinikka
Paul Collier**

The World Bank
Washington, D.C.

Copyright © 2001 The International Bank for Reconstruction
and Development / THE WORLD BANK
1818 H Street, N.W., Washington, D.C. 20433, USA

All rights reserved
Manufactured in the United States of America
First printing March 2001

The World Bank Regional and Sectoral Studies series provides an outlet for work that is relatively focused in its subject matter or geographic coverage and that contributes to the intellectual foundations of development operations and policy formulation. Some sources cited in this publication may be informal documents that are not readily available.

The findings, interpretations, and conclusions expressed in this book are entirely those of the authors and should not be attributed in any manner to the World Bank, to its affiliated organizations, or to members of its Board of Executive Directors or the countries they represent. The World Bank does not guarantee the accuracy of the data included in this publication and accepts no responsibility for any consequence of their use.

The boundaries, colors, denominations, and other information shown on any map in this volume do not imply on the part of the World Bank Group any judgment on the legal status of any territory or the endorsement or acceptance of such boundaries.

The material in this publication is copyrighted. The World Bank encourages dissemination of its work and will normally grant permission to reproduce portions of the work promptly.

Permission to *photocopy* items for internal or personal use, for the internal or personal use of specific clients, or for educational classroom use is granted by the World Bank, provided that the appropriate fee is paid directly to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, USA; telephone 978-750-8400, fax 978-750-4470. Please contact the Copyright Clearance Center before photocopying items.

For permission to *reprint* individual articles or chapters, please fax a request with complete information to the Republication Department, Copyright Clearance Center, fax 978-750-4470.

All other queries on rights and licenses should be addressed to the Office of the Publisher, World Bank, at the address above or faxed to 202-522-2422.

Cover art: Hand shield, Uganda.

Wood, pigment. Pastoral nilotic peoples of Uganda.

This work is included in the collection of the World Bank Art Program, which makes particular efforts to identify artists from developing nations and to make their work available to a wider audience.

Library of Congress Cataloging-in-Publication Data

Uganda's recovery: the role of farms, firms, and government / edited by Ritva Reinikka, Paul Collier.

p. cm.

Includes bibliographical references and index.

ISBN 0-8213-4664-4

1. Uganda--Economic conditions--1979- 2. Uganda--Economic policy. 3. Uganda--Politics and government--1979- I. Reinikka, Ritva. II. Collier, Paul.

HC870.U45 2001
338.96761--dc21

00-049791

Contents

Acknowledgments	ix
Contributors	xi
Foreword	xiii
Map of Uganda	xvi
1. Introduction	1
<i>Paul Collier and Ritva Reinikka</i>	
Postconflict Recovery and Macroeconomic Reforms	5
Households	6
Firms	7
Government	8
Sustainability and Lessons	10
References	11
 <i>Part I. Postconflict Recovery and Macroeconomic Reforms</i>	 13
2. Reconstruction and Liberalization: An Overview	15
<i>Paul Collier and Ritva Reinikka</i>	
The Inheritance of Disorder	16
The Restoration of Peace	21
Growth Policies in the Context of the Postconflict Economy	24
Economic Liberalization	31
Impact on Investment and Exports	38
The Role of Aid	39

Conclusions	44
References	45
3. Exchange Reforms, Stabilization, and Fiscal Management	49
<i>Mark Henstridge and Louis Kasekende</i>	
Exchange Reforms	50
Legalizing the Parallel Market and Exchange Rate Unification	52
The Achievement of Macroeconomic Stability	56
Planning and Implementing Fiscal Policy	58
Targets, Tradeoffs, and Costs in Macroeconomic Management	71
Conclusions	76
References	77
Part II. Household Responses and Constraints	81
4. Changes in Poverty and Inequality	83
<i>Simon Appleton</i>	
Changes in Mean Consumption Per Capita	87
Defining an Absolute Poverty Line for Uganda	89
Sectoral Decomposition of Poverty Changes	105
Summary and Conclusions	111
Annex 4.1. Methodology	113
References	119
5. Rural Households: Incomes, Productivity, and Nonfarm Enterprises	123
<i>Klaus Deininger and John Okidi</i>	
A Panorama of Rural Uganda	124
Intertemporal Changes in Household Income	137
Agricultural Productivity and Nonfarm Enterprises	143
Conclusions	152
Annex 5.1. Tables of Estimation Results	154
References	174
6. Crop Markets and Household Participation	177
<i>Donald Larson and Klaus Deininger</i>	
Market Participation in the Early 1990s	178
A Market Model for Community Trade	180
The Determinants of Market Participation	191
The Effects of Price Changes on Household Welfare	194
Are Crop Markets Developing?	195
Conclusions and Policy Implications	202
Annex 6.1. Calculating Household Welfare	203
References	203

<i>Part III. Firm Responses and Constraints</i>	205
7. Confronting Competition: Investment, Profit, and Risk	207
<i>Ritva Reinikka and Jakob Svensson</i>	
Investment Response	209
Constraints to Investment	216
Conclusions and Policy Recommendations	226
Annex 7.1. Data and Estimation Results	228
Annex 7.2. Derivation of the Investment Equation	231
References	232
8. Productivity and Exports	235
<i>Bernard Gauthier</i>	
Trade Liberalization, Exports, and Productivity	236
Enterprise Responses to Changing Incentives	238
Export Response	246
Conclusions	252
Annex 8.1. Productivity Measures	253
References	265
<i>Part IV. Government Performance from a Beneficiary Perspective</i>	269
9. A Quest for Revenue and Tax Incidence	271
<i>Duanjie Chen, John Matovu, and Ritva Reinikka</i>	
Revenue Trends and Tax Reforms	276
Method and Data for Tax Incidence Analysis	278
Tax Incidence on Households	280
Marginal Effective Tax Rate for Firms	281
Cross-Border Comparison for Foreign Firms	288
Compliance and Tax Administration	292
Conclusions	295
Annex 9.1. Household Incidence Analysis and the Concept of Welfare Dominance	296
Annex 9.2. Marginal Effective Tax Rate	298
Annex 9.3. Figures and Tables for Household Incidence and METR	302
References	316
10. The Cost of Doing Business: Firms' Experience with Corruption	319
<i>Jakob Svensson</i>	
The Data	321
Incidence, Level, and Effects of Corruption	321
Case Studies	331

Conclusions	334
Annex 10.1. Ranking of Constraints and Payment of Bribes	336
References	340
11. Recovery in Service Delivery: Evidence from Schools and Health Centers	343
<i>Ritva Reinikka</i>	
Diagnostic Survey	346
Education and Public Spending	347
Health Care and Public Spending	363
Conclusions and Policy Changes	366
References	368
12. What Can We Expect from Universal Primary Education?	371
<i>Simon Appleton</i>	
Access to Education Prior to the UPE Initiative	373
Returns to Education: Productivity and Labor Allocation Effects ...	378
Effects of UPE on School Quality	395
Summary and Conclusions	400
Annex 12.1. Models	401
References	402
13. Combating Illness	407
<i>Paul Hutchinson</i>	
Health Policy and Access to Services	409
Burden of Disease	414
Demand for Curative and Preventive Services	423
Conclusions and the Way Forward	430
Annex 13.1. Data and Estimation Results	433
References	444
Part V. Sustainability and Lessons	451
14. Beyond Recovery	453
<i>Paul Collier and Ritva Reinikka</i>	
References	460
Appendixes	
A. Household Surveys	463
B. The Uganda Enterprise Survey	467
References	473
List of Tables, Figures, and Boxes	475
Index	481

Acknowledgments

Much of the credit for inspiring this book must go to the Ugandan economic team led by Emmanuel Tumusiime-Mutebile, permanent secretary and secretary to the Treasury, which has made a tremendous effort to turn around the Ugandan economy since the mid-1980s. The Bureau of Statistics, the Private Sector Foundation, and the Uganda Manufacturers Association's Information and Consultancy Service were instrumental in obtaining the microeconomic data on households and firms used in most of the chapters of this book. For their encouragement and support to the project we are grateful to James Adams and Shantayanan Devarajan at the World Bank and Peter Miovic and Joseph Stiglitz.

Drafts of the chapters were presented and discussed at a conference on the Comprehensive Development Framework in October 1999 in Kampala. We would like to thank participants for the stimulating and open discussion, and the World Bank Institute for financial and other support for the conference.

The governments of Austria, Japan, Sweden, and the United Kingdom have supported parts of the survey work and analysis contained in this book. Financial support was also received from the Bank's Poverty Reduction and Economic Management network in the form of a PREM fellowship.

We would like to acknowledge the World Bank's Editorial Committee and four anonymous referees for comments on the manuscript.

Finally, special thanks go to the World Bank publications team and to Hedy Sladovich who worked diligently and with good humor to bring this book to its final form.

Contributors

Simon Appleton	Lecturer, University of Nottingham; Research Associate, Centre for the Study of African Economies, University of Oxford, United Kingdom
Duanjie Chen	Associate Director, International Tax Program, Institute for International Business, University of Toronto, Canada
Paul Collier	Director, Development Research Group, World Bank, Washington, D.C.
Klaus Deininger	Senior Economist, Development Research Group, World Bank, Washington, D.C.
Bernard Gauthier	Professor, Institut d'Économie Appliquée, École des Hautes Études Commerciales, Montréal, Canada
Mark Henstridge	Economist, African Department, International Monetary Fund, Washington, D.C.
Paul Hutchinson	Researcher, Economics Department, University of North Carolina, Chapel Hill
Louis Kasekende	Deputy Governor, Bank of Uganda, Kampala

Donald Larson	Senior Economist, Development Research Group, World Bank, Washington, D.C.
John Matovu	Economist, IMF Institute, International Monetary Fund, Washington, D.C.
John Okidi	Senior Research Fellow, Economic Policy Research Centre, Kampala, Uganda
Ritva Reinikka	Research Manager, Development Research Group, World Bank, Washington, D.C.
Jakob Svensson	Assistant Professor, Institute for International Economic Studies, Stockholm University, Sweden; Senior Economist, Development Research Group, World Bank, Washington, D.C.

Foreword

The economic reforms implemented in Uganda under the leadership of President Museveni and the economic recovery that these reforms have generated have justifiably attracted a great deal of attention among development practitioners and academics around the world. Uganda is rightly regarded as a pioneer of macroeconomic stabilization and structural adjustment in Sub-Saharan Africa for two reasons: first, because of the extent and consistency of its economic reform program, especially in the areas of fiscal policy, exchange rate reforms, trade policy, and the use of debt relief to enhance public expenditure on basic social services; and second, because of the reform program's success in restoring macroeconomic stability, boosting the economic growth rate, and reducing poverty.

The reform program followed a prolonged period of economic decline and civil strife that devastated human and physical capital and destroyed the economy's formal sectors, not least because this period witnessed significant erosion of much of the institutional framework that is required to support transactions in a modern economy. Sadly, too many countries have entered the new millennium suffering from a collapse of the economy, of state capacities, of social capital, and of law and order similar to that which afflicted Uganda in the 1970s and 1980s.

Understanding what Uganda has achieved and the strengths and weaknesses of its economic reform program is especially important. Exploring the challenges that the country faces as it attempts to sustain its recovery by raising private investment levels and improving human resource capacities is also important. This volume is unique in providing such a comprehensive analysis of policy reform in a Sub-Saharan African country and the lessons that can be learned from this analysis for future policy reforms, both in Uganda and in other countries. The volume will have played an invaluable role if it

brings these lessons to a wide audience and can stimulate debate among development practitioners.

This book consists of a series of studies written by a range of specialists, all with considerable expertise in their respective fields, that analyze the responses of private sector agents—households, farms, and firms—and of the government itself, to the macroeconomic and structural reforms implemented since the late 1980s in a society recovering from a traumatic civil conflict. The importance of this line of enquiry cannot be underestimated, because the success or failure of market-oriented reforms depends crucially on just how private sector agents are able to respond to the incentives and opportunities created by the reforms. In this context, the consistency of government policy over time has become an invaluable national asset. Supporters of market-oriented reforms argue that they can stimulate increased production and investment and a more efficient allocation of resources that, over time, will boost incomes, enhance welfare, and reduce poverty. By contrast, critics of market-oriented reforms argue that market imperfections and structural or institutional constraints prevent a positive response from private sector agents. Resolving these contentious issues requires detailed empirical analysis of the type presented in this volume.

The analysis in this book draws on a wealth of quantitative data derived from a series of household surveys and from surveys of firms conducted in the 1990s and more recently in 1999/2000. The household surveys, conducted at intervals between 1992 and 1997, permit analysis of the evolution of income, expenditures, and poverty during this period. The impact of reforms on rural factor markets, on crop and livestock production decisions, and on firms' investment decisions are also among the issues researched in this volume. It is the solid quantitative database on which so much of the empirical analysis is based that makes this volume so important: few other studies of structural adjustment reforms have drawn on such a comprehensive database that has been compiled using state-of-the-art data collection techniques in developing countries. Unfortunately, rigorous empirical analysis of reforms in Sub-Saharan Africa has often been impeded by a lack of hard data, a deficiency that this volume helps to rectify.

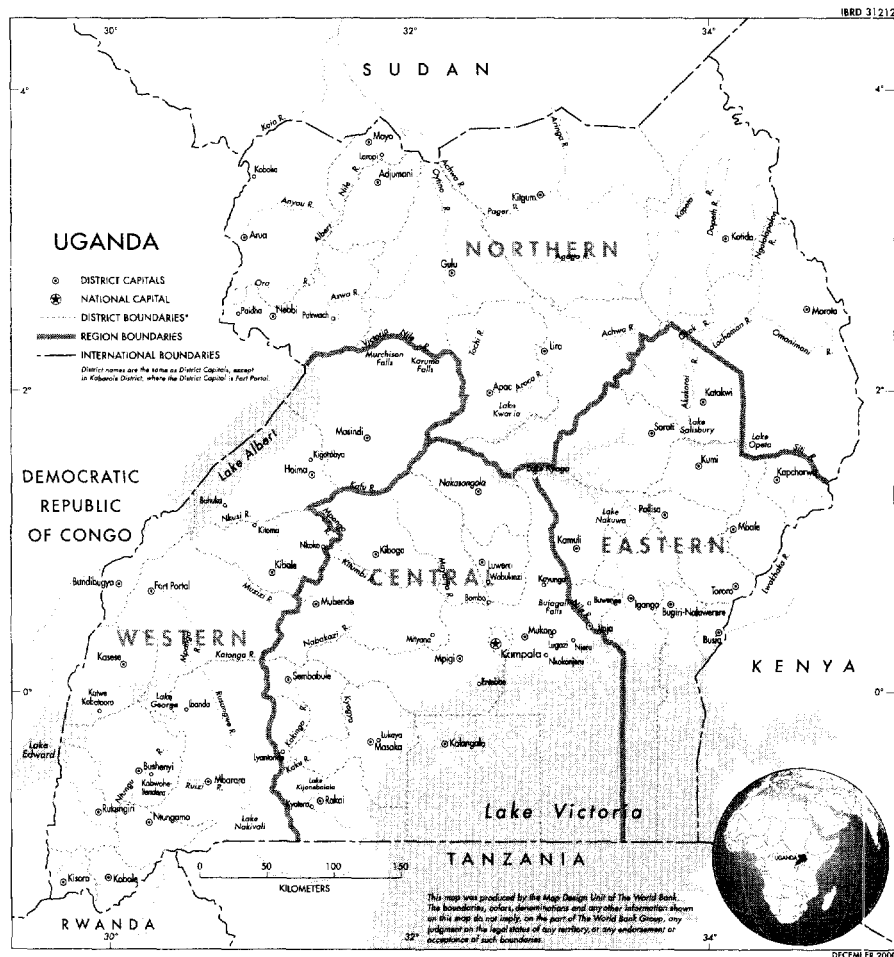
While this book praises Uganda's achievements where warranted, it provides an objective assessment of the reforms and does not shy away from identifying areas where policy mistakes were made, for example, where implementing reforms earlier might have generated higher rates of return and alleviated bottlenecks to private sector production. It points out where major weaknesses still exist, notably, the corruption in the public sector, which raises the cost of doing business in Uganda and undermines the quality of public services, the still poor enforcement of contracts, and the deficiencies in the physical infrastructure. While reforms created economic opportunities that led to reductions in poverty among most groups of poor households, a notable exception is households with nonworking heads, which demonstrates the need for more effective transfer mechanisms to support

vulnerable households. The objectivity and clarity of the findings in this volume provide a valuable service to those in Uganda who are striving to deepen the reform program and to move ahead to tackle the more difficult institutional reforms that are needed to reduce the cost of doing business in Uganda and to improve the incentives for saving, investment, and trade.

As someone who has been closely involved in designing and implementing economic reforms in Uganda for more than a decade, I believe that these reforms deserve the type of comprehensive evaluation, based on a rigorous analysis of quantitative data, that this volume provides. I hope that it will enable the lessons that can be learned from our efforts to implement reforms in Uganda to be disseminated to a wider audience and that these lessons will be of benefit to others in the developing world who are working to reform their economies.

Emmanuel Tumusiime-Mutebile
Permanent Secretary/Secretary to the Treasury
Ministry of Finance, Planning, and Economic Development, Uganda

Map of Uganda



Introduction

Paul Collier and Ritva Reinikka

Uganda's emergence over the past 15 years from economic decline, conflict, and repressive government to macroeconomic stability, high growth, and considerable political freedom represents a major turnaround in Africa. After the tyranny in the 1970s under Idi Amin and the less notorious, but no less destructive, regime of Milton Obote during the first half of the 1980s, Uganda has been undergoing a major transformation since Yoweri Museveni's government came to power in 1986 (Bigsten and Kayizzi-Mugerwa 1999; Hansen and Twaddle 1998). What makes Uganda's postconflict recovery particularly interesting is that it coincides with one of the most ambitious programs of economic liberalization on the African continent. How far has Uganda progressed on its road to recovery? What are the lessons learned from liberalization in a postconflict economy? Can the country sustain its success to date? This book sets out to answer these questions and in doing so brings the Ugandan experience to a wider audience.

The overarching themes of this book are postconflict recovery and economic liberalization. In addition, the book discusses at length the many issues policymakers must consider when they try to guide a country out of a tragic past. The book also attempts to highlight the complexity of interconnections and the tradeoffs involved. To do this it analyzes the responses of a wide range of actors in the economy, namely, households, firms, and the government.

This book presents the findings from a large number of mostly microeconomic studies on the Ugandan experience of postconflict recovery and economic liberalization. The rich empirical evidence helps construct a clear picture of these twin processes and their outcomes. The individual studies take the most recent thinking, theory, and analytical techniques in a wide range of areas and apply them all to one country. In effect, Uganda serves as a laboratory illustrating both the strengths and weaknesses of the theory and techniques and the extent to which they are useful for policy analysis.

Uganda's experience provides several interesting lessons. First, the wealth of information on household and firm responses to economic reforms and government interventions can help policymakers both in Uganda and other postconflict and low-income countries design more effective policies in support of faster economic growth and poverty reduction. Many African countries now embroiled in conflict and war, such as Angola, the Democratic Republic of Congo, Liberia, and Sierra Leone, will find lessons from Uganda invaluable once they embark on their postconflict recovery. Second, the Uganda case demonstrates that good policies and strong leadership can bring about transformation and progress against all odds, including long-lasting internal conflict, instability in neighboring countries, and geography dominated by a tropical climate and no direct access to the sea (Sachs and Warner 1995, 1997). If Uganda can achieve high growth rates over a long period of time, why not the other low-income countries with more favorable endowments? Third, such initiatives as universal primary education and making use of openness and information to combat the HIV/AIDS pandemic and curtail the leakage of public funds also offer useful lessons more generally.

We argue that Uganda during the 1990s demonstrates the astonishing efficacy of three elementary aspects of government behavior. First, the government provided a reasonable level of internal peace where previously large-scale violence had existed. Second, it rescinded predatory taxation. Most notably, the government removed massive implicit taxation on exports by liberalizing the foreign exchange rate and coffee marketing. Third, by ensuring fiscal discipline, the government provided a currency whose value did not dramatically erode. While these three achievements may sound modest, attaining them was not easy.

Part I explores these three aspects of government behavior from a macroeconomic perspective, that is, it analyzes the characteristics of and tradeoffs in Uganda's postconflict reconstruction and economic reforms, including macroeconomic and fiscal management that has ensured a stable macro economy since 1992. Hence, part I sets the stage for the rest of the book, which mainly addresses microeconomic and institutional responses to these reforms, and constraints that remain.

At the household level, the restoration of internal peace allowed a gradual return from subsistence production to market-based activities. Removing implicit taxation on exports, in turn, made recovery in export crops possible, particularly for coffee and cotton, but also allowed for the emergence of nontraditional exports. The stable currency and orderly macroeconomic management of the 1994–95 coffee boom allowed coffee-growing households to transform a temporary income windfall—the biggest in Uganda in the 1990s—into productive investment. At the onset of the boom, financial assets were accumulated temporarily, which, over time, were transformed into physical assets.

Part II focuses on household responses, first, by looking at changes in households' economic welfare and inequality in the 1990s. Uganda's good macroeconomic performance and high growth rates over the past decade

pose intriguing questions for policymakers and researchers alike. Has poverty declined as a result? Has economic growth increased inequality? Which groups have benefited? Have others been left out? Following the poverty analysis, part II explores households' responses to liberalization and new economic incentives as producers, given that households are the principal productive unit in the Ugandan economy. Most people, and almost all the poorest, depend on smallholder agriculture for their livelihoods. The scope for sustainable poverty reduction is therefore intimately linked to increases in market participation, agricultural productivity, and nonfarm employment. At the macroeconomic level, reliance on subsistence production in agriculture increased considerably during the economic decline in 1971–85, from 21 percent of gross domestic product (GDP) in 1971 to 36 percent of GDP in 1986. Only in recent years has the share of subsistence agriculture returned to its preconflict level. Part II explores the corresponding changes in crop markets and market participation at the microeconomic level.

This relatively comprehensive analysis of household responses and constraints is possible—for the first time—thanks to the data from five nationally representative household and community surveys that the Ugandan Bureau of Statistics has made available for 1992/93–1997/98 (see appendix A.) In addition, preliminary data from the second baseline survey carried out in 1999/2000 were made available. The latter focuses on agriculture and other productive activities more than the previous surveys. All chapters in part II are based on these household survey data.

For enterprises, internal peace was a necessary condition for increasing capacity utilization and for initiating new investments. Removal of implicit export taxation, in turn, changed the incentive regime in favor of exportable goods, while a stable currency and a stable macro economy provided the necessary conditions—similar to restoration of peace—for firms to resume production, investment, and export activities.

Part III is devoted to firms. At present, the firm sector in Uganda is still very small. In 1996, only about 500 firms had more than 20 employees. This sector has not yet fully recovered from the double blow of deportation of the Asian business community by Idi Amin in 1972 and the subsequent period of economic and social decline that, among other things, led to a retreat from transaction-intensive activities into subsistence production. The 1971–85 period was characterized by a shrinking enterprise sector, dissaving, and decumulation of assets. Yet, the enterprise sector plays a critical role in the country's development as households rarely achieve the economies of scale required to sustain growth. To assess Uganda's economic prospects, it is important to know the extent to which firms are investing in productive assets and increasing their productivity and exports, and what constraints remain, both for domestic firms and foreign investors.

Analysis of the enterprise sector is based on surveys of domestic and foreign-owned firms. The main source of data is an enterprise survey implemented by the World Bank and the Ugandan Private Sector Foundation in

1998 in which quantitative and qualitative data on manufacturing, agroprocessing, commercial farming, tourism, and construction firms were collected for 1995–97. Because similar data exist for several African countries, it is possible to compare the performance of Ugandan firms with that of their counterparts elsewhere in Africa. Apart from the 1998 enterprise survey, qualitative data are also available from two surveys of foreign investors in 1994 and 1999 and a survey of domestic firms in 1994 (see appendix B.)

Finally, part IV examines the government's role in Uganda's recovery, first focusing on how the government was able to become less predatory, with particular emphasis on how it was able to restructure the earlier predatory tax regime. In other words, this part of the book explores the degree to which the government was able to shift from export taxation to other revenue sources and how this restructuring affected households and firms. Corruption is another form of predatory behavior within the public sector. Although it is not possible to examine changes in corruption over time in the absence of data, we do examine the costs of corruption today.

Another area of focus with respect to government is public investment, which is a necessary complement to a strong private response to policy reforms. As in many other African countries, macroeconomic and externally-oriented trade and exchange rate policies have ceased to be the most binding constraints in Uganda. Instead, domestically-oriented and institutional problems, notably, poor delivery of public services, are now the most serious obstacles for investment and growth on the one hand, and poverty reduction on the other hand (Collier and Gunning 1999a,b). Success in macroeconomic policy has made these institutional constraints blatantly evident. Institutional reform in Uganda has acquired an added dimension as responsibility for basic services has been decentralized to local governments (districts) in recent years. Part IV examines the extent to which public sector institutions have recovered in the past 15 years, recognizing that institutional problems tend to be harder to correct than policies, which can often be altered by a stroke of the pen. In particular, it looks at institutional recovery in social services using data from schools and health centers. Because high educational attainment and good health are both intrinsically desirable goals of human development and investments in households' human capital, this part then looks at changes in education and health policy and access to and demand for these services. The impact of new policy initiatives and economic opportunities on household behavior related to health and education are examined, as well as adverse developments, particularly the HIV/AIDS pandemic.

As in the two preceding parts of the book, the analysis in part IV is based on survey evidence from firms and households, which is complemented with data from service facilities. Hence, the public sector's performance is assessed from the beneficiary's perspective.

Part V synthesizes the evidence from both macroeconomic and microeconomic analysis and discusses Uganda's prospects for sustaining its achievements in the areas of growth and further poverty reduction. It also

explores the extent to which the Ugandan experience is applicable to other low-income and postconflict countries.

The remainder of this chapter summarizes the main issues covered in each chapter, including its most important findings.

Postconflict Recovery and Macroeconomic Reforms

In chapter 2, Paul Collier and Ritva Reinikka analyze Uganda's post-1986 performance in light of the past socioeconomic collapse and explore features of the economic liberalization program that led to a remarkable economic recovery in the 1990s. This overview chapter provides the setting for more detailed studies in the rest of the book. First, the chapter quantifies the inheritance of social disorder that faced the National Resistance Movement in 1986, and then assesses the extent to which the society was prone to further conflict and how the level and structure of economic activity had been altered during the conflict. The authors find that by 1999, Ugandan society was considerably safer from internal, large-scale conflict than it had been both at independence and in 1986. Second, the chapter explores the extent to which the Ugandan government was successful in meeting the needs of enhanced security, on the one hand, and economic growth and poverty reduction, on the other. As the inheritance has implications for economic policy, the chapter examines how the government should have changed economic policy priorities and the extent to which it recognized them in practice. Third, the chapter looks at the experience with trade liberalization and privatization and summarizes macroeconomic evidence on the impact of these reforms on investment and exports. Finally, it estimates the direct contribution of foreign aid to economic growth and poverty reduction, and finds that it is about 30 percent of the realized GDP growth rate per capita and of the fall in the incidence of poverty. These estimates are probably conservative, as aid has had an additional positive effect on policy reforms, and thus has also contributed indirectly to Uganda's overall performance.

In chapter 3, Mark Henstridge and Louis Kasekende review Uganda's exchange reforms, stabilization record, and fiscal management. They begin by analyzing exchange liberalization and subsequent management of a floating exchange rate, and then consider the role of public expenditure management in delivering low inflation. They highlight the fact that fiscal policy has been the paramount instrument in successful macroeconomic management and describe how the system and institutions have evolved. Within this context, macroeconomic policy in Uganda has faced three tradeoffs. First, a tradeoff has occurred between short-term fiscal adjustment and monetary measures. Second, in the face of shocks to expenditures—mainly due to within-year spending pressures from some parts of the government—a tradeoff has occurred between the maintenance of the spending allocations and of budget aggregates. Given that inflation control has been government's paramount goal since 1992, aggregate spending levels have been maintained, when

necessary, at the expense of sector allocations. Third, a tradeoff has occurred between the volume of foreign aid inflows to finance the budget and the impact of foreign aid on the exchange rate. This chapter analyzes the resolution of these tradeoffs, including the coffee boom of 1994–95, the management of which is one of Uganda’s macroeconomic challenges—and successes.

Households

In chapter 4, Simon Appleton examines the dynamics of poverty in Uganda in the 1990s using private household consumption as the measure of poverty. Although consumption is only one dimension of poverty, it is important in the Ugandan context where major economic reforms have been implemented and the primary objective was to increase household incomes and consumption. The analysis of five nationally representative household surveys shows an unambiguous picture of rising living standards and a substantial fall in poverty. Using an absolute poverty line, the chapter finds that 56 percent of Ugandans were poor in 1992, but that this number fell to 44 percent in 1997. Hence, in the five years for which data are available, growth translated into a 20 percent reduction in poverty. In addition, real consumption per capita has risen for all population deciles, implying a reduction in poverty regardless of where the poverty line is set. Indeed, living standards grew most rapidly for the poorer deciles, leading to less inequality. The fall in poverty was, to a large extent, attributable to coffee-growing households. The only group (representing about 5 percent of the total number of households) within which poverty increased was households with a nonworking (for example, elderly) head. This finding confirms the general impression that economic recovery has created opportunities that many households were able to seize, but that transfer mechanisms for targeting the households unable to do so are inadequate. While urban living standards have risen faster than rural ones, an interesting observation is that the rise in rural welfare is comparable with, and even more consistent than, the rise in urban areas.

In chapter 5, Klaus Deininger and John Okidi review major changes that have occurred in Uganda’s rural sector between 1992 and 1999. Consistent with Appleton’s findings of household consumption, these authors show that in response to liberalization, per capita incomes have grown significantly without deterioration in income distribution. Households that had low incomes in 1992, but had human and physical capital assets, were able to benefit the most from economic growth. Other changes include the recovery of cotton output (especially in the northern region), the increased cultivation of nontraditional crops, and a doubling in livestock ownership. Rural factor markets are now functioning better than before, as shown by the increased number of land transactions and share of producers with access to credit. Analysis of the determinants of nonfarm enterprise startups illustrates the crucial role of education and access to financial markets. At the same time, the chapter demonstrates why many constraints remain. With the exception of cotton, little agricultural diversification and economic growth has taken place in the north, which is the

poorest region. In the rest of the country, output remains variable, mainly due to crop diseases. Differential performance by communities even within the same region suggests that better access to existing technology could help increase productivity. Despite continued efforts, extension services remain limited, and only one-third of communities reported having been served by an extension worker. Land conflicts exist in about half of the communities. Unless cost-effective ways are developed to implement recently passed land legislation, these conflicts, together with other tensions, could easily threaten social stability and rapid development.

In chapter 6, Donald Larson and Klaus Deininger explore the characteristics of crop markets and the extent to which households participate in them. Price differentials between local and district markets for food crops are found to be large absolutely and relative to export crops. Because of the large margins, high transport costs, and uncertainty about crop quality, the marketing of food crops is riskier than the marketing of export crops. These characteristics encourage households to remain self-sufficient and diversified in their production. This situation is self-reinforcing, because the lack of specialization limits the demand for local food crops and the depth of local markets. This chapter shows that although no indications of widespread market failure exist and participation in crop markets is increasing, most rural households continue to be engaged in self-reliant farming, and hence are unspecialized. Access to infrastructure, telecommunications, and credit help explain average crop price differences among communities, but their quantitative impact appears to be small. In fact, household-specific characteristics, such as assets and education, are found to be more important for increased market participation than community-specific characteristics, such as infrastructure and access to financial services. Consequently, policies that enable households to accumulate savings and human and physical capital, thereby equipping them to handle the additional risks of specialization, are likely to result in improved crop market performance.

Firms

In chapter 7, Ritva Reinikka and Jakob Svensson use data from the 1998 enterprise survey to show that the investment rates (the value of investment relative to capital stock) of Ugandan firms are not very different from those in other African countries. Despite major improvements in the policy environment in Uganda, the investment rates of Ugandan firms average slightly more than 10 percent annually, with a median value of just below 1 percent. Profit rates, however, are considerably lower in Uganda. These results are consistent with the view that Ugandan firms are more confident in the economy than their counterparts in other African countries and, for a given profit rate, Ugandan firms invest more. At the same time, thanks to economic liberalization, increased competition in Uganda has put pressure on firms to cut costs. Many of these costs, however, are in the public domain and not under firms' control (for example, infrastructure services). Thus, Ugandan

firms have been hindered in their ability to respond to increased competition by reducing costs, which has adversely affected profits. The chapter shows that firms, especially small firms, are liquidity constrained in the sense that they only invest when sufficient internal funds are available. However, given the level of firms' profit-to-capital ratios compared with the rest of the world, it is hard to argue that the liquidity constraint is binding in most cases.

In chapter 8, Bernard Gauthier assesses the impact of trade reforms on the enterprise sector. The expectation is that firms adopt new technologies and reorganize operations to compete in the world market and that production shifts toward more efficient firms. The chapter looks at enterprise responses to the new economic incentives and examines the relationship between export orientation and productivity. A number of productivity measures are used, such as labor productivity, total unit cost, total factor productivity, and technical efficiency. The chapter shows that export orientation is a significant determinant of firms' performance, especially as it relates to output and productivity growth. Although nominal export growth is important, incumbent exporters produce most of the exports, because few new firms are entering the market. When new firms do so, they concentrate on the regional market and tend to be smaller. Finally, chapter 8 compares Ugandan exporting firms with companies in several other African countries and examines remaining constraints to exporting.

Government

Uganda began its recovery and liberalization at a low level of government revenue, merely 5 percent of GDP in 1986, about one half of which was tax on coffee exports. Indeed, a low level of revenue is characteristic of postconflict countries. At the same time the needs for public spending on social services and infrastructure are huge, both to support impoverished households' efforts to increase their production, consumption, and welfare and to encourage enterprises to invest and diversify. Ugandan policymakers responded by rapidly increasing domestic revenue and increasing public spending even more; efforts facilitated by foreign aid. Indeed, the rebuilding of the government's revenue base was instrumental in Uganda's economic recovery.

In chapter 9, Duanjie Chen, John Matovu, and Ritva Reinikka discuss the government's efforts to reduce implicit export taxation. They argue that the policy of rapidly increasing public revenue presented a tradeoff for the economic liberalization program. Specifically, they believe this policy initially curtailed the scope of trade reform. Although the coffee export tax was abolished early on, tariffs and other import taxes were retained, initially at a fairly high level, because of the quest for revenue. In recent years tax policy has emphasized measures to achieve a more efficient and equitable tax regime, including reducing import duties and discretionary tax exemptions, introducing the value added tax, and reforming income tax. Despite these efforts, the share of tax revenue in GDP seems to have stagnated at about 11 percent since 1997–98.

The chapter also examines the resulting incidence of tax policies on households and firms. Household survey data are used to assess the distributional impact of the tax reforms, which are generally found to be benign for the poor. Firm-level data are used to calculate the marginal effective tax rates for several factors of production and for the productive sectors for Uganda and its neighbors, Kenya and Tanzania. The analysis shows that although Uganda's public revenue is lower as a share of GDP, its manufacturing and tourism enterprises face a higher tax burden than their counterparts in the neighboring countries. This clearly limits the scope for raising business tax rates.

The problem of corruption has recently gained prominence in public debate in Uganda and elsewhere. The government has responded by putting forward and beginning to implement an anticorruption action plan. An important part of the fight against pervasive corruption involves collecting and disseminating systematic data on the problem. Until recently, it was considered impossible to measure corruption. However, experience both from Uganda and elsewhere shows that with appropriate survey methods and interview techniques, household heads and firm managers are willing to discuss corruption with remarkable candor.

In chapter 10, Jakob Svensson exploits quantitative data from the 1998 enterprise survey, showing that firms typically must pay bribes when dealing with public officials whose actions directly affect the firms' business operations. Such dealings cannot easily be avoided when, for example, exporting, importing, or requiring public infrastructure services. Moreover, the demanded bribes are not fixed sums for given public services, but depend on a firm's "ability" to pay. The chapter shows that the adverse effect of bribery on firm growth is more than triple that of corporate taxation. To sustain high growth rates in the future, the fight against corruption must intensify.

In chapter 11, Ritva Reinikka demonstrates that even in the absence of reliable financial management systems, disseminating information on budget allocations and on the use of funds through newspapers and other popular information sources enables people to hold civil servants accountable for results. Increasing public access to information has reduced inefficiency and corruption in Uganda. When primary grade enrollments recorded in official statistics did not seem to improve despite substantial increases in budget allocations for education, schools were surveyed to examine public spending on primary education. The survey found that budget allocations matter little when institutions are weak: at most, 20 percent of the intended nonsalary public spending on primary education reached schools during the period under review. In response, the government has taken steps to improve performance by increasing the flow of information within the system. A major breakthrough occurred when newspapers and the radio regularly announced the transfer of public funds to districts, and posted this information on education spending at schools. A follow-up survey in 1999 shows that as a result, input flow to the schools has improved dramatically since 1995. Schools now receive more than 90 percent of the nonwage public funding released by the

central government. By contrast, health sector improvements have been much slower and more difficult to document in the absence of facility-level records on inputs and outputs.

In education, a major development was the 1997 universal primary education initiative, which sparked a strong reaction from households. In chapter 12, Simon Appleton demonstrates the positive equity effects of this initiative and shows how girls, children from poor households, those with poorly educated parents, and those from poorer regions benefited. Furthermore, the common finding from cross-sectional analysis that school fees have little or no impact on enrollment was turned on its head in Uganda when removing these fees resulted in a huge increase in primary school enrollment. Efficiency gains are also found to be fairly significant, and education has similar proportional productive benefits across different economic activities, including the effect of education in reallocating labor. Ultimately, the efficiency effects of the universal primary education initiative will depend on how the initiative affects the quality of education. As can be expected, preliminary research reported in this chapter shows academic performance declining because of very large class sizes. Addressing the quality of education will be one of the greatest challenges for Ugandan policymakers in the next few years.

In health, important questions are whether health outcomes at the household level have improved with higher incomes, and how access to and demand for health services has changed. In chapter 13, Paul Hutchinson finds that overall, health outcomes seem to have moderately improved, except for life expectancy, which has worsened because of the HIV/AIDS pandemic. The impact of other major health problems in Uganda, such as malaria, childhood malnutrition, and poor reproductive health, are also discussed. The chapter examines the demand for health care, including the relative importance of such factors as proximity, price, and quality of service, and reviews key issues in the supply of health services. The chapter finds that poor quality of service in the public sector has resulted in low utilization rates in its facilities.

Sustainability and Lessons

Chapter 14 by Paul Collier and Ritva Reinikka synthesizes the finding of the studies presented in the volume and, in light of these findings, assesses prospects for sustaining the remarkable performance of the 1990s. The challenge to which the Ugandan government rose so successfully during the 1990s was that of recovery; in contrast, today it faces quite a different set of challenges. The achieved agenda has been peace and prices, while investment and behavioral change might characterize today's agenda. Indeed, the authors of this chapter argue that the Ugandan government has already embarked on an agenda beyond recovery. Both public and private investment is recovering, and investor risk ratings have improved considerably. The government has also begun to embrace the difficult task of inducing behavioral change,

by initiating active policies to curtail corruption. This agenda will undoubtedly be difficult and time-consuming to accomplish.

As a landlocked economy, much of Uganda's trade over the long run is likely to be regional. Uganda is also potentially competitive in the international export markets that warrant air freighting. Regional integration is unlikely to offer Uganda many opportunities for manufacturing, but it is likely to provide opportunities in food production and service industries. Hence, the agenda envisioned for sectoral growth in the future includes intensification of agriculture, service exports to the region, and new agro-based international exports. These sectors all need improvements in institutions and infrastructure.

The authors conclude that the National Resistance Movement government inherited a society in which improvements in service delivery would inevitably take a long time, while rapid poverty reduction was greatly facilitated by ending predatory taxation, providing a stable currency, and achieving peace. In the process of achieving these limited but important objectives, the government has acquired the competence, the mandate, and the confidence to tackle the more difficult tasks it now faces.

References

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

Bigsten, Arne, and Steve Kayizzi-Mugerwa. 1999. *Crisis, Adjustment and Growth in Uganda. A Study of Adaptation in an African Economy*. London: MacMillan Press.

Collier, Paul, and Jan Willem Gunning. 1999a. "Explaining African Economic Performance." *Journal of Economic Literature* 37(March): 64-111.

———. 1999b. "Why Has Africa Grown Slowly?" *Journal of Economic Perspectives* 13(3): 3-22.

Hansen, Holger Bernt, and Michael Twaddle, eds. 1998. *Developing Uganda*. Oxford, U.K.: James Currey; Athens, Ohio: Ohio University Press.

Sachs, Jeffrey, and Andrew M. Warner. 1995. "Natural Resources and Economic Growth." Development Discussion Paper no. 517a. Harvard Institute for International Development, Cambridge, Massachusetts.

———. 1997. "Sources of Slow Growth in African Economies." *Journal of African Economies* 6(October): 335-76.

Part I

Postconflict Recovery and Macroeconomic Reforms

Reconstruction and Liberalization: An Overview

Paul Collier and Ritva Reinikka

Uganda's economic performance has been among the most successful in the world during the past decade. Rapid growth is reducing poverty, prices are stable, and investor confidence has increased more than anywhere else in Africa. As Uganda exemplifies successful African economic liberalization, it is important to understand the reform process. Uganda's current success can only be understood in the context of its past. During 1971–85, both the Ugandan economy and Ugandan society collapsed. By 1986, when the National Resistance Movement (NRM) captured Kampala and formed a government, Uganda had suffered the predations of Idi Amin and three other transient presidents, as well as a civil war, the mass emigration of skilled workers, and mass murder. Current success thus represents a recovery from conflict. Indeed, Uganda is the main model of successful postconflict recovery in Africa.

Uganda's collapse made attaining rapid growth easier in some respects, and more difficult in others. It was easier because resources were available to draw upon; for example, there was scope to induce the repatriation of human and financial capital. It was more difficult because the social and institutional collapse left a persistent inheritance, such as low trust and high opportunism. This reality makes Uganda's success more complex, but also potentially even more illuminating than if it were a straightforward story of economic liberalization. Most of Africa's currently problematic economies will need to replicate Uganda's transition to rapid growth from an inheritance of social decay. The objective of this chapter—and of the entire book—is thus to understand the twin processes of liberalization and reconstruction and how they relate to each other. The need for social reconstruction changed the liberalization program both by constraining it and by introducing new priorities. The need for liberalization similarly changed the reconstruction program.

This overview chapter analyzes Uganda's performance after 1986 from the perspective of the inheritance of socioeconomic collapse. It addresses the following questions: What is distinctive about an economy newly emerged from internal conflict? How successful was the government in meeting the dual needs of enhanced security and poverty reduction? What were the implications for economic policy? To answer these questions the chapter first quantifies the inheritance of social disorder that the NRM government faced in 1986. It assesses how prone the society was to further conflict and the extent to which the level and structure of economic activity had been altered. Second, the chapter focuses on the implications of the past conflict for the government's security policy and explains how the government had little choice but to give priority to making Uganda a safer society. It then examines how Uganda became safer, and to what extent the NRM's policy succeeded in reducing the risk of conflict. Third, the chapter looks at how the inheritance should have changed the approach to economic liberalization and the extent to which this was recognized in practice. Fourth, the chapter highlights key features of economic liberalization and the structural reform program, including macrolevel outcomes in exports and investment. Finally, the chapter discusses the role of foreign aid in Uganda's recovery.

The Inheritance of Disorder

In 1972 President Idi Amin declared economic war against the large and commercially dominant Asian community in Uganda. This action marked the beginning of an economic collapse and of escalating political and social disorder. By 1979, when Amin was overthrown, as many as 500,000 Ugandans had died as a result of the regime and there had been two insurgency attempts by exiles. Amin's overthrow threw the country into a period of extreme instability and mass murder. By 1986, the year that marks the return of political order, some 7 percent of the population had been displaced. Since 1971, per capita income had declined by 40 percent, and the composition of economic activity had changed radically.

The causes of political breakdown in Uganda were various. It is important to consider them to distinguish between factors that made Uganda intrinsically prone to conflict and require attention during the postconflict phase and the ones that were idiosyncratic to the episode itself. In particular, was Uganda simply unfortunate in being led by particular personalities, notably Idi Amin, or were the personalities to some extent merely the instruments of deeper social forces? Naturally, definitive answers to such questions are unattainable, but recent analysis of the causes of civil conflict may shed some light. Globally, six factors have been shown to increase the probability of conflict (Collier and Hoeffler 2000b). Low per capita income, slow per capita economic growth, rapid population growth, high dependence on primary commodity exports, and a geographically dispersed population are all risk factors. In addition, the structure of the society matters.

Societies with a homogenous ethnic and religious makeup and societies where one ethnic group constitutes an absolute majority of the population—known as ethnic dominance—are more at risk of conflict than others. Table 2.1 applies the probit regression, which Collier and Hoeffler (2000b) find best explains the risk that a civil war will occur during the subsequent five years, to estimate the risks of civil war in Uganda as of 1970.

In 1970, prior to Amin's coup, Uganda was predicted to have had a moderately high risk of conflict: a 1-in-10 chance during the ensuing five years. The country's main risk factor was its high dependence on primary commodity exports, because they are easy targets for rebel forces motivated by greed or grievance. A second risk factor was the slow growth of opportunities relative to the rapid population growth experienced during the previous five years. Although incomes were relatively high by African standards, the slow growth of the economy and the rapid population growth limited economic opportunities for youths newly entering the labor force. Thus, the structure of the economy made Uganda inherently risk-prone, but the structure of society was quite favorable. Uganda had a high level of social fractionalization, which tends to make societies safer, because no one group can dominate the political process. Ugandan politics reflected the country's social divisions. Two were perhaps most prominent: the division between the Baganda and the non-Baganda, and the division between the predominantly Moslem and poorer north and the predominantly Christian, more commercialized south. However, the presence of many other ethnic and religious groups helped mitigate the situation. Many people assume that socially fractionalized societies are more at risk of civil war, because different social groups usually dislike each other and loudly express their grievances. Yet empirical evidence shows that fractionalization is a powerful source of safety and that dislike does not translate into combat.¹

Despite a 1-in-10 risk of civil war in each five-year period, Uganda was unfortunate to collapse into civil war relatively soon after independence. Its misfortunes included the repression of political rights under President Obote and having someone like Idi Amin as head of the army.

Social conflict and political breakdown have various impacts that affect both the level and composition of economic activity (Collier 1999), namely:

- Conflict destroys assets. Both the government and rebels become predatory. For example, many households lost livestock to soldiers.

1. Note this qualification to Uganda's generally benign social composition. Although no ethnic group constituted a majority in society, one group—the Baganda—was much larger than any other group, representing around 30 percent of the population. On average it is only when one group accounts for more than around 45 percent of the population that the risk of conflict is significantly increased. However, fear of Baganda dominance may help explain the collapse of political rights as President Obote used the army to crush political opposition.

Table 2.1. The Risk of Civil War in the Ensuing Five Years, 1970, 1986, and 1999

Factor	Factors determining risk			Coefficient	Contribution to risk		
	Value in 1970	Value in 1986	Value in 1999		1970	1986	1999
Per capita income ^a	842.029	488.3768	724.1449	-1.0074	-6.785659	-6.236901	-6.63372
Growth – population growth ^b	-10.85138	-7.572243	-4.13839	-0.103	1.1176921	0.779941	0.4262541
Primary exports ^c	0.126	0.109681	0.051785	22.9831	2.8958667	2.5208056	1.901878
Primary exports squared				-39.2932	-0.623817	-0.472693	-0.105373
Population	9,812,000	14,460,240	21,445,515	0.6248	1.01E+01	1.03E+01	1.05E+01
Fractionalization ^d	6,210	5,940	5,940	-0.00036	-2.2356	-2.1384	-2.1384
Ethnic dominance ^e	0	0	0	0.6225	0	0	0
Geographic concentration ^f	0.508	0.508	0.519	-1.8505	-0.940054	-0.940054	-0.96041
Time since previous conflict ^g	42	1	139	-0.0041	-0.1722	-0.0041	-0.5699
Constant				-5.4823	-5.4823	-5.4823	-5.4823
Total ^h					-2.167344	-1.672678	-3.726396
Risk of conflict (percent) ⁱ					10.3	15.8	2.4

Note: The contribution to risk measures the product of the value of the variable and its coefficient.

a. Per capita income is at purchasing power parity (PPP) prices. In the regression it is entered as a natural logarithm.

b. Growth – population growth follows Collier and Hoeffler (2000b) in taking the average rate of per capita economic growth during the five preceding years, minus three times the rate of population growth, these weights being empirically derived in their paper.

c. Primary exports are the share in gross domestic product.

d. Fractionalization is the square of the product of ethnolinguistic and religious fractionalization. On a scale of 0–100, measuring the probability that two randomly drawn people will be from different groups, ethnic fractionalization in Uganda is estimated for the entire period at 90, and religious fractionalization at 68 in 1965 and 64 in 1985.

e. The zero value on ethnic dominance implies that no single ethnic group constitutes as much as 45 percent of the population.

f. Geographic concentration measures the spatial dispersion of the population over a 20 square kilometer grid of the country.

g. Time since the previous conflict is measured in months. The arrival of the NRM in Kampala is taken as the end of the civil war, although conflict continued at a lower level for some months.

h. The total row shows the value of $[\ln(p/(1-p))]$, where p is the probability of civil war in the ensuing five years.

i. The risk of conflict row shows the value of p .

Source: Collier and Hoeffler (2000b).

- Transactions become disrupted as the means to enforce contracts start to break down. When the political leadership becomes opportunistic, the legal system and the civil service also become opportunistic. Businesses respond to this situation by retreating into a hard core of known relationships, not daring to risk new clients. For example, the major banks in Uganda were extremely reluctant to take on new business customers. Thus transactions became both more costly and less competitive, fostering the emergence of informal cartels.
- Government expenditure is diverted from its economically productive functions and becomes focused on the objectives of predation and defense. A graphic example of this in Uganda was the contraction of the police force and the rise of the army.
- Because conflict causes economic decline, households, firms, and government have strong incentives to dissave. As incomes are perceived as temporarily low, people will try to maintain consumption.
- Households shift their assets, including human capital, out of the country, to environments where they are both safer and more productive. The process of shifting assets may itself be costly. For example, consider the problem of shifting a building, a coffee tree, or an installed machine out of Uganda. In one sense, these items are all immovable. However, to remain productive they all need to be maintained. Hence, the owner can gradually liquidate the asset by cutting maintenance expenditures. If the money saved on maintenance is used to purchase illegal foreign exchange which is held in a foreign bank, the immovable asset is gradually transformed into flight capital. By 1986, 60 percent of Uganda's private wealth was held abroad

Conflict reduces the level of economic activity through two routes. Destruction, dissaving, and flight diminish the stock of physical and human capital. In addition, productivity is reduced by disruption and expenditure diversion. As shown in table 2.2, per capita gross domestic product (GDP) declined by over 40 percent between 1971 and 1986. This severe decline was larger than is typical for periods of domestic conflict. Collier (1999) estimates that on average such conflicts reduce growth by 2.2 percent per year relative to counterfactual growth. The Ugandan economy declined in absolute terms by 1 percent per year, and given rapid population growth, counterfactual growth could hardly have been less than 2 to 3 percent. Hence, either the Ugandan economy was atypically vulnerable to social disorder, or the disorder was severe even by the normal standards of civil war. Because subsistence agriculture is relatively invulnerable to disorder and Uganda had a large subsistence sector even before the outbreak of conflict, its economy should not have been abnormally vulnerable to disorder. Thus the more likely interpretation is that Uganda suffered an unusually severe social collapse. The decline in aggregate expenditure was even more severe than the decline in output. Aid inflows ceased, and the government was manifestly unable to

Table 2.2. The Level and Composition of Economic Activity, Selected Years

<i>Economic activity</i>	1971	1986	1994	1997	1999
GDP per capita (index: 1971 = 100)	100	58	69	80	86
Volume of coffee exports (thousands of tons)	191	141	152	265	216
<i>War-vulnerable activities (percentage share of GDP at 1991 prices)</i>					
Activities intensive in assets and transactions (manufacturing)	8.8	4.4	6.0	8.6	9.6
Transaction-providing activities (transport and commerce)	21.1	16.1	17.2	17.7	18.2
Asset-providing activities (construction)	12.5	3.5	5.5	7.6	7.9
Total	42.5	24.0	28.7	33.9	35.7
<i>War-invulnerable activities (percentage share of GDP at 1991 prices)</i>					
Subsistence activities excluding livestock and construction	20.5	36.0	26.9	21.0	20.3
Unassigned activities	37.0	40.0	44.4	45.1	44.0

Note: Data are for fiscal years.

Source: Collier (1999); Republic of Uganda (various years); Bank of Uganda data.

borrow commercially. As foreign flows to the government ceased, an illegal outflow of private capital started.

The composition of GDP is altered by social disorder because activities are affected differentially. As the costs of transactions rise and capital stock declines, activities that are intensive in transactions and in capital, such as manufacturing, decline relative to those that have the opposite characteristics, such as subsistence agriculture. Similarly, the sectors that supply transaction services, such as transport and finance, and those that supply capital, such as construction, decline because the demand for their output falls. Table 2.2 classifies the components of GDP according to these principles into three groups: (a) those likely to be differentially vulnerable to social disorder, (b) those likely to be differentially immune, and (c) those for which, a priori, there is no reason to expect a differential effect.

As table 2.2 shows, a remarkable change in the composition of activity took place between 1971 and 1986. Subsistence activities (excluding livestock and construction) increased from 21 to 36 percent of the economy. In contrast, the shares of manufacturing and the other vulnerable sectors virtually halved.

To summarize, the economy inherited by the NRM in 1986 was both much poorer than that of 1971, and it had retreated into subsistence activities. These realities had implications for postconflict recovery.

In addition to the economic effects, a civil war leaves a legacy that considerably increases the risk of further conflict. Empirically, half the societies that experience a civil war sustain the subsequent peace for less than a decade. Collier and Hoeffler (2000b) find that a conflict typically more than doubles the risk of subsequent conflict, a risk that gradually fades with sustained peace. Conflict might increase the risk of additional conflict for several reasons. The society is likely to have become polarized, with smaller groups agglomerating into two sides, creating a situation somewhat analogous to ethnic dominance. Norms will have changed, and violence becomes an accepted way to resolve political conflict. Moreover, fears that opponents will resort to violence may make it rational to use violence preemptively. The society will have accumulated both human and physical capital, which can only be used in conflict, that is, many people are trained in violence and have guns. Finally, rival military organizations will have been built, and the senior people within these organizations have little incentive to dismantle them, because some people profit from war.

Given these changes, the Collier-Hoeffler model estimates that by 1986 the risk of conflict had increased to around 16 percent over the next five years (see table 2.1.) At this level of risk, Uganda was evidently facing a dangerous future. A major factor accounting for this increase in risk was the cumulative decline in the level of income. Poorer societies are much more prone than others to conflict, partly because the state is incapacitated by a lack of revenue. In low-income societies, the state is penalized twice: most obviously by a small tax base, but also because tax revenue is a very small share of income. By 1986, the share of revenue in GDP had collapsed to around 5 percent, a level below that required to finance the state's essential functions. Further risk factors include various legacy effects of recent conflict, such as polarization, militarization, and displacement. A safety valve was created through the drastically slowed rate of population growth, attributed to emigration and high mortality related to the turmoil. This slowdown in population growth also implied less competition for the limited opportunities generated by the economy.

The Restoration of Peace

The policy objectives of a postconflict government such as that of Uganda in 1986 must differ from those of a government conventionally embarking on economic reform in the sense that the former must place greater priority on state security. The risk of conflict in Uganda was evidently unacceptably high. The government needed to make improving the prospects of internal peace a top priority, to address through whatever means it had available.

The final part of table 2.1 estimates the risk of internal conflict as of 1999. It predicts a drastic reduction in risk from nearly 16 percent during 1986–91 to only 2.4 percent for 1999–2004. This is an astonishing turnaround, and it is therefore important, both for Uganda and for other postconflict

societies, to understand the various elements that contributed to this enhanced internal security. First, however, note that the Collier-Hoeffler model focuses only on the occurrence of large-scale internal conflicts. Although saved from large-scale internal conflict, as of 1999, Uganda was far from being at genuine peace. It was engaged in an external war in the neighboring Democratic Republic of Congo. Internally, two groups, the Lord's Resistance Army and the Allied Democratic Front, were conducting organized rebellion. However, neither group constituted a major widespread threat of combat deaths or a challenge to the government's survival. This level of conflict was somewhere between civil war and banditry, and the groups received much of their funding from external sources. A useful way to think about the restoration of peace in Uganda during 1986–99 is to pose the following questions: Why were the Lord's Resistance Army and Allied Democratic Front unable to escalate their operations to become a serious threat, despite receiving external "pump-priming" finance?

The NRM government's main economic achievement was policy improvements that delivered rapid, broad-based growth. This growth reduced the risk of conflict in three respects. First, rapid growth implied opportunities for young entrants to the labor force. Compared with the early 1980s when the economy was declining, the late 1990s saw an improvement in the per capita growth rate by 6 percentage points and this dramatically reduced the risk of conflict. Second, the growth cumulatively raised per capita incomes. Although by 1999 the economy had not recovered to the level of 1970, it was much higher than in 1986. Third, the higher level of income was accompanied by a diversification of income away from primary commodity exports, as is typical for economies with rising income. Furthermore, policy reform and aid both directly reduce primary commodity dependence (in addition to any effects via the level of income [Collier and Hoeffler 2000a]), and the sharp improvement in Ugandan economic policy and the support of the donor community both contributed directly to export diversification.

As the Ugandan peace persisted, it generated a virtuous circle in which the risk of conflict as the issues of polarization, militarization, and displacement were gradually addressed.

The government addressed the problem of polarization by restoring political rights and including potential opponents within the regime. As of 1985, Uganda had been classified on the Polity III scale as completely lacking democratic practices (Jagers and Gurr 1995). Especially in highly fractionalized societies, a lack of democracy significantly impedes economic growth. Collier (forthcoming) finds that in a society as fractionalized as Uganda, the change from repression to full democracy will typically increase the growth rate by nearly 3 percent. Although Uganda had not achieved full democracy as of 1999, it had made substantial progress. Because there is still an embargo on formal campaigns by political parties during elections, members of parliament campaign as individuals. However, in other respects Uganda has achieved a highly open society. The press is free, and several major political

figures have returned to Uganda from exile. A genuinely contested and non-violent presidential election took place in 1996.

The underlying high fractionalization of Ugandan society was potentially a major asset; but political identity depends on history and government behavior. The experience of conflict may have tended to polarize Uganda's initially highly fractionalized society into north versus south and Buganda versus non-Buganda. Hence, to restore security the government attempted to rebuild diversity, with the restoration of the kingships being a case in point.

The government also addressed the problem of demilitarization. The large armies of both the former government and the NRM needed to be demobilized, but doing so presented the risk that their members might either take to violent crime or be ready recruits for new rebel movements. Thus, major demobilization was delayed until 1993/94. Once soldiers were demobilized, they were taken to their home villages and given transitional financial and material assistance. Soldiers appear to have reintegrated into society. During the first year of demobilization, crime did not tend to increase in districts where many soldiers had been demobilized. However, the demobilization could have been even more successful. Overall, some 12 percent of demobilized soldiers reported in advance of their demobilization that they did not have access to land. These soldiers were around 100 times more likely than the average Ugandan to commit crimes once demobilized (Collier 1994). Hence, in retrospect, the ideal policy would have either retained the landless in the army or made greater provision for them. While no direct evidence shows whether demobilized soldiers have joined rebel groups in significant numbers, the fact that they did not differentially resort to crime suggests that they did not differentially resort to rebellion, because from the potential recruit's perspective these choices are somewhat similar.

Overall, the policies of poverty reduction, sectorally diversified growth, democratization, social pluralism, and demobilization that the government has implemented reduced both the underlying risk factors, such as primary commodity dependence and the risks from the social legacies of the conflict.

The policies that enhanced security involved a potential tradeoff with the ability to achieve economic growth. Two policy options that were probably more important for security than for overall growth were the targeting of growth in the north, and the expansion in education. The north was the poorest region because it was the least accessible (and parts of it are the least fertile), and probably offered the lowest returns on public investment. Investment in education required a long gestation period before returns began to be realized. Hence, from an economic standpoint, higher priorities probably existed. However, investments in education would probably have reduced the incentive to join rebel forces, as recruits were drawn disproportionately from illiterate young men. For example, a 1993 census of the Ugandan army, which by then combined the previous official army and the originally guerrilla forces of the NRM, showed that its recruits were far less educated than the average Ugandan.

In any event, rebellion, albeit at a low level, has continued to be a costly problem for the economy. Hence, it may have been desirable to accept a slightly slower rate of growth in the first decade of the NRM government to reduce the scale of this problem in the second decade. Since 1986, the northern region has been most prone to rebellion, a predictable outcome. This region has grown more slowly than other regions, but from a security standpoint, more rapid growth would have been desirable. Similarly, if in the NRM's first decade more children had been educated, by its second decade fewer illiterate youths without prospects would have been available for rebel movements to recruit into their ranks. From the standpoint of security, the universal primary education initiative of 1997 should have been implemented a decade earlier.

Growth Policies in the Context of the Postconflict Economy

This section shifts the focus from security to the objective of economic growth. As of 1986, Uganda had in place a range of policies and institutions likely to impede growth, so in one respect the government needed to embark upon a conventional liberalization strategy. However, given that Uganda was a postconflict economy created both opportunities and constraints that would not otherwise have existed. This section discusses the considerations that Uganda faced because of its postconflict inheritance. The effects of conflict described previously provide the framework for the discussion.

Public Spending Priorities

Consider the policy implications of an atmosphere characterized by destruction and dissaving of assets and diversion of public expenditure from economic to military purposes. This environment created a need to reconstruct the infrastructure. This aspect of postconflict policy is one that donors are most familiar with, because the government must make investment expenditures on infrastructure at a time when its resources are very limited. In Uganda, the main infrastructure deterioration was probably in the road system, which had not been maintained. Society's shift back out of subsistence and into a market economy makes road maintenance a critically important function. Collier and Pradhan (1998) show that the rate of return to Ugandan transport projects during the first years of peace was an astonishing 40 percent. Hence, projects such as road maintenance must take priority over expenditures with lower payoffs.

The spending priorities of the Ugandan government broadly reflected society's changing needs. Military expenditure was reduced as a share of total expenditure, the police force was rehabilitated, and in 1993/94 there was substantial demobilization of the army. Despite these reductions, military expenditure remained high as the government built a better-equipped force, partly in response to the continued threat to internal security.

The sector most favored by the public was road construction. A survey by Bigsten and Kayizzi-Mugerwa (1999) found that the public service improvement that rural households most appreciated was the road network. However, not all restoration of infrastructure was so successful. Electricity, which had received no new investment after 1971, (except for rehabilitation in the late-1980s), gradually became a severe problem as supply failed to keep up with demand. Because Uganda is landlocked and cannot cheaply rent mobile power stations, and because the gestation period for obtaining increased supply is long, it became essential to plan electricity supply carefully. As Reinikka and Svensson show (in chapter 7 in this volume), by 1998 Ugandan firms reported electricity as their single most important constraint to productive investment and growth. Around a quarter of firms' total investment in machinery and equipment consisted of private generators, which could only produce electricity at a high cost. Hence, the failure to rectify the neglect of electricity investment must count as one of the major policy errors of the period.

Priorities for Institution Building

Now consider the policy implications for a society characterized by disruption of transactions as a result of rising opportunism and a declining police force. The decline is of such magnitude that it threatens the ability of society to transition back to a society of trust. Tirole (1992) shows how both high opportunism and low opportunism societies can be locally stable equilibria. In the Ugandan context, the shortening of horizons and breakdown of contract enforcement mechanisms during the period of disorder seems likely to have shifted the society from a low-opportunism to a high-opportunism equilibrium. Restoring peace may itself be insufficient to shift the society back to the low-opportunism equilibrium, but had peace been maintained throughout, the society may have remained in the low-opportunism equilibrium. In this environment, what are the implications for policy?

The high level of opportunism becomes a constraint upon policy, and thus reducing opportunism becomes a priority. When opportunism is high, it implies that many aspects of government will function badly because the professional ethics that normally govern conduct will have eroded. This was markedly the case in Uganda. The erosion of ethics affected the legal, accountancy, medical, education, and civil service professions. Its consequences were far-reaching. If the legal profession no longer enforces standards of conduct, then the last-resort means that firms normally use to enforce contracts becomes unreliable. One important consequence is that banks then find it difficult to enforce assets as collateral. A survey of banks in 1996 found that their single greatest need was for a fast-track legal settlement procedure to enable foreclosure on collateral (Kasekende and Atingi-Ego 1997). In the absence of this procedure, banks will lack profitable lending opportunities and thus either restrict credit or encounter a high default rate. If the accountancy

profession no longer enforces standards of conduct, then accounts cannot be trusted. This situation impairs both banks and the tax authorities. Banks cannot lend on the basis of balance sheets, and tax authorities cannot levy taxes on the basis of audited profits.

Similarly, in the medical profession standards of prescription had declined. A survey of the leading hospital in the country found a misprescription rate of around 50 percent. Furthermore, many medical staff pilfered drug supplies and sold them privately (McPake and others 1999). As a result, although imports of drugs were nearly adequate for the population, public clinics continually faced severe scarcity. As a result, considerable hoarding of drugs took place at the household level. In fact, households were typically self-prescribing home-stored drugs, many beyond their expiry date, on the basis of self-prescription. Presumably, this practice reduced the efficiency of public drug expenditures in reducing illness.

In the teaching profession, a high incidence of nonattendance was apparent; a clean-up of teachers' payroll removed 20 percent of teachers as "ghosts" in 1993.

The decline in civil service conduct impaired public sector performance in both revenue collection and service delivery. Svensson shows (in chapter 10 in this volume) that a private sector firm paying taxes and experiencing a difference in tax assessment by the revenue authority above 50 percent pays three times as much in bribes than a firm reporting a difference in tax assessment below 50 percent.

With regard to service delivery, Reinikka shows (in chapter 11 in this volume) that only 2 percent of the money released by the Ministry of Finance for nonsalary primary school expenditures actually reached the schools in 1991. Even in 1995, the ratio was as low as 20 percent. A public information campaign has since dramatically improved the flow of funds so that more than 90 percent of the funds now reach the schools.

The decline in professional standards had two key implications for policy. First, as government activities are by their nature atypically dependent on self-policed standards of conduct in the professions, the efficiency of government expenditure would be unusually low, and the cost of tax collection unusually high. This implied that the optimal size of government would be smaller than in an economy without a postconflict inheritance. Second, some private activities, notably banking, were also highly vulnerable to opportunism.

The government recognized the constraints on its own efficiency and accommodated them to some extent. It kept both recurrent public expenditures and revenue low relative to other developing economies with less severe problems of professional conduct. The government also attempted to relax the constraints by implementing five strategies, namely:

- The government established a new tax collection service, the Uganda Revenue Authority (URA), in which staff were paid well above civil service pay scales and held more directly to account.

- In the area of customs collection, the government privatized many functions, using the services of an international inspection company.
- To improve public service delivery, the government reduced the size of the civil service (from 320,000 in 1992 to about 160,000 in 1999) and used the expenditure savings to raise salaries.
- The government also decentralized basic service delivery to districts, with the intention of subjecting services to the scrutiny of local electorates and politicians.
- The government revived the courts by bringing in some foreign judges.

However, even by 1999 these strategies had had only limited success. Although tax revenues had increased substantially from 5 percent of GDP in 1986 to 11 percent in 1999, revenues have shown signs of stagnation in recent years, and the URA has been the subject of many complaints about corruption. The pay reform has not yet been adequately implemented, and the efficacy of public service delivery remains quite low. Hence, the attempt to rebuild professionalism and institutions has had only limited success.

The strategies and incentives applied to revenue collection were not extended to service delivery. For example, the health service sector was not transformed from civil service pay and conditions into a URA equivalent, nor were some of its functions privatized as was the case with the customs service. Hutchinson (chapter 13 in this volume) discusses the outcome in terms of limited demand for public health services. Generally, one can conclude that the government was more innovative with respect to making revenue collection work than with respect to making public service delivery work.

As mentioned earlier, the private activity most likely to be damaged by opportunism was banking. The Ugandan banking sector inherited by the NRM government had four private banks—all of which had survived by being conservative—and a large government-owned bank, which had all the problems of the rest of the public sector. The number of private banks was too few to support competition; thus, liberalizing the sector and attracting new entrants was desirable. However, this priority was in danger of conflicting with the constraints imposed by the high degree of opportunism in society. Given the level of opportunism, it appeared prudent for the central bank to place priority on both designing incentives and properly supervising banks to prevent dishonest banking practices. In any event, the policy probably placed too much weight on the need for liberalization and did not recognize sufficiently the constraints implied by the high degree of opportunism. By 1998, several of the new banks had encountered severe difficulties, and the privatization of the government-owned commercial bank had proved a fiasco.

Flight Capital

The policy implications of the massive shift of assets abroad, which had taken place during the period of disorder, created both a major problem and a major

opportunity for the government. By 1986 some 60 percent of private wealth was held abroad. As a result, the private capital stock per member of the labor force had been declining, making it among the lowest in the world. As a result, Uganda was chronically short of private capital. In principle, it had three means of recapitalizing the economy: through domestic private savings, through attracting foreign capital, and through inducing the repatriation of its own wealth. Of these, the first was neither feasible nor desirable. There was, of course, some scope for raising the private savings rate, but as incomes had fallen to very low levels, it was important to increase consumption as rapidly as possible. The second option was not likely to succeed because Uganda's history of social disturbance did not enhance perceptions that the country was suitable for foreign investment. A good measure of this is the *Institutional Investor* (various years) risk rating, which is, in effect, a poll of international business opinion. As of 1986, Uganda had the worst rating of the 25 African countries that were then rated. Furthermore, evidence shows that the ratings are quite persistent (Haque, Nelson, and Mathieson 2000), and even a rapid improvement in the underlying investment environment would not lead to a rapid reappraisal of Uganda on the part of foreign investors. Repatriation was therefore the most realistic option for recapitalizing the economy. If Uganda's own private wealth could be recovered, the private capital stock could more than double.

Globally, three features influence capital flight: risk, exchange rate overvaluation, and the amount of wealth per capita (Collier, Hoeffler, and Pattillo forthcoming). Table 2.3 applies this global relationship to estimate the share of Ugandan private wealth held abroad in 1985 and 1998. This approach is analogous to that used in table 2.1 to measure the change in the risk of war.

The high level of capital flight as of 1986 is no mystery. The two main drivers of capital flight—poor risk ratings and exchange rate misalignment—were both extreme problems. As measured by the *Institutional Investor* survey of private investment opinion, the risk ratings were among the lowest in the world at only 5.1 out of 100. Similarly, a distortion index, at 198 (100 equals the average level of distortion), showed the Ugandan shilling to be among the most misaligned currencies in the world (Dollar 1992). The loss of capital gradually reduced the private capital stock per worker: by 1986 capital per member of the labor force was around 10 percent below its 1971 level. Uganda thus faced a severe problem of undercapitalization.

The progress of policy reform divides into two clear phases: 1986–92 and 1992 to the present. In the first phase, neither of the major determinants of capital flight were much improved. The *Institutional Investor* risk ratings were essentially unchanged by 1992, standing at only 5.2. There was greater progress toward reducing exchange rate misalignment, but by 1992 the distortion index developed by Dollar (1992) was still at the very high level of 87. Hence, our analysis would predict that because of the lack of reform of these two variables, little change would occur in the experience of capital flight. This indeed was the case. In most of the intervening years, capital flight continued to be a severe problem, and as a result, the private capital stock per

Table 2.3. The Predicted Change in Flight Capital as a Proportion of Ugandan Private Wealth, 1985 and 1998

Variable	Value of variable in Uganda			Coefficient ^d	Effect on flight (change in percentage of private wealth) ^e
	1985	1998	Change		
Risk rating ^a	5.1	20.3	+15.2	-0.497	-7.6
Exchange rate misalignment ^b	198	35	-163	-0.000878	-33.0
Wealth (US\$) ^c	383	395	+12	0.000889	0.0
Total predicted (Actual, 1986-97)					-40.6 -10.0

a. The risk rating is that of the *Institutional Investor*, averaged for the year.

b. The exchange rate misalignment measure is the distortion index by Dollar (1992), which measures exchange rate misalignment due to a variety of factors. The value used in the regression is the square of this index.

c. The stock of private wealth per worker for 1985 is taken from the data generated by Collier, Hoeffler, and Pattillo (forthcoming). It is estimated for 1998 using their methodology, whereby the ratio of wealth to GDP is assumed constant, so that wealth in 1985 is simply scaled up by the growth in GDP.

d. The coefficients on these variables come from Collier, Hoeffler, and Pattillo (forthcoming, table 2).

e. The contribution to capital flight is the product of the variable and its coefficient in each year.

Source: Collier, Hoeffler, and Pattillo (forthcoming).

member of the labor force continued to decline. By 1992, 67 percent of private wealth was held abroad.

During the second phase, that is since 1992, progress has been remarkable. The government rebuilt investor confidence by implementing a wide range of measures. It returned confiscated property to its former Asian owners in order to restore and clarify property rights. This was a politically difficult first step, because it involved handing back assets to an emigrant ethnic minority, and sometimes required expelling people currently living in properties. The second step was to simplify procedures using an investment authority. The third step was to attain macroeconomic stability and economic liberalization. As discussed in chapter 3 (in this volume), inflation was reduced to single-digit levels and held there, foreign exchange reserves were accumulated, the exchange rate was gradually made fully convertible, and trade policy was liberalized. The fourth step was to signal strong political commitment to the reform process. For example, during the year of the presidential election around a third of the civil service was dismissed. This signaling was reinforced by the response of the international financial institutions: Uganda was the first country to obtain highly indebted poor countries' (HIPC)

debt relief in 1998. Cumulatively, these measures had dramatic effects on confidence. The *Institutional Investor* risk ratings have improved sharply, from 5.2 in 1986 to 22.9 in 2000, overtaking countries such as Côte d'Ivoire. Similarly, the liberalization of the exchange rate led to a massive improvement in the Dollar distortion index, which fell from 87 in 1992 to 35 in 1997. The cross-country analysis would predict that this improvement would lead to a major reversal of capital flight. Indeed, using the coefficients of the Collier-Hoeffler-Pattillo model, these reforms predict a massive capital repatriation, resulting in around 40 percent of private wealth returning to Uganda. The model is a cross-section equilibrium model, and thus does not indicate how long private wealth holders would take to adjust to this new equilibrium. It might, for example, take a decade for portfolios to fully adjust to the new policies. However, the Ugandan data on capital flight show an immediate response. There are four different measures of capital flight available (see Collier, Hoeffler, and Pattillo forthcoming). Taking the average of these four measures, a clear and dramatic reversal has been demonstrated, from capital flight to capital repatriation (table 2.4).

The scale of the repatriation as of 1997, although substantial, was still well short of that predicted by the model. Specifically, by 1986, 60 percent of Ugandan private wealth was outside the country. By 1991 the rate had deteriorated to 67 percent. By 1997 (the most recent data), repatriation had reduced the figure to 50 percent. Thus 17 percent of Ugandan private wealth had been repatriated from abroad between the start of the 1992 reforms and 1997. The model predicts that around 40 percent of wealth would be repatriated. This prediction takes into account that portfolios had yet to fully adjust to the new equilibrium; thus, repatriation could be expected to increase further in subsequent years.

To summarize, by 1997 the Ugandan government had turned the tide of capital flight. In only five years, 17 percent of private wealth had returned to the economy. Yet even in 1997, some 50 percent of private wealth remained abroad. There was thus enormous potential for continued repatriation: the private capital stock could be doubled.

Table 2.4. Capital Flight and Repatriation, 1991–97

<i>Year</i>	<i>Capital (in US\$ millions)</i>
1991	–17.3
1992	–15.0
1993	+16.8
1994	+160.3
1995	+59.0
1996	+108.9
1997	+311.3

– Indicates capital flight.

+ Indicates repatriation.

Source: Collier, Hoeffler, and Pattillo (forthcoming).

These effects created both constraints and opportunities for a postconflict government that would not be present to the same degree in economies embarking on liberalization from an inheritance of peace. On balance, the opportunities probably outweighed the constraints. Collier (1999) finds that growth during the first five years of peace after a civil war depends on the duration of the conflict. After long conflicts growth rebounds, presumably in part because the exodus of capital has already been completed and peace induces repatriation. After a 15-year conflict, growth rebounded by 6 percent per year over the underlying performance of the economy. Although the disruption prior to 1986 was intermittent rather than continuous, the cumulative effects on output were even more severe than would typically have been experienced by a continuous civil war of 15 years. During 1986–98, the economy considerably outperformed the average, but not by more than one would expect for an economy in the early years of recovery from a long internal conflict. Even by 1999 the economy had not returned to the per capita GDP level reached in 1971.

This picture is not intended to belittle the government's achievements. The recovery from a long conflict is not automatic and requires careful policy management. Rather, it suggests that the government has taken the opportunities provided by a postconflict situation. However, it cautions against treating Uganda as simply a conventional case of liberalization; the same policy sequence in a society that had not emerged from a long conflict might yield slower progress in terms of growth.

Economic Liberalization

This section explores the economic liberalization agenda in more detail. The focus is on trade liberalization and privatization of state-owned enterprises.

Trade Liberalization

Trade liberalization has been central to Uganda's structural reform program. The government did not need the political argument of reciprocity to be able to reap the gains from trade liberalization; it achieved substantial liberalization unilaterally. However, because the liberalization program has had no international institutional framework, it has had no enforcement mechanism, and hence only limited credibility, at least initially. For example, in the 1998 survey of firms, two-thirds of the respondents expected the trade regime to be further liberalized, while one-third expected liberalization to be reversed or stalled.

During the 1970s, export taxation and quantitative restrictions on imports characterized trade policy in Uganda. Exports were taxed, directly and implicitly, at very high rates. All exports except for coffee collapsed under this taxation. For example, tea production fell from a peak of 20,000 tons in the early 1970s to around 2,000 tons by the early 1980s, and cotton production fell from a peak of 87,000 tons, to 2,000 tons. By contrast, coffee exports declined by

around one-third. The decline in coffee was cushioned by three factors: coffee trees depreciated only slowly, production required few inputs, and about a quarter of it could be smuggled abroad (Henstridge 1996). Hence, exports became highly concentrated in coffee (around 90 percent). Part of the export taxation was achieved through overvaluation of the exchange rate, which was propelled by intense foreign exchange rationing, but mitigated by an active illegal market. Manufacturing based on import substitution collapsed along with the export sector as a result of shortages, volatility, and rationing of import licenses and foreign exchange. President Amin's policy toward foreign investment was dominated by confiscation without compensation, and he expelled more than 70,000 people from the Asian community.

In 1986 the NRM government inherited a trade regime that included extensive nontariff barriers, biased government purchasing, and high export taxes, coupled with considerable smuggling. The nontariff barriers have gradually been removed since the introduction in 1991 of automatic licensing under an import certification scheme (World Trade Organization 1995). By 1995 a short negative list remained, consisting of beer, soft drinks, cigarettes, car batteries, and used car tires. This list was designed to prevent smuggling and to protect revenue. In particular, only by banning imported beer was it possible to sustain high taxes on domestic production. Smuggled beer could be detected simply by observing imports at a point of sale; had imported beer carried a high tariff instead of a ban, smuggling would have been much more difficult to prevent. In 1999, the bans on the remaining products on the list were lifted. Similarly, central government purchasing was reformed and is now subject to open tendering without a preference for domestic firms over imports.

During the early 1990s, the structure of trade taxes switched from export taxation to import taxation. The coffee export tax was abolished and import tariffs were introduced, initially at a fairly high level. Import taxes were retained because of the quest for public revenue (see chapter 9 in this volume). Even by 1996 trade taxes still accounted for more than half of revenue, and revenue had more than doubled as a percentage of GDP during the decade. A strong rationale prevailed for removing, or substantially reducing, the coffee tax, because this tax had manifestly damaged exports. However, in replacing export taxes with taxes on imports the government failed to recognize the equivalence between export taxes and import taxes (see, for example, World Bank 1996). Had imports been financed entirely by coffee exports and had the two tax rates been the same, the administrative upheaval involved in the switch from export to import taxation would have had no real effect. In practice, various features made the two taxes less than fully equivalent, but only one of them constituted an argument in favor of levying the tax on imports instead of exports. In addition, an obvious argument against the switch was the presence of many import tariff rates in place of only a single export tax rate. Thus the switch introduced dispersion into trade taxation, which would likely increase allocative inefficiency.

The switch from export taxation to import taxation enabled three components of imports not financed by coffee exports to be taxed. The first category was imports financed by noncoffee exports. Given that the government was rightly desperate to increase noncoffee exports to lessen export concentration, it would have avoided such a tax had it been made explicit. The second category was imports financed by program aid, under which donors lent or gave foreign exchange to the government, which then sold it to the private sector. Clearly, as the value of this foreign exchange to private agents equaled the value of the imports they purchased, taxing imports had an offsetting effect on the value of the foreign exchange. As a result, the government ended up paying the import tax itself by getting less for its sales of foreign currency. The third category was those imports financed by private capital inflows. This was the only legitimate case for the switch to import taxation, and it was not negligible, as private capital inflows exceeded the value of coffee exports for most of the 1990s. However, these inflows of private capital in the early years of the reform were probably socially useful in reputation rebuilding for Uganda, and so, even in this case, it is not clear that the government really wanted to tax them. At the same time, the switch from export taxation to import taxation was combined with a mass of import tax exemptions, which introduced an additional layer of distortions (Short 1995).

In summary, whether the switch was worth it is questionable given the increased administrative complexity involved. The benefits of trade liberalization came not from this switch, but from the subsequent reduction in the rates of import taxes, when the government recognized that import taxation had many of the features of export taxation.

By the mid-1990s, the import tariff schedule had five *ad valorem* rates between 0 and 60 percent. For more than 95 percent of imported items the tariff was between 10 and 30 percent (Reinikka 1997). During the latter half of the 1990s, the government implemented a major tariff reduction program. As a result, by 1999 the tariff system had been substantially rationalized and liberalized, which gave Uganda one of the lowest tariff structures in Africa. The maximum tariff is now 15 percent on consumer goods, and there are only two other tariff bands: zero for capital goods and 7 percent for intermediate imports. Regional trade has even lower tariff rates (6 and 4 percent, respectively) but carries a 10 percent surcharge, as other Common Market for Eastern and Southern Africa (COMESA) countries continue to maintain much higher tariff rates. At present, the average tariff on imports from the COMESA preferential trade area is 5.5 percent; from the rest of the world, it averages 12.9 percent. The median tariff for imports from the COMESA area is 4 percent, compared with 7 percent for the rest of the world. The current trade-weighted tariff is 6.5 percent (Short 2000).

As mentioned previously, by the mid-1990s, exemptions, legal and illegal, dominated the import tax system. Smuggling was estimated at 15 to 20 percent for beer and cigarettes, and 5 to 10 percent for soft drinks. Legal

exemptions amounted to 25 to 40 percent of the total value of imports. The major groups included goods imported by international organizations, plant and equipment imported by licensed investors, raw materials not available locally used by “important and high value added industries” as specified by the Ministry of Finance and Economic Planning in consultation with the Uganda Manufacturers Association, discretionary exemption for anything “in the national interest,” and all inputs incorporated into exports. As part of the import tax reform, firm-specific exemptions were to be curtailed. However, firm survey evidence indicates that by 1997 the situation had not changed significantly: 12 percent of firms enjoyed exemptions from import taxes in 1995 and 16 percent did so in 1997 (see chapter 7 in this volume).

The tariff reduction in the latter half of the 1990s had a marked impact on the levels of protection. The average effective rate of protection declined from 34 percent in 1994 to 15 percent in 1999, and the dispersion as measured by the standard deviation was reduced from 47 to 23 percent during the same period (Short 2000).² However, the current structure of protective taxes (including excise taxes used as import surcharges), which range from 0 to 27 percent, inevitably produces a wide spectrum of effective protection at the individual product and company level, depending on value added and the specific protective taxes on inputs and outputs. The granting of exemptions further compounds the remaining problem.

Coffee Liberalization

At independence Uganda inherited a government-controlled marketing and pricing system for coffee. The dominance of the Coffee Marketing Board (CMB) continued until the early 1990s. Transportation of exports was also a state (railways) monopoly, and the difference between the producer and border prices—created by export taxation and an overvalued exchange rate—was a major source of public revenue. Payments to farmers, mostly smallholders, were typically delayed for long periods of time. Key activities, such as research, extension, promotion, quality control, and export processing, were all conducted solely by the CMB (Akiyama forthcoming). With the sharp fall of world coffee prices, which started in 1989 after the collapse of the International Coffee Agreement export quota system, the government kept producer prices low to reduce crop financing requirements and its fiscal deficit. As a result, by the late 1980s incentives to coffee farmers had fallen dramatically, and the status quo in the coffee sector became unsustainable.

The government, led by its reform advocates, liberalized the coffee sector in 1991–92 with the support of World Bank conditionality. The CMB was converted to a publicly-owned corporation, while regulation and quality

2. Estimates in Short (2000) are based on data from 59 manufacturing firms.

issues were assigned to the newly created Uganda Coffee Development Authority. The Bank of Uganda was relieved of its responsibilities to provide crop financing, which was taken up by commercial banks. Other reform measures included removing the dual exchange rate system and export tax, and allowing prefinancing arrangements and the formation of joint venture companies. These measures introduced a completely new dimension to the coffee business in Uganda by increasing the liquidity and greatly reducing the problems of crop finance (Akiyama forthcoming). Similarly, the mode of transport used by coffee exporters was deregulated.

A consequence of coffee liberalization was increased competition among exporters in purchasing coffee from the producers. After liberalization, the number of private exporters skyrocketed to more than 100, but has since fallen to about 50 registered exporters. As a result of increased competition, producer prices received by coffee growers increased sharply, both in absolute terms and as a share of border prices (from 20 to 30 percent to more than 80 percent). Farmers who used to have to supply coffee to the primary cooperatives on credit are now paid in cash.

Following a short coffee boom in 1994–95, coffee production increased sharply from 2.7 to more than 4 million 60-kilo bags per year. Several factors apart from the coffee boom contributed to the strong supply response. First, thanks to higher domestic producer prices (even before the boom), farmers became more interested in investing in coffee and undertaking good husbandry. Second, seedlings of the high-yielding varieties became more readily available. These varieties had been developed in Uganda a few decades earlier, but seedlings had only been available to farmers in limited quantities (Akiyama forthcoming). The situation changed drastically when privately-run nurseries were allowed following liberalization. Many nurseries now provide seedlings to farmers who have increased both production and exports. Third, other private investment includes export-processing facilities by major exporters and the establishment of large coffee farms by private firms and individuals. Finally, removing export taxation shifted the direction of smuggling so that growers in the neighboring countries began to sell their coffee to Uganda instead of Ugandan farmers smuggling through Kenya, which had always avoided taxing coffee exports.

While prompted by a combination of international market conditions and top-down donor conditionality, coffee liberalization has been a success both in terms of private sector development and poverty reduction (for more explanation on the latter, see chapter 4 in this volume). The private sector made good use of the opportunities provided by the liberalization. Evidence of this includes the large number of private firms that entered the coffee export business and the investment in processing, nurseries, and plantations.

Prior to liberalization, the government was concerned about the private sector's ability to fulfill the role of exporting coffee carried out by the CMB. To ensure no disruption of exports, the marketing branch of the CMB was

transformed into a limited company to continue coffee exports, while competing with the private firms. The government's concern did not materialize as domestic processors and merchants trading other commodities entered the coffee export business (Akiyama forthcoming). In addition, several large international coffee trading firms entered the market. Another concern the government had about liberalization was crop financing, or the ability of Ugandan exporters and traders to pay coffee growers. This concern was effectively solved through prefinancing arrangements. Under this system, Ugandan exporters made arrangements with foreign importers for advance payments.

Investment Policy

Uganda has a history of expropriation of foreign investment. The incentive system was biased in favor of domestic firms. For example, under the initial rules of the preferential trade agreement, tariff preferences were only given to domestic majority-owned firms. This system was revoked through three major initiatives. First, the investment code of 1991 established the rights of foreign investors. Second, the Departed Asians Property Custodian Board returned confiscated properties to their previous owners. A statute of limitations required that claims be made by 1995 to prevent indefinite contestability of titles. Third, the dependence of preferential trade agreement preferences on majority domestic ownership was revoked in 1992.

Under the investment code, foreign investment is subject to prior, but nearly automatic, approval by an investment authority. Upon receiving an application, the investment authority is legally required to issue a report within 30 days and to make a decision within another 14 days. Typically, decisions take only a few days. Applications must be approved if the application complies with the code and the activity is not "contrary to the interests of Uganda." Approval may be conditional upon specified minimum contribution of capital by the investor, a commitment to employ and train citizens with a view to Africanization, an agreement to use Ugandan inputs where they are "competitive," and assurances that the operation is not ecologically or economically harmful. However, hardly any applications have been rejected on these grounds.

Investment licensing is subject to separate application procedures, but is normally done hand-in-hand with project approval. Once licensed, all investors used to be eligible for duty and tax exceptions.³ Duty exemptions were discontinued in 1995 and replaced by zero rating of capital goods for all investors. Corporate tax holidays were discontinued in 1997, but those granted prior to 1997 could be retained until they expired. Domestic investments are,

3. The normal entitlement used to be exemption from profits tax for three to six years; drawback of any duties and sales taxes levied on the inputs used for export production, exemptions on imports of capital goods, unrestricted repayment of foreign

in principle, not subject to the investment authority's approval, but businesses operating without a license would not have qualified for any of the benefits under the investment code.

Privatization

In the late 1980s, more than 150 public enterprises (defined as majority state owned) were engaged in virtually all sectors of the economy. They employed more than 30,000 people, accounting for more than a quarter of total formal employment in the firm sector, and generated about 10 percent of GDP. The performance of these enterprises was characterized by low productivity, high losses, and rising debts, which placed a considerable burden on the banking system, public finances, and the balance of payments. For example, in 1992 most public enterprises received direct and indirect subsidies from the government (estimated at 50 percent of total domestic revenue), credits from the banking system (amounting to about 18 percent of total credit), grants and foreign loans (4 percent of outstanding external debt service obligations), and accumulated internal and external arrears. Only one firm was making a profit. The government initiated a program of public enterprise reform and divestiture in 1992 to redefine the role of the state in the economy, reduce the financial and administrative burden on public resources, and increase efficiency and private investment.

By the end of 1999, the government had completed 93 divestitures of enterprises in the industrial, commercial, agricultural, and hotel sectors, privatizing 62 firms and liquidating the remainder. Only one firm was sold to the public through the sale of shares on the stock exchange. Twenty firms were sold to foreign investors. To date, total costs related to divestiture have exceeded the proceeds. This has occurred because the firms' valuation was typically based on book value, which in many cases was higher than their market value; the size of debts and arrears was greater than expected; and the liberalization of the economy and reduction of subsidies negatively affected the firms' value.

A recent assessment based on firm-level evidence suggests that privatization has succeeded in turning around the performance of many former public enterprises (UMACIS 2000). In most cases, privatization led to increased output and efficiency, higher tax payments, significant new investment, and some job creation. The government also reduced direct subsidies to the public enterprise sector (that is, cash injections, investment subsidies, and donor grants) from a record high of U Sh 87 billion in 1997 to U Sh 9

loans and interests, and the transfer of dividends and proceeds on disposal of assets. Foreign and domestic investors were both eligible for the same benefits, but a higher qualification level applied for foreign investors than for Ugandans. The threshold for certificates of incentives is US\$50,000 for locals compared with US\$300,000 for foreigners.

billion in 1998.⁴ A survey of stakeholder perceptions indicates that fiscal, social, and economic objectives for privatization had been achieved, but that the process through which the firms were sold was perceived to have been corrupt. Respondents suggested that the impact of privatization would have been higher had it not been for the uneven implementation of the program and other shortcomings. These shortcomings included inadequate legal and institutional arrangements, ill-defined responsibilities and accountability, lack of broadly based ownership of the program and transparency in a number of transactions, and the executing agency's failure to collect payments from buyers. All these led to parliament's decision to partially suspend and investigate the privatization program in early 1999.

Despite a qualified success with privatization of commercial enterprises to date, the remaining parastatals account for most employment and the bulk of the fiscal burden. They include utilities, which comprise electricity, water, and sewage; transport services; and other large public enterprises, which are mostly engaged in manufacturing, construction, agribusiness, tourism, trade, and financial services. These enterprises continue to place a heavy burden on the budget. Public resources are insufficient to restore the financial viability of these enterprises and maintain the existing infrastructure, let alone improve the coverage and quality of these services. Against this backdrop, the government has decided to overhaul the key utility sectors, including telecommunications, electricity, water and sewage, and rail transport.

In telecommunications, the postal and telecommunications company was restructured into three new entities: telecommunications, post, and post office bank. The sector was opened up to competition and the government awarded two operator licenses for basic telecommunications services through a competitive process. The results have been impressive, and the number of lines in service has more than doubled in a short time, thanks to mobile phone service. For electricity and air transport, significant restructuring initiatives involving greater reliance on private participation have been approved and are at various stages of implementation. However, in other sectors, such as rail transport, and water and sewage, reforms were attempted without a clear assessment of the sectors' requirements, and little competition. With regard to a regulatory framework, the government intends to explore the possibilities of establishing a multisector regulatory agency, which would include the newly created telecommunications and electricity regulator.

Impact on Investment and Exports

The average real GDP growth rate was 6.3 percent per year during the entire recovery period (1986–99) and 6.9 percent in the 1990s. One obvious

4. However, indirect subsidies doubled in 1998 reaching U Sh 203 billion, an increase due mainly to increases in loans and tax arrears in public utilities.

explanation for the high growth rates is the preceding economic contraction, the result of economic mismanagement in 1971–85. During this period, the capital stock shrunk and capacity utilization was low. Hence, much of the subsequent growth resulted from the increased use of capacity, the improved allocation of existing resources, and the return of both human and financial flight capital. As these kinds of opportunities become increasingly scarce, significant private investment will be required to stimulate the economy.

What is the macroeconomic evidence on the investment response to liberalization? According to the national accounts, private investment increased, on average, by 13 percent per year in the past decade. The coffee boom in 1994–95 created a peak during which private investment (in constant prices) grew by almost 40 percent, while its share of GDP increased from 9.9 to 12.4 percent (lower panel in table 2.5). The largest increase was in machinery and equipment investment. Since then, growth in private investment has slowed, but the level of investment achieved during the coffee boom has been maintained and even slightly surpassed previous levels in 1997–98. Following the initial rehabilitation phase of the late 1980s, the share of public investment in GDP has fallen to about 6 to 7 percent, while the share of total fixed investment has ranged between 15 and 20 percent of GDP. For comparison, until recently the share of investment was much higher (about 30 percent of GDP) in the fast growing East Asian economies. In addition, such high levels were maintained for more than two decades. This implies that a higher investment level is required to sustain Uganda's growth performance in the future.

The liberalization of trade has had a marked effect on export performance as demonstrated by macroeconomic data (table 2.6). In the 1990s export volumes grew (at constant prices) at an annualized rate of 15 percent, and import volumes grew at 13 percent. As a percentage share of GDP, exports increased from 7.8 percent in 1990/91 to 15.8 percent in 1996/97 (but fell to 12.7 percent in 1997/98) (table 2.6). The value of noncoffee exports increased fivefold between 1992 and 1999. Sustaining Uganda's growth performance requires maintaining the favorable trend in export growth.

The macroeconomic picture of investment and export response provides a useful framework for chapter 7 (in this volume), which examines investment response at the firm level using microeconomic survey data, and for chapter 8, which looks at firms' export response and productivity at the microeconomic level.

The Role of Aid

Uganda's postconflict recovery and economic reforms have benefited from generous foreign aid (table 2.7). Some 21 countries have been active donors since 1987. During the initial reform period, Uganda received substantial multilateral aid, but in the 1990s bilateral grant aid became the dominant source of external finance. Technical assistance made up almost one-third of total grants during the period 1987–96. According to Holmgren and others

Table 2.5. Investment as a Share of GDP at Market Prices, Fiscal Years 1986/87–1997/98
(percent)

<i>Category</i>	<i>1986/87</i>	<i>1987/88</i>	<i>1988/89</i>	<i>1989/90</i>	<i>1990/91</i>	<i>1991/92</i>	<i>1992/93</i>	<i>1993/94</i>	<i>1994/95</i>	<i>1995/96</i>	<i>1996/97</i>	<i>1997/98</i>
<i>In current prices</i>												
Fixed investment	9.7	10.8	11.1	12.7	15.2	15.9	15.2	14.6	15.4	16.6	15.5	15.5
Public investment	4.3	5.6	5.4	6.2	7.4	7.4	6.7	5.4	5.4	6.3	5.6	5.6
Private investment	5.4	5.2	5.7	6.5	7.8	8.5	8.5	9.1	10.0	10.3	9.9	9.9
Machinery and vehicles	3.8	4.5	4.4	5.2	6.1	6.0	5.3	4.7	5.6	5.4	3.7	3.4
Construction	5.9	6.3	6.7	7.5	9.0	9.9	9.9	9.9	9.8	11.2	11.8	12.0
<i>In constant prices (1991 = 100)</i>												
Fixed investment	17.8	20.2	18.1	17.2	16.8	15.5	15.1	15.5	19.5	20.2	18.8	19.3
Public investment	10.2	12.4	10.4	9.3	8.3	6.9	6.3	5.7	7.1	8.0	6.8	5.9
Private investment	7.6	7.8	7.6	7.9	8.5	8.6	8.8	9.9	12.4	12.2	12.0	13.5
Machinery and vehicles	8.5	9.6	8.1	7.4	6.8	5.6	5.0	4.9	7.6	7.1	5.1	4.8
Construction	9.3	10.6	10.0	9.9	10.0	9.9	10.1	10.7	11.9	13.1	13.7	14.6

Source: Bureau of Statistics data.

Table 2.6. Export Shares of GDP, Fiscal Years 1990/91–1997/98
(percent)

<i>Fiscal year</i>	<i>Exports^a/GDP</i>	
	<i>Current prices</i>	<i>Constant prices</i>
1990/91	7.5	7.8
1991/92	8.8	8.7
1992/93	7.1	7.7
1993/94	8.7	9.5
1994/95	11.8	11.0
1995/96	12.0	12.8
1996/97	13.1	15.8
1997/98	10.3	12.7

a. Exports consists of goods and nonfactor services.

Source: Bureau of Statistics and Ministry of Finance, Planning, and Economic Development data.

(1999), various evaluations show that Uganda made exceptionally good use of technical assistance, including learning from the experience of other African reformers, such as Ghana. However, despite continuous progress in Uganda's public expenditure management, donor-funded projects are still, largely initiated through direct contacts between line ministries or districts and the donors and are not integrated into the government's medium-term expenditure framework and budget. Similarly, the number of nongovernmental organizations has exploded in recent years, from about 1,000 in the mid-1990s to more than 3,000 in 2000, which at least partially reflects the availability of donor funding.

Apart from aid inflows, bilateral creditor governments in the Paris Club have agreed on debt rescheduling for Uganda on several occasions since 1981. Before the HIPC initiative was introduced, a portion of Uganda's multilateral debt was serviced by a number of its bilateral donors. Uganda was the first country to benefit from the HIPC initiative in 1998 as well as from the enhanced HIPC in 2000 (a total of US\$1 billion of debt relief in net present value terms). A commercial debt buy-back was arranged with the International Development Association's support in 1993 (US\$153 million of commercial debt was bought at 12 cents per dollar).

How important has foreign aid been to Uganda's reform effort? A recent assessment concludes that financial aid and its associated conditionality have played a positive role in supporting Uganda's reform agenda (Holmgren and others 1999). In particular, they helped generate and implement policy reforms in the late 1980s and early 1990s, when reform advocates within the government used conditionality to help push the policy changes. Since 1992, when government ownership of the reform agenda was secured, conditionality has become less instrumental in inducing reforms. Consequently, policy dialogue,

Table 2.7. Foreign Currency Inflows, Fiscal Years 1989/90–1998/99

<i>Category</i>	<i>1989/90</i>	<i>1990/91</i>	<i>1991/92</i>	<i>1992/93</i>	<i>1993/94</i>	<i>1994/95</i>	<i>1995/96</i>	<i>1996/97</i>	<i>1997/98</i>	<i>1998/99</i>
<i>US\$ (million)</i>										
Exports ^a	245.7	198.9	195.1	237.8	333.1	667.1	725.6	824.8	633.7	726.4
Current private transfers	78.0	80.5	135.9	107.9	303.7	329.9	421.1	322.1	539.2	375.0
Foreign direct investment	—	—	—	—	—	—	110.4	160.0	190.0	230.0
ODA flows, net ^b	409.1	385.1	272.6	779.1	427.4	599.8	504.8	536.9	641.9	572.1
Total	732.8	664.5	603.6	1,124.8	1,064.2	1,596.8	1,761.9	1,843.8	2,004.8	1,903.5
<i>Percentage of GDP (PPP)^c</i>										
Exports	1.95	1.45	1.31	1.45	1.87	3.28	3.22	3.50	2.57	2.74
Current private transfers	0.62	0.59	0.92	0.66	1.70	1.62	1.87	1.37	2.19	1.41
Foreign direct investment	—	—	—	—	—	—	0.49	0.68	0.77	0.87
ODA flows, net	3.25	2.81	1.84	4.75	2.39	2.95	2.24	2.28	2.60	2.15
Total	5.83	4.86	4.07	6.86	5.96	7.86	7.83	7.82	8.13	7.17
<i>Memo items</i>										
GDP (PPP, million)	12,574	13,685	14,842	16,407	17,855	20,318	22,504	23,568	24,658	26,549
Net aid as percentage of public expenditure	33	59	47	57	66	62	52	45	44	48

— Not available.

Note: 1998/99 data are preliminary.

a. Exports include goods and nonfactor services.

b. ODA flows, net, are official development assistance disbursements less amortization.

c. GDP valued at purchasing power parity (PPP) exchange rate, hence these numbers differ from those in table 2.6.

Source: Bank of Uganda and World Bank data.

advisory services, and technical assistance have assumed a greater role, as continued financial assistance has allowed a much higher level of public spending than would have been possible within the limitations of the country's own resources. (The share of foreign aid has ranged between 33 and 66 percent of total public expenditure; see table 2.7). It is interesting that the assessment by Holmgren and others (1999) considers the continuity and long tenure of the government's economic team as critical in the process of achieving broad ownership of the reform program.

How important has foreign aid been to Uganda's growth performance? In an effort to quantify the effects of aid, results of the recent cross-country analysis by Collier and Dollar (1999) can be applied to Uganda. Using data from more than 100 countries, they test the hypothesis that the better the policy environment, the more effective aid is in raising growth, and that aid is subject to diminishing marginal returns. The hypothesis indeed appears to be true. The quality of policy variable (annual cross-country ratings by World Bank country specialists are used) and the aid and policy interaction term are both positive and significant in the growth regression, and aid squared (that is, aid being subject to diminishing marginal returns) is negative and significant.⁵ Thus the policy environment determines how rapidly diminishing returns eliminate the marginal contribution of aid to growth. The Collier-Dollar cross-country analysis is a straightforward tool for calculating the change in Uganda's growth rate, assuming that aid inflows were zero, all else being constant. The difference between the actual growth rate (with actual aid flows) and the calculated hypothetical case of no aid is 1.7 percent per capita per year. Thus, in the absence of aid, the growth rate per capita would have been 3.8 percent per year instead of 5.5 percent (GDP is expressed in terms of purchasing power parity in these calculations). The contribution of aid was therefore 31 percent of the actual growth rate. This should be taken as a conservative estimate. As demonstrated by Holmgren and others (1999), aid in Uganda's case has had a positive effect on policy, so the overall growth effect of aid is likely to be somewhat greater than what is estimated here.

Finally, how important has aid been to poverty reduction? Appleton shows in chapter 4 in this volume that the headcount index of poverty fell from 56 to 44 percent, or 12 percentage points, in 1992–97, and that this decline was almost entirely attributable to growth (95 percent). The annual average poverty reduction was hence 2.4 percentage points. The simplest way to estimate the impact of aid on poverty is to use the ratio of the growth rate attributable to aid and the actual growth rate multiplied by the decline in the headcount index that was attributable to growth.⁶ This calculation suggests that 29 percent of

5. Other control variables include institutional quality, initial income, and regional and period dummies.

6. $(1.7/5.5) * P_0 = 0.31 * P_0$, where P_0 is change in the headcount index of poverty attributable to growth.

the decline in poverty was due to aid. The rate of poverty reduction achieved—thanks to foreign aid—was then 0.7 of a percentage point per year.

Conclusions

Since 1986, the Ugandan government has faced two policy challenges: reducing the risks of conflict in a conflict-prone society and reducing poverty in a very poor economy. The risk of conflict comes partly from the economic and political inheritance at independence, and partly from the economic and political consequences of prolonged conflict between 1971 and 1985. The economic inheritance implied a high risk of conflict because of the country's dependence on natural resources and its low levels of education. The government has taken several action steps to diversify the economy, and more recently has worked to increase educational attainment. The economic consequences of the prolonged conflict included massive capital flight and the breakdown of many institutions, including the professions. The government has achieved considerable success in reversing capital flight through a range of measures that have rebuilt investor confidence. It has embarked upon the task of rebuilding institutions, but this is a long process. The political inheritance at independence was a paper democracy, but democratic institutions did not survive when tested. The consequences of prolonged conflict were a legacy of suspicion and bitterness. The government has made considerable progress in promoting reconciliation, by encouraging the return of former political leaders and traditional rulers. It has also built more robust democratic institutions, most notably a free and active press, and has decentralized decisionmaking.

Overall, by 1999 the society was considerably safer from internal large-scale conflict than it had been both at independence and at the start of the Museveni government. During the 1990s, the economy staged a remarkable recovery from the collapse that had occurred during the conflict, and experienced one of the highest economic growth rates in the world. However, even with this impressive performance, the country was only about to achieve the level of GDP per capita inherited at independence.

In the early 1990s, the Ugandan government embarked on economic liberalization in earnest, including external trade, privatization of public enterprises, and the return of confiscated properties to their former Asian owners. In trade policy, the most important changes were the removal of quantitative restrictions and foreign exchange rationing. The switch from export taxation to import taxation, however, missed an opportunity to radically reduce the taxation of exports because of revenue considerations. It gave the appearance of having removed export taxation without the reality, because the general equilibrium effects of import taxation were broadly equivalent to the earlier export tax. Once government expenditure had risen to utilize the additional revenues raised from import taxes, it became more difficult to reduce these rates than if the import taxes had not been introduced in the first place. Nevertheless, during the latter part of the decade, tariff reductions were implemented, which gave Uganda one of the lowest tariff structures in Africa.

Major privatization of commercial public enterprises has also taken place. Many of these loss-making enterprises have been turned around by their new owners and are now contributing to growth, investment, employment, and public revenue. However, progress in reforming and privatizing public utilities has been much slower. They continue to present a heavy fiscal burden and provide poor service. Privatization has also suffered from lack of transparency and corruption in some of the transactions, which has tainted the entire process.

Because considerable reallocation and rehabilitation of the existing productive capacity has already taken place, growth rates are unlikely to be sustained in the future without a higher share of investment and continued export growth and diversification. Thus, a challenge for Uganda's future economic growth is to implement policies conducive to technological change, private investment, and export growth, while at the same time ensuring that both private and public capital are efficiently employed.

Finally, foreign aid has contributed substantially to Uganda's growth performance and poverty reduction, estimated at 31 and 29 percent, respectively. These should be interpreted as conservative estimates because, according to recent assessments, aid has also had a positive effect on policy reforms and hence contributed indirectly to growth and the decline in poverty.

References

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

- Akiyama, Takamasa. Forthcoming. "Background, Process, and Results of Recent Coffee Market Liberalization." In Takamasa Akiyama, John Baffes, Donald F. Larson, and Panos Varangis, eds., *Lessons from Market Reforms over the Last Two Decades*. Regional and Sectoral Studies. Washington, D.C.: World Bank.
- Bigsten, Arne, and Steven Kayizzi-Mugerwa. 1999. *Crisis, Adjustment, and Growth in Uganda. A Study of Adaptation in an African Economy*. London: Macmillan Press.
- Collier, Paul. 1994. "Demobilization and Insecurity: A Study in the Economics of the Transition from War to Peace." *Journal of International Development* 6: 343–51.
- . 1999. "The Economic Consequences of Civil War." *Oxford Economic Papers* 51: 168–83.
- . Forthcoming. "Ethnicity, Politics, and Economic Performance." *Economics and Politics*.
- Collier, Paul, and David Dollar. 1999. "Aid Allocation and Poverty Reduction." Policy Research Working Paper no. 2041. World Bank, Development Research Group, Washington D.C. Processed.

- Collier, Paul, and Anke Hoeffler. 2000a. "Aid, Policy, and Peace." World Bank, Development Research Group, Washington, D.C. Processed.
- . 2000b. "Greed and Grievance in Civil War." Policy Research Working Paper no. 2355. World Bank, Development Research Group, Washington, D.C.
- Collier, Paul, and Sanjay Pradhan. 1998. "Economic Aspects of the Transition from Civil War." In Holger B. Hansen and Michael Twaddle, eds., *Developing Uganda*. Oxford, U.K.: James Currey; Athens, Ohio: Ohio University Press.
- Collier, Paul, Anke Hoeffler, and Catherine Pattillo. Forthcoming. "Flight Capital as a Portfolio Choice." *World Bank Economic Review*.
- Dollar, David. 1992. "Outward-Oriented Developing Countries Really Do Grow More Rapidly." *Economic Development and Cultural Change* 40(3): 523–44.
- Haque, Nadeem Ul, Mark Nelson, and Donald J. Mathieson. 2000. "Rating Africa: The Economic and Political Content of Risk Indicators." In Paul Collier and Catherine Pattillo, eds., *Investment and Risk in Africa*. London: Macmillan.
- Henstridge, Mark. 1996. "Coffee and Money in Uganda: An Econometric Analysis." DPhil. thesis. Oxford University, U.K. Processed.
- Holmgren, Torgny, Louis Kasekende, Michael Atingi-Ego, and Daniel Ddamulira. 1999. "Aid and Reform in Uganda Country Case Study." Research Series no. 23. Economic Policy Research Centre, Kampala.
- Institutional Investor, Inc. *Institutional Investor*. Various years. New York.
- Jagers, Keith, and Ted Robert Gurr. 1995. Tracking Democracy's Third Wave with the Polity III Data. *Journal of Peace Research* 32(4): 469–82.
- Kasekende, Louis, and Michael Atingi-Ego. 1997. "Financial Markets and Monetary Policy in Sub-Saharan Africa: The Experience of Uganda." Final draft report for the African Economic Research Consortium Collaborative Research Project. Nairobi, Kenya.
- McPake, Barbara, Delius Asiimwe, Francis Mwesigye, Matthius Ofumbi, Peter Streefland, and Asaph Turinde. 1999. "The Economic Behaviour of Health Workers in Uganda: Implications for Quality and Accessibility of Public Health Services." *Social Science and Medicine* 49(7): 849–65.
- Reinikka, Ritva. 1997. "Adjusting Trade Policy for Export Growth." World Bank, Eastern Africa Department, Washington, D.C. Processed.
- Republic of Uganda. Various years. *Statistical Abstracts*. Entebbe: Bureau of Statistics.

- Short, John. 1995. "Uganda: Review of the Tax and Incentive Structure." A report to the Eastern Africa Department. World Bank, Washington D.C. Processed.
- _____. 2000. "Impact of Tariff Changes." A report to the Ministry of Finance, Planning, and Economic Development and the World Bank. Kampala. Processed.
- Tirole, Jean. 1992. *Persistence of Corruption*. Working Paper no. IPR55: 2-32. Institute for Policy Reform, Washington, D.C.
- UMACIS (Uganda Manufacturers Association Consultancy and Information Services, Ltd). 2000. "Assessing the Impact of the Privatization Process in Uganda." A Report for the Ministry of Finance, Planning, and Economic Development. Kampala. Processed.
- World Bank. 1996. "Uganda: The Challenge of Growth and Poverty Reduction." A Country Study, Washington, D.C.
- World Trade Organization. 1995. *Trade Policy Review: Uganda*, vol. 1. Geneva: World Trade Organization Secretariat.

Exchange Reforms, Stabilization, and Fiscal Management

Mark Henstridge and Louis Kasekende

Uganda's strong macroeconomic performance in the 1990s was based on two key reforms: the legalization of the parallel market in foreign exchange in 1990, and the achievement of macroeconomic stability in 1992. The legalization of the parallel market paved the way for a broader liberalization of exports, especially coffee. In turn, the liberalization of the coffee sector made possible one of the single biggest reductions of poverty in Uganda by ensuring that the bulk of the windfall proceeds from the 1994–95 coffee boom went to coffee-growing households (see chapter 4 in this volume). The exchange reform arose from a vigorous debate within Uganda, and was not a result of donor conditionality.

Uganda has maintained price stability since 1992 through both prudent budgeting and careful implementation of fiscal and monetary policy.¹ Prices have remained stable despite large requests for supplementary expenditures from some ministries and agencies within each fiscal year. Although the annual budget determined the overall fiscal stance, control was maintained by

The fiscal policy discussion in this chapter draws upon material from an International Monetary Fund working paper (Henstridge forthcoming) and work carried out at the Centre for the Study of African Economies, University of Oxford. The latter (Henstridge 1997) was funded by a research grant from the U.K. Department for International Development, which is gratefully acknowledged. The authors are grateful to the Ministry of Finance, Planning, and Economic Development, the Bureau of Statistics, and the Bank of Uganda for the use of their data; however, none of these institutions is responsible for any errors or misinterpretations.

1. The analysis presented in this chapter is based on data up to mid-1997. The cash flow system described continues to operate, with some modifications.

implementing the budget through the operation of the “cash flow,” which was both a spreadsheet-based framework for monitoring resources and spending each month as well as the key focus of the monthly cash flow committee that was responsible for ensuring that fiscal policy remained consistent with low inflation. By tracking the fiscal position each month, the cash flow table was a timely substitute for nonexistent treasury accounts, and provided a way to regularly review the fiscal situation and to make short-term fiscal adjustments in response to shocks. During the period covered by this chapter (largely up to mid-1997), a short-term adjustment meant controlling cash releases; more recently, control has been extended to include spending ministries’ freedom to enter into commitments. Stabilization policy that targeted inflation through short-run fiscal adjustments was perhaps unusual, but was nonetheless effective.

Success in managing aggregate spending provided the foundation for significant improvements in expenditure allocations toward basic services (Republic of Uganda 2000) and in the effectiveness of public service delivery (see chapter 11 in this volume). Upon establishing control of the budget aggregates, the government could start to focus on specific reforms in budgetary operations, such as civil service reform or funding for roads. In turn, the government then established a medium-term expenditure framework that reflects the priorities of public policy in the composition of spending that remains, in aggregate, within the available resources, over a three-year horizon.

This chapter analyzes the stabilization record and the macroeconomic reforms carried out in the 1990s. First, it sets out the main arguments of the exchange rate debate in the late 1980s. It describes the progress from a dual exchange system, through an auction, to a unified rate—with an interbank market and a retail *bureaux de change* market—in November 1993, as well as the operation of the exchange rate policy since then. Second, the chapter discusses how price stability was achieved in 1992 and has been maintained since. It emphasizes the distinctions between the *ex ante* budget and the *ex post* outcomes given the government’s need to respond to shocks during the fiscal year. Third, the chapter reviews the costs and tradeoffs of a relatively clean-floating exchange rate, the rationale for targeting inflation, the relative merits of short-term fiscal adjustment and monetary policy, and the implications of short-term fiscal adjustments for volatility in public expenditure. Finally, the chapter highlights some of the budget management reforms made possible by the earlier success in controlling aggregate spending.

Exchange Reforms

The National Resistance Movement (NRM) government’s instinctive approach to economic policy was dirigiste. It was implicitly assumed that economic agents would respect the basic requirement of military discipline to obey orders. However, President Museveni appeared to have sufficient intellectual self-confidence to allow an open debate on economic policy.

While fighting the second Obote government, the NRM established the objective of an “independent, integrated, self-sustaining economy” as part of its 10-point program for government. In 1986 a group sponsored by the International Development Research Centre of Canada was charged with developing a strategy for economic recovery that would achieve the NRM’s objective. A minority of the group favored a revaluation of the exchange rate and administered prices. It was, essentially, an approach that sought to mend the old control regime. Proponents of this approach believed that devaluation would fuel inflation and slow recovery by raising the cost of imported inputs. Although their views were contrary to those held by a majority of the International Development Research Centre group, the governor of the central bank was appointed from the minority. The official exchange rate was then revalued in nominal terms. The economy did not respond favorably. With inflation accelerating from 120 percent in May 1986 to 240 percent in May 1987, the real appreciation of the official exchange rate reached around 380 percent over the same period.

An agreement with the International Monetary Fund (IMF) and the World Bank in 1987 on a package of reforms included a currency reform and a large nominal devaluation of the exchange rate. Although the decision to seek donor assistance was made with the support of President Museveni, the debate over the exchange rate continued for another three years. In addition, little consensus was reached regarding the importance of price stability, or how to achieve it. Inflation remained high, fueled by credit to the government to finance loose control of the budget and by rapid growth in credit to the monopoly marketing boards, mainly the Coffee Marketing Board, to finance the purchase of export crops. The official exchange rate was occasionally devalued to recover the ground lost to inflation. However, no consistent direction on macroeconomic strategy was established until early 1990.

Two developments influenced the exchange rate debate. First, a government seminar in 1989 that was designed to take a critical look at Uganda’s policy under the NRM government brought together academics, politicians, and officials formally to discuss economic reform for the first time. The seminar was useful in providing open discussions and sensitizing all participants about the key issues—including the role of the parallel market in foreign exchange (or *kibanda*)—in everyone’s lives. Second, the Presidential Economic Council provided a forum for an increasingly focused debate between ministers holding economic portfolios and senior officials. Ministry of Planning and Economic Development officials led the argument for macroeconomic stabilization and liberalization in a statement of macroeconomic strategy called *The Way Forward I* (Republic of Uganda 2000).² They recommended prudent budgeting to control inflation, promotion of exports through legalization of the parallel market, and devaluation of the official exchange rate to a competitive level.

2. In an early example of transparency, this document was later published.

Legalizing the Parallel Market and Exchange Rate Unification

The prevailing wisdom within Uganda was that a depreciation of the official exchange rate led to inflation that, in turn, led to a depreciation of the parallel market rate and thus reestablished the previously existing premium between the parallel and official rates. This conclusion was also reflected in the academic economics literature. For example, Kharas and Pinto (1989) and Pinto (1988, 1989) suggest that a devaluation or float of the official exchange rate could be dangerous (see also Lizondo 1987). If the local currency equivalent of a (net) foreign currency payment—say, for debt—is financed by increased credit to the government, which is monetized, then the ensuing inflation does indeed depreciate the parallel market and reestablish the premium. Under the assumptions regarding foreign payments made in Kharas and Pinto's model, they also showed that a constant crawl exchange rate regime was stable.

Analysis within the Ministry of Planning and Economic Development, however, came to the opposite conclusion: that a devaluation of the official rate would both help the government implement a budget consistent with low inflation and would not lead to an offsetting depreciation of the parallel exchange rate. In addition, a persuasive argument for legalizing the parallel rate was the widely shared observation that, in reality, everyone used and needed that market, and that this fact should be legally recognized.

The analysis supporting the argument for a sharp depreciation of the official exchange rate was presented in two Ministry of Planning and Economic Development discussion papers (Morris 1989a,b). The first paper showed that changes in the parallel market exchange rate quickly led to changes in the price level. The parallel market exchange rate and the price level were both increased by increases in the money supply, which was mainly a result of central bank financing of the budget deficit. The parallel market rate was also lowered, or stabilized, by allocations of official foreign exchange by the central bank for consumer goods. The second paper focused on the impact of official exchange rate devaluation in Uganda. It demonstrated that the official exchange rate did not directly determine any component of the official balance of payments. The paper then discussed the impact of an official exchange rate devaluation on the government budget by tracking its role as an accounting price in the government's budget. Because the government was a net seller of foreign exchange—courtesy of donor support—then a devaluation increased the shilling value of foreign exchange receipts more than it increased the shilling value of foreign exchange payments. This effect remained when adjustments to the retail prices for petroleum products and the official producer price of coffee were included. Therefore, for a constant nominal shilling level of other expenditures, a devaluation of the official exchange rate led to a reduction in the budget deficit, and consequently reduced the need for financing from the

central bank. The lower central bank credit to the government reduced the growth in the money supply, and therefore reduced inflation and the rate of depreciation of the parallel market exchange rate.³

Morris (1995) formalized these arguments. First, Morris showed that the results from Kharas and Pinto (1989) and Pinto (1988, 1989)—that a constant crawl exchange rate regime was stable and that attempts to unify the exchange rate were doomed to end in higher inflation—depended crucially on the assumptions made regarding the structure of foreign exchange transactions in the budget. Given the underlying structure of Uganda's budget in the late 1980s and early 1990s (where inflows of donor balance of payments support easily outweighed debt payments), exchange unification lowered inflation and a constant crawl exchange rate regime was unstable. Because a constant crawl (albeit interspersed with periodic devaluations) accurately characterized the exchange rate regime in the late 1980s, this latter result of inherent instability helped explain part of the difficulties in implementing macroeconomic programs during that period.

Backed by this analysis, the Presidential Economic Council approved the Way Forward I strategy. The legalization of the parallel market was announced in the 1990 budget, along with a sharp depreciation of the official exchange rate. Transactions remaining at the official rate were confined to government transactions and the sale of coffee export proceeds. All other export proceeds could be sold at the prevailing market rate. The legalization of *kibanda* was a bold reform that went beyond the conditionality agreed with the IMF. It triggered a rapid expansion in noncoffee exports, from about US\$25 million in 1990 to around US\$125 million four years later. It also greatly eased the process of current transfers and released any residual rationing in imported consumer goods. Perhaps most important, legalization of the parallel market laid the foundation for the liberalization of coffee exports.

Exchange Rate Unification

Kasekende and Malik (1994) argued that a weekly auction of official foreign exchange, which began in early 1992, had largely eliminated the overvaluation of the official rate. The clearing price in the auction was the exchange rate for official transactions. The auction was well funded with donors' import support, and in only 2 of the first 10 auctions did total bids exceed the amount offered for sale. Nonetheless, a premium between the parallel and official rates persisted.

3. See also Kasekende and Ssemogerere (1994), who concluded that in 1987–92, domestic prices and parallel exchange rates were both driven by monetary expansion due to slack fiscal policy.

Kasekende and Malik (1994) argued that the transactions in the official and the parallel markets were imperfectly segmented. Some private importers could source financing in either of the two markets, creating a link between them. In particular, excess demand for foreign exchange in the official market spilled over into a relatively depreciated exchange rate in the parallel market. The only way to eliminate this effect was to merge the two markets. Other structural factors helped explain why a premium remained between the market rate and the official rate, even when the official rate appeared not to be overvalued any longer. For example, imports financed from foreign exchange bought at the auction had to be “eligible” merchandise imports and financed using a letter of credit, a requirement that ruled out most small-scale importers. Perhaps most important, imports financed from foreign exchange bought from the Bank of Uganda at the official exchange rate were more likely to be assessed for import taxes than those financed through the market, for which documentation requirements were less stringent. Indeed, the exchange rate premium narrowed in March 1992 when all shipments were required to be cleared by customs centrally, rather than at the border, where it was easier to evade import duties.

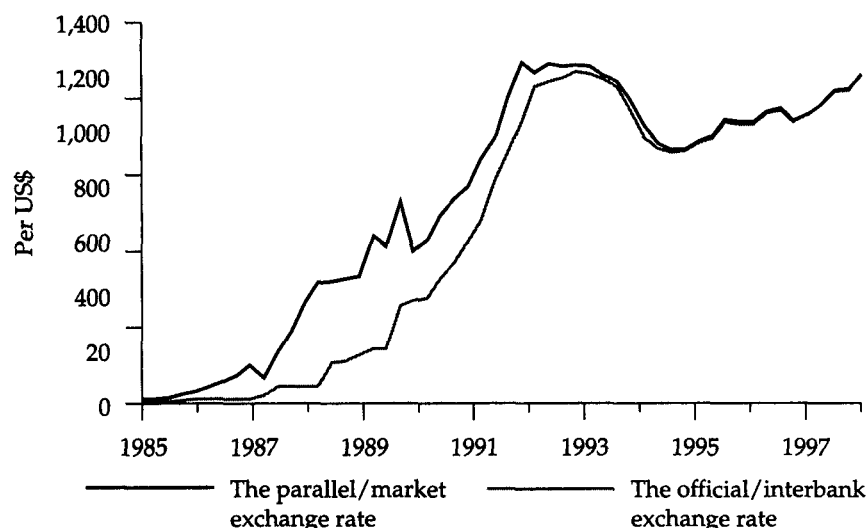
An interbank market replaced the auction in November 1993. This action unified the rates as well as the transaction costs—and evened out the likelihood of being taxed—for both markets. As a result, the market rates appreciated toward the (former) official rate, rather than converging on the relatively depreciated *bureaux* exchange rate.

Figure 3.1 shows both the official exchange rate and the market rate for 1985–98. The wide premium during the late 1980s, at a time of rapid depreciation, is clear. From 1990 onward, the more rapid depreciation of the official rate rapidly narrows the premium until 1992. During the auction in 1992–93, the premium persists until the new interbank rate in November 1993 effectively eliminates it. The residual difference between the interbank and *bureaux* rates reflects the fact that the former is largely a wholesale market, while the latter mostly caters for small, spot transactions. The figure shows a sharp appreciation in the exchange rate from late 1993 through 1994. This difficult period of exchange rate management is discussed next.

Managing a Floating Exchange Rate

The move to the interbank market in 1993 provided Uganda with a unified, floating exchange rate. During this period, two developments provided new challenges for managing the exchange rate. First, progress on the return of property confiscated by the Amin regime from the Asian population in 1972 had led to an increase in private transfers for reinvestment in those assets. Second, coffee prices rose toward the end of 1993 and in the early months of 1994 and, following a frost in Brazil, increased sharply in mid-1994. With coffee marketing and exports now liberalized, the increased export earnings

Figure 3.1. The Official/Interbank and the Parallel/Market Exchange Rates, 1985–98



Source: Ministry of Finance, Planning, and Economic Development data; Research Department, Bank of Uganda data.

and the subsequently repatriated proceeds fueled a significant increase in the supply of foreign exchange to the market. This situation, in turn, led to episodes of sharp exchange rate appreciation beginning early in 1994 and problems associated with large foreign exchange inflows (see Kasekende, Kitabire, and Martin 1996 for more details about the management of foreign exchange inflows). The difficulties provoked by the combined effect of capital repatriation and the sharp increase in international coffee prices lasted through mid-1996. The approach taken to exchange rate policy evolved as experience was accumulated.

The first intervention in the foreign exchange market was in December 1993, shortly after the start of the interbank market. When the Bank of Uganda observed the rate appreciation, it intervened to slow it, but with little effect. Apparently importers were less willing to pay a high price for foreign exchange because of the growing requirements to submit to customs inspection and assessment regardless of their source of foreign exchange. (Previously, only those who had bought funds at the Bank of Uganda auction were checked thoroughly on the value of their shipments.) In other words, the relatively tax free market exchange rate was moving more toward the tax-inclusive rate.

Because the earlier Bank of Uganda intervention had had relatively little effect, the limits of intervention in exchange rate management were already

apparent. Yet, intervention was justified to promote market stability, and thus preempt market panic. The accumulation of foreign exchange, coupled with strong pressures for an appreciation of the rate, led to a situation where some banks refused to quote for the purchase of foreign exchange. As these events unfolded in the market, government policy remained that the authorities would not target any particular exchange rate, but would intervene to maintain orderly market conduct.

The 1994 market developments appeared to have led to a relatively rapid maturity in most market participants, and it also helped establish some credibility for the government's *laissez faire* approach to the exchange rate. Although subsequent periods of turbulence have taken place, the overall performance of the foreign exchange market as a way to determine the exchange rate and allocate foreign exchange has been good enough for it not to have been called into question.

The Achievement of Macroeconomic Stability

Uganda achieved macroeconomic stability in 1992 following a fiscal crisis. Although commitment to macroeconomic stability was part of the adjustment programs agreed to with the IMF and the World Bank from 1987 onward, repeatedly loose control of budget implementation had resulted in larger than planned fiscal deficits. These deficits were financed by borrowing from the central bank, and the resulting monetary expansion led to an average annual inflation rate of 191 percent between 1986 and 1989.

Implementation of the budget closely followed the planned budget in fiscal year 1989/90, which helped inflation drop significantly. However, the following year was characterized by a renewed loss of fiscal control, a consequent expansion in credit to the government, and increased inflation. Two shocks in the first half of 1991/92 drove inflation further up. First, a drought led to sharply increased food prices. Second, there was a shortfall in both revenues and program aid inflows. The revenue shortfall was a result of overly optimistic projections, while aid inflows fell short partly because some donors waited for a foreign exchange auction to start in January 1992 before disbursing, but also because others did not deliver on pledged support. By December 1991 only one-fifth of the program aid budgeted for the fiscal year had been received. Despite this shortfall in resources, no offsetting adjustment was made to expenditures, which were financed by an increase in credit to the government equivalent to 40 percent of the money stock. As a result, inflation surged to a peak monthly rate of 10.6 percent in April 1992 (equivalent to an annualized rate of more than 200 percent).

In response to the accelerating crisis, the ministries of Finance and Planning and Economic Development were merged in March 1992. The new management, largely from Planning and Economic Development, then cut expenditure in the fourth quarter of 1991/92 by the equivalent of 1.8 percent of

gross domestic product (GDP).⁴ This measure stopped the increase in credit to the government, the expansion of the money supply, and the rise in inflation within three months.

The stabilization in the last quarter of 1991/92 marked the beginning of stability and accelerated growth in GDP. From July 1992 until June 1997, annual inflation averaged 6.6 percent and growth averaged 7.5 percent. The top two rows of table 3.1 summarize the fiscal roots of the pre-1992 inflation and the stability that followed. The outcome of fiscal policy is shown in terms of domestic government financing as a percentage of GDP and in terms of the change in the government's net credit at the Bank of Uganda. Because markets for government bonds remained thin, domestic budget financing was largely dependent on credit from the central bank.⁵ Hence these indicators show the magnitude of monetary expansion caused by fiscal policy.

Table 3.1. Inflation, Investment, and Growth before and after the Achievement of Stability

<i>Category</i>	<i>Average 1986/87–1991/92</i>	<i>Average 1992/93–1996/97</i>
Domestic government financing (percentage of GDP)	1.2	–1.4
Change in Bank of Uganda net credit to government (percentage of beginning of period money stock)	16.5	–15.0
Growth in average level of money M2 (percent per year)	105.5	28.6
Average end-period inflation (percent per year)	107.6	6.6
Private investment (percentage of constant price GDP)	6.6	9.6
Growth in total GDP (percent per year)	5.2	7.5
Growth in monetary GDP (percent per year)	6.7	9.3
Money, M2 (percentage of GDP)	6.3	9.4

Source: Republic of Uganda (various years); Ministry of Finance, Planning, and Economic Development; Bureau of Statistics; and Research Department, Bank of Uganda data.

4. This is an understatement of the decisiveness of the expenditure adjustment, because it does not count those originally budgeted expenditures that were cut to accommodate demands for additional spending made during the year.

5. The primary auction for treasury bills started in 1992, and by June 1997 the stock of outstanding treasury bills was equivalent to only 1.4 percent of GDP.

Average domestic financing was 1.2 percent of GDP between 1986/87 and 1991/92; over the same period, the average change in credit to government was 16.5 percent of the money stock. In contrast, these same ratios for the period 1992/93 to 1996/97 were -1.4 percent and -15.0 percent, respectively. Even though increased foreign inflows led to a strong buildup of reserves after stabilization, annual money growth slowed from an average of 105.5 to 28.6 percent, and as a result inflation dropped from an average of 107.6 to 6.6 percent a year over the same period.

Better fiscal management could sustain macroeconomic stability after 1992 for two reasons. First, the new management of the Ministry of Finance and Economic Planning was explicitly mandated by the president to do so by matching spending to resources. In a statement following the 1992 budget speech, President Museveni said, "There will be no inflation. Inflation is indiscipline. If there is no money then we will close down some ministries and walk." The *New Vision* (Uganda's main newspaper) reported the following: "On inflation, the President blamed the old team at the helm of the Finance Ministry for mismanagement. He said, 'You just can't print money because the World Bank has not given you money in time' He observed that the act had undermined the country's currency" (Obbo and Waswa 1992).

The second reason was the increased willingness to make intrayear adjustments to budget implementation. Just as a sharp fiscal adjustment stopped inflation, it was reasoned that simply ensuring that spending did not spin out of control from month to month would keep inflation low.

Short-run fiscal adjustments, that is, holding back budgeted spending by limiting cash releases, was made possible through use of the monthly cash flow table. The monthly compilation of fiscal and monetary data allowed the cash flow committee to track the evolution of fiscal policy. However before discussing the data, the spreadsheet, and the work of the committee (see also box 3.1), we put the cash flow into context by reviewing the planning of macroeconomic policy.

Planning and Implementing Fiscal Policy

This section distinguishes between the *ex ante* planning of macroeconomic policy, on the one hand, and its implementation through cash flow, on the other, in order to achieve inflation objectives *ex post* in the face of shocks. The distinction between these two aspects of fiscal management is important.

The Budget Framework Paper

Starting in 1992/93, the annual budget was prepared using the guidelines of the three-year Budget Framework Paper (BFP). Prepared for cabinet approval, the BFP presented proposals for all spending—its composition and levels—that fitted within available resources. The resource envelope was determined within a

Box 3.1. Cash Flow

The cash flow table showed fiscal operations every month. As the fiscal year proceeded, data on monthly out-turns replaced the monthly projections, which were originally based on the annual budget.

Data on revenue were based on the collections recorded by the Ugandan Revenue Authority (URA) and available with a lag of 10 days.

Non-URA revenue (appropriations-in-aid) was recorded by the Treasury Office of Accounts (again, with a lag).

Budget support was initially recorded by the Bank of Uganda's Foreign Exchange Operations (FEO) department when disbursed by the donor:

Foreign grants were shown as receipts "above the line."

Loan disbursements were shown as positive foreign financing "below the line."

Expenditures were recorded either as releases (the value of checks printed and issued), or as the value of checks presented to the Bank of Uganda and paid. Expenditures were categorized as interest on both domestic and foreign debt, as wages and salaries, and as other recurrent and local development spending. Once district administrations were decentralized, the transfers to districts were shown separately.

Foreign financing was the sum of loan disbursements and amortization.

Bank of Uganda financing was the sum of net changes in the government's balances at the Bank of Uganda (sometimes referred to as changes in the "ways and means" account) and the change in Bank of Uganda holdings of treasury bills.

Commercial bank financing was the sum of changes in government-held accounts at commercial banks and changes in commercial banks' holdings of government securities, which could include promissory notes as well as treasury bills.

Nonbank financing was primarily changes in the nonbank holdings of treasury bills (although in 1996/97, a large quantity of promissory notes was also issued).

There were differences in timing and valuation in the records of some elements of the cash flow table. For example, although the URA initially recorded revenue as collections, the accounts of the Bank of Uganda showed revenue only when it was received from a transfer from the URA revenue accounts at the Uganda Commercial Bank (UCB). As a result, if URA data were to be used as the record of revenue, an adjustment for the difference between revenue received by the revenue account at the UCB and the revenue transferred from the UCB into the consolidated fund at the Bank of Uganda had to be made.

(box continues on following page)

Box 3.1 continued

This situation also applied when there were differences between donor funds received by the FEO and those credited to the government accounts, and between the value of releases, checks printed, and of checks paid and debited from the government accounts. These alternative sources of data were used for presentations on a commitments and on a cash basis, with the differences reflected in an adjustment to cash. The magnitude of the differences between data on the same flow, but monitored at different points, was largely a function of the slow rate at which Bank of Uganda accounts were compiled, but could also have been caused by different valuation dates for foreign transactions. Taken together, the timing differences from different data sources, possible valuation differences, and the potential difficulties in the classification of government accounts help explain why a residual appears at the bottom of the cash flow spreadsheet, if not its fluctuations or magnitude (see table 3.2).

Table 3.3 shows the relationships between the various data lags for compiling the cash flow and for the data on money and prices on the one hand, and the timing of the decisions on releases taken by the monthly cash flow committee on the other. The committee usually met in the third week of each month, when some provisional data (although not from the Bank of Uganda accounts) would be available on the out-turn of the previous month. Actual fiscal data for month t would not be available until month $t + 2$, along with base money and a provisional figure for currency in circulation. Data on broad money for month t would not be finalized until month $t + 3$, although price statistics were usually available for each month with minimal lags.

macroframework, which used conventional financial programming to ensure that the planned fiscal stance was consistent with projected changes in reserves, expected growth in private credit, and monetary growth deemed consistent with low inflation. From 1993 to 1996, the BFP also addressed some medium-term issues in budgetary allocation, such as the wage bill and allocations to the road sector (see Tumusiime-Mutebile 1999 for more information on the development of Uganda's medium-term expenditure framework). From 1996, the BFP process began providing comprehensive allocation of spending across sectors within the three-year macroframework, which was explicitly linked to sectoral policy objectives. The annual budget represented, in effect, the first year of a three-year rolling expenditure plan. The budget process was designed to better manage the tension between demands for expenditures from various parts of government and the resources available, consistent with both macroeconomic stability and the government's sectoral policy objectives.

Cash Flow

Beginning in fiscal year 1992/93, the budgeted spending plan was implemented through monthly cash releases, or authorizations to spend, and the

Table 3.2. Actual Budget and Cash Flow Out-Turn, 1991/92–1996/97
(cash basis, excluding donor-financed projects)

Category	1991/92		1992/93		1993/94		1994/95		1995/96		1996/97	
	Original program	MFEP out-turn	Revised budget	Cash flow out-turn	Government budget	Cash flow out-turn	Original program	Cash flow out-turn	Government budget	Cash flow out-turn	Government budget	Cash flow out-turn
<i>U Sh billions</i>												
Revenue and grants	333.4	242.3	421.9	406.1	460.1	488.6	527.0	594.6	678.1	727.4	891.5	860.5
Total revenue	204.1	185.4	288.0	293.2	384.7	398.9	478.3	528.8	614.0	643.8	829.3	741.4
Grants	129.4	56.9	133.9	112.9	75.4	89.7	48.8	65.7	64.1	83.6	62.3	119.0
Expenditures and net lending	320.2	281.1	362.9	338.5	436.3	434.2	513.6	539.1	615.9	638.3	797.0	753.8
Recurrent expenditure	251.3	235.9	301.3	301.6	381.3	367.5	442.6	450.2	539.4	545.3	649.7	634.3
Domestic development and net lending	68.9	45.2	61.6	37.0	55.0	66.7	71.0	88.9	76.5	93.0	147.3	119.5
Overall deficit (commitment)	13.2	-38.8	59.0	67.6	23.7	54.4	13.4	55.5	62.2	89.1	94.5	106.7
Primary balance	3.2	-30.7	30.2	34.0	70.9	77.3	74.4	117.6	142.0	146.2	229.1	165.1
Overall deficit (cash)	-14.0	-74.8	-4.6	-2.9	-37.7	-29.2	-30.9	10.2	7.8	75.0	54.0	82.0
Financing	14.0	74.8	4.6	2.9	37.7	29.2	30.9	-10.2	-7.8	-75.0	-54.0	-82.0
External	56.4	32.4	27.0	14.4	51.0	50.6	77.5	33.3	61.2	0.6	33.2	-5.3
Domestic	-42.4	42.4	-22.4	-15.5	-13.4	-35.0	-46.6	-26.8	-64.1	-39.3	-75.0	-42.1
Bank of Uganda	-49.4	35.3	-32.4	-21.7	0.0	-61.7	-46.6	-57.2	-51.6	-67.0	-85.0	-92.5
Residual	0	0	0	4	0	14	0	-17	-5	-36	-12	-35
<i>Percentage of GDP</i>												
Revenue and grants	15.3	9.4	11.2	11.2	11.7	12.1	10.6	12.3	12.5	13.2	14.4	13.6
Total revenue	9.4	7.2	7.6	8.1	9.8	9.9	9.7	11.0	11.3	11.7	13.4	11.8
Grants	5.9	2.2	3.6	3.1	1.9	2.2	1.0	1.4	1.2	1.5	1.0	1.9

(table continues on following page)

Table 3.2 continued

Category	1991/92		1992/93		1993/94		1994/95		1995/96		1996/97	
	Original program	MFEP out-turn	Revised budget	Cash flow out-turn	Government budget	Cash flow out-turn	Original program	Cash flow out-turn	Government budget	Cash flow out-turn	Government budget	Cash flow out-turn
<i>Percentage of GDP (continued)</i>												
Expenditures and net lending	14.7	10.9	9.6	9.3	11.1	10.8	10.4	11.2	11.3	11.6	12.8	12.0
Recurrent expenditure	11.5	9.1	8.0	8.3	9.7	9.1	8.9	9.3	9.9	9.9	10.5	10.1
Domestic development and net lending	3.2	1.7	1.6	1.0	1.4	1.7	1.4	1.8	1.4	1.7	2.4	1.9
Overall deficit (commitment)	0.6	-1.5	1.6	1.9	0.6	1.3	0.3	1.1	1.1	1.6	1.5	1.7
Primary balance	0.1	-1.2	0.8	0.9	1.8	1.9	1.5	2.4	2.6	2.6	3.7	2.6
Overall deficit (cash)	-0.6	-2.9	-0.1	-0.1	-1.0	-0.7	-0.6	0.2	0.1	1.4	0.9	1.3
Financing	0.6	2.9	0.1	0.1	1.0	0.7	0.6	-0.2	-0.1	-1.4	-0.9	-1.3
External	2.6	1.3	0.7	0.4	1.3	1.3	1.6	0.7	1.1	0.0	0.5	-0.1
Domestic	-1.9	1.6	-0.6	-0.4	-0.3	-0.9	-0.9	-0.6	-1.2	-0.7	-1.2	-0.7
Bank of Uganda	-2.3	1.4	-0.9	-0.6	0.0	-1.5	-0.9	-1.2	-0.9	-1.2	-1.4	-1.5
<i>Memorandum items</i>												
GDP (current prices, factor cost, U Sh billions)	2,182	2,588	3,766	3,626	3,924	4,036	4,953	4,828	5,428	5,521	6,203	6,307
Annual inflation (underlying, end-period, percent)		50		9		9		9		9		2
Annual inflation (all items, end-period, percent)		66		-2		16		4		5		10
Annual inflation (all items, period average, percent)		42		30		7		8		7		8

MFEP Ministry of Finance, Planning, and Economic Development.

Note: Fiscal year runs from July 1 to June 30.

Source: Ministry of Finance, Planning, and Economic Development data.

Table 3.3. Information Lags, Cash Flow Compilation, and Short-Term Macroeconomic Management

<i>End-Month t</i>	<i>Month $t + 1$</i>				<i>Month $t + 2$</i>				<i>Month $t + 3$</i>			
<i>Weeks</i>	1	2	3	4	5	6	7	8	9	10	11	12
Fiscal data		Uganda Revenue Authority revenue collections				Non-Uganda Revenue Authority revenue collections and receipts						
			Provisional revenue receipts			Actual revenue receipts						
			Programmed grant receipts			Actual grant receipts						
Nonproject expenditure releases		Checks printed				Actual checks paid						
			Provisional checks paid									
Debt authorizations		Treasury bill sales and stocks	Debt payments									
			Provisional foreign financing									
			Provisional Bank of Uganda financing			Actual Bank of Uganda financing						
			Provisional treasury bill financing			Actual treasury bill financing					Actual commercial bank financing	
Monetary data												
Exchange rates daily			Initial estimate of base money		Provisional base money		Actual base money and provisional M0		Provisional monetary survey and bank liquidity indicators		Actual monetary survey (including broad money)	
Real economy	Month t prices				Month $t + 1$ prices				Month $t + 2$ prices		Index of key industrial production	
			Cash flow committee meeting for month $t + 1$				Cash flow committee meeting for month $t + 2$		Month t 's stance starts to appear in the consumer price index		Cash flow committee meeting for month $t + 3$	

Source: Henstridge (1997).

magnitude of spending was decided by a monthly cash flow committee, made up of representatives of the main institutions involved in monitoring macroeconomic policy.⁶ Each month's fiscal operations were tracked using the cash flow spreadsheet, and the budgeted monthly spending limits were adjusted if events—particularly revenue shortfalls, additional spending demands, and monetary shocks—unfolding throughout the year threatened the achievement of low inflation.

The cash flow tables and the decisions of the cash flow committee guided monthly cash releases in the implementation of the annual budget, but it was not a cash budget, as operated, for example, in Tanzania and Zambia. A cash budget typically determines one month's expenditure with reference either to the previous month's revenues or some other fixed rule for balancing the budget every month. In Zambia the monthly cash budget limited recurrent expenditures (including domestic interest payments) to recurrent revenue (excluding grants). As Adam and Bevan (1997) note, it is technically simpler to operate a cash budget than a conventional budget, and thus easier to maintain control. Publicly announcing the use of such a clearly defined and relatively simple system allows the government to communicate commitment to fiscal discipline to the private sector and to aid donors. Adam and Bevan also discuss some of the difficulties with such rules-based operations, including issues related to balancing the budget over time, which is not automatically desirable, and renunciation of smoothing between (often lumpy) receipts and expenditures. In contrast, the cash flow was more sophisticated and flexible. It did not renounce smoothing; and its use was not the subject of a public declaration on the means with which low inflation would be delivered. The credibility of the resource envelope as a way of limiting total spending was bolstered by President Museveni's public support. Wider credibility of macroeconomic management in Uganda has been established through a track record of low inflation.⁷

Each fiscal year the cash flow was based on the annual budget projections. Revenues were projected using a seasonal pattern of revenue. The monthly schedule for payments of principal and interest and the expected timing for disbursements of loans and grants were used, along with a pro-rata projection of the remaining elements of the cash flow. As the fiscal year proceeded, the data on out-turns replaced the projections, enabling the Ministry of Finance to track the budget implementation and thereby ensure that the decisions of the

6. The participants in the cash flow committee included departmental representatives from the Ministry of Finance and Economic Planning with an interest in revenue mobilization and expenditure management, and representatives from the Bank of Uganda with an interest in tracking the government's foreign receipts and payments and the conduct of monetary policy. In 1998/99 the frequency of expenditure releases changed from monthly to quarterly.

7. Stasavage and Moyo (1999) provide a more detailed comparison of Uganda's cash flow framework with Zambia's cash budget operation, including the respective benefits and drawbacks.

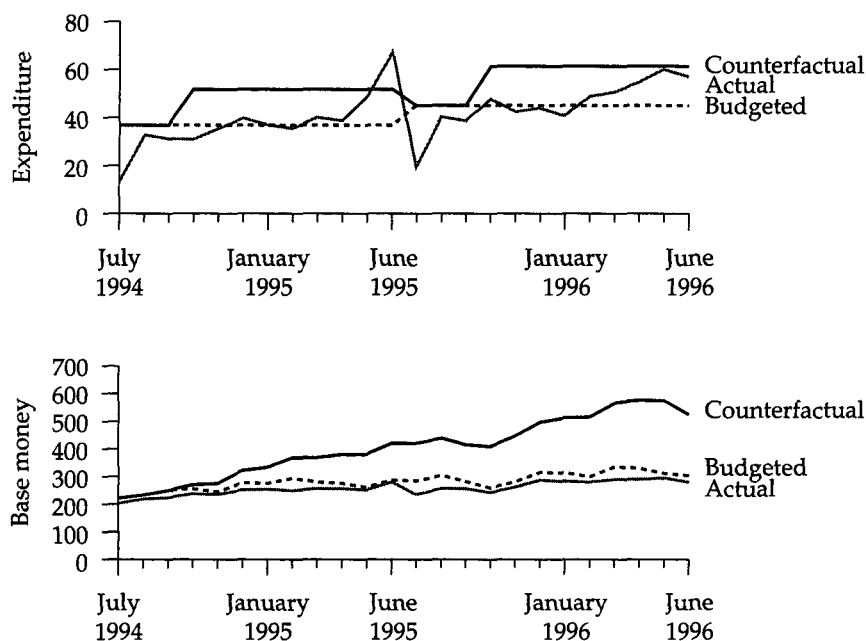
cash flow committee were as well informed as possible. The structure and use of the cash flow framework is discussed more fully in box 3.1 and in Henstridge (1997). Table 3.3 shows the sequencing of available fiscal data, the compilation of each month's cash flow table, the timing of price and monetary data, and the meetings of the cash flow committee.

In the absence of shocks, the implementation of the budget through the monthly releases monitored by the cash flow would lead to the same outcome as a conventional budget system, except perhaps that broadly equal monthly releases would imply more smoothing of expenditures across the fiscal year. In practice, even in the absence of shocks, expenditure releases in Uganda were usually less than *pro rata* during the first quarter because parliament tended not to approve the budget until September. This delay also provided some time to assess the reliability of revenue projections, particularly when there had been changes to the tax system. Depending on the ministry's level of confidence in the revenue and aid projections, total expenditure was usually higher in the second and third quarters than during the first quarter, and closer to the budget. The rate of spending during the last quarter was influenced by both performance in the first three quarters against the targets for the fiscal year as a whole and the intensity of pressures for extra spending. This pattern of spending is illustrated in the bottom graph in figure 3.2.

Intrayear adjustments were made if either fiscal shocks emanating from requests for supplementary spending or macroeconomic shocks exceeded the capacity of monetary policy to maintain stability. An adjustment typically meant a reduction in releases for nonwage recurrent spending. The use of the cash flow for fiscal management has generally led to a tighter fiscal outcome than originally programmed. Table 3.2 shows the budget and the out-turn recorded by the cash flow tables between 1991/92 and 1996/97. Donor-financed projects are excluded because compiling accurate out-turn data was problematic, and because project expenditures could not be controlled using the cash flow. The top part of table 3.2 shows the budget and out-turn in nominal terms. The bottom part shows the same data as percentages of nominal GDP, using the projected GDP for the budget and actual GDP for the out-turn. The out-turn on inflation is shown at the bottom of the table.

In 1991/92—before the cash flow tables and regular meetings of the cash flow committee had started—the lack of intrayear fiscal control is indicated by domestic financing, mostly as increased credit from the Bank of Uganda, of about U Sh 85 billion (close to 4 percent of GDP) higher than budgeted. In contrast, a tighter than budgeted out-turn has been achieved for every year since 1991/92. In 1992/93 revenues and grants were U Sh 16 billion below budget projections, but expenditures and net lending were U Sh 24 billion less than budgeted, leading to a smaller overall deficit than programmed. In the following three years, revenues and grants were higher than projected, but expenditures increased by less than the additional resources (and they decreased in 1993/94). Table 3.2 shows that overall, the planned fiscal stance in the budget has been consistent with stability. However, the fact that the out-turn was usually less than programmed implies

Figure 3.2. Actual and Counterfactual Government Budgetary Operations, 1994/95–1995/96
(U Sh billions)



Source: Ministry of Finance, Planning, and Economic Development and Bank of Uganda data.

that achieving low inflation largely depended on careful budget implementation through the use of the cash flow.

Fiscal Shocks

The experience of resources falling short of budget projections was the main reason for adopting a monthly cash flow system. However, since 1992 the main fiscal shocks have come from persistent demands within the government to increase spending within each fiscal year. To understand the potential impact of these demands for extra or supplementary expenditures, see figure 3.2. The top graph in this figure shows actual expenditures, the monthly average of budgeted expenditures, and counterfactual expenditures for 1994/95 and 1995/96. The latter are equal to the total supplementaries approved by parliament evenly distributed over the last nine months of each fiscal year.⁸ Had all else

8. The amounts finally approved by parliament in 1994/95 and 1995/96 were much smaller than those originally requested by spending ministries; in figure 3.2,

remained the same, the supplementaries would have been financed by increased credit to government, leading to more base money, as shown in the bottom graph of figure 3.2. Counterfactual base money peaks at U Sh 560 billion, which is about twice both the actual and programmed levels. Assuming that prices would have increased in proportion to the excess increase in the supply of money, inflation would have risen to an annual rate of at least 25 percent.⁹ This figure understates the consequences of such monetary expansion, because annual inflation rates higher than about 10 percent are likely to lead to a sharp reduction in the private sector's demand for real money balances. Therefore, higher inflation would have sharply increased the velocity of money, and inflation would rise much more than implied by the counterfactual series on base money.

Given these demands for extra spending, the Ministry of Finance faced a tradeoff. It could either keep the allocations in the original budget intact, adding the extra supplementary spending to total spending, or it had to cut other expenditures to retain control of total spending. As the ministry was charged by the president to maintain price stability, it decided to keep total expenditures within the resource envelope, and balance the supplementary spending by cuts elsewhere in the budget.

Following the introduction of the cash flow system in 1992, there was no shortfall in donor resources—although it was still difficult to predict the timing of disbursements. A small shortfall of revenue occurred in 1993/94, but it was not until 1996/97 that actual receipts were significantly less than projected, in this case by the equivalent of 1.4 percent of GDP.¹⁰ The ability to monitor the budget implementation through the cash flow system enabled the government to cut expenditures (on a cash basis) by 0.76 percent of GDP, with the remaining gap more than offset by increased foreign grants. At the same time, however, higher expenditures (on a commitment basis) were financed by increased domestic arrears. Arrears were the result of a lack of control over the line ministries' ability to enter into expenditure commitments. Despite the increased domestic arrears, the adjustments made to cash expenditure in 1996/97 delivered low underlying inflation of 2 percent, despite lower than projected revenue.¹¹ This is quite an achievement compared with the underlying inflation of 50 percent that followed the failure to adjust to a revenue shock in 1991/92. In the face of a shock to resources, maintaining low inflation—although not impossible in the absence of the cash flow system—was certainly facilitated by it.

they were allocated over the last nine months of the fiscal year because parliamentary approval was not forthcoming until three months into the year.

9. Assuming a constant demand for real money balances.

10. Revenues were U Sh 90 billion less than projected, owing to sluggish imports and the difficulties in implementing a new value added tax.

11. The underlying inflation index excluded food crop prices (but included processed food), and was not, therefore, sensitive to the possibility that dry weather would push up food crop prices.

External Shocks

In addition to absorbing within-year fiscal shocks, the cash flow system helped the government respond to macroeconomic shocks that could otherwise have led to higher inflation. As discussed previously, Uganda experienced a coffee boom in 1994–96 coupled with significant inflows of foreign capital. Both threatened to lead to a major appreciation of the exchange rate.

Generally, in formulating fiscal policy a tradeoff was perceived between increasing donor budget support and the concern that doing so would contribute to an overvaluation of the real exchange rate. This tradeoff also surfaced when the government's economic team tried to dampen nominal exchange rate appreciation during the course of the fiscal year. To offset nominal appreciation, increased foreign reserves were projected arising from the Bank of Uganda intervention in the foreign exchange market; these interventions were to be offset by reductions in net credit to government. This, of course, implied a tighter fiscal policy.¹² Similarly, if the corresponding monetary injection were perceived to threaten price stability, then an offsetting reduction in net domestic assets through fiscal tightening had to be made.

The theory behind, and actual experience of, temporary trade shocks suggest that they lead to an appreciation of the real exchange rate, either through an appreciation of the nominal exchange rate, an increase in the price level, or some combination of both (see Bevan, Collier, and Gunning 1989, 1990; Collier and Gunning 1996). The appropriate fiscal response to a temporary trade shock and to increased inflows of foreign capital is to increase public savings, which is what the Ugandan government did, as reflected in the negative central bank financing from 1993/94 onward (table 3.2). These reductions in central bank credit to the government were achieved in part by setting a tight budget, but were also sustained through the cash flow system. In addition, the government imposed a coffee stabilization tax, which was a hotly debated topic in Uganda at the time. Arguments for and against the coffee tax are presented in boxes 3.2 and 3.3.

The role of the cash flow in managing the consequences of the coffee boom is illustrated in figure 3.3. The top graph shows that the increase in the terms of trade was followed, with a lag of one quarter, by an increase in the producer price of coffee. With a lag of another quarter, there is a sustained increase in underlying inflation (here a weighted average of the quarterly underlying inflation index).¹³ The bottom graph shows that underlying inflation increased sharply during 1995 and shows the discrepancy between the planned budget and the implemented fiscal stance (as proxied by the budgeted and actual

12. Bevan (1998) concludes that the impact on the exchange rate of additional inflows is at worst ambiguous, at best benign.

13. The means and ranges of these series have been adjusted to maximize visual correlation, and the left-hand scale is therefore that of the terms of trade index.

Box 3.2. Arguments for the Coffee Stabilization Tax

In June 1994, frost in Brazil triggered a sharp, but temporary, increase in international coffee prices. Uganda expected to earn US\$500 million over the year to September 1995, compared with coffee export earnings of US\$180 million over the year to September 1994. The increase in coffee export earnings was expected to be equivalent to more than 70 percent of the stock of broad money at the end of December 1994, and thus presented a potentially serious threat to monetary stability. The rational private response, that is, to accumulate domestic financial assets, would look the same in the monetary statistics as an inflationary monetary expansion, the difference being that the latter would quickly lead to inflation. The risk was that the magnitude of monetary expansion involved could have been so large that little could have been done in the event of an unwarranted monetary expansion regardless of the source to rescue price stability.

It was not clear that the Kenyan experience during the 1970s coffee boom would be replicated (see Bevan, Collier, and Gunning 1990). The structure of the coffee export sector was different, being private and liberalized in the 1990s in Uganda. Payments were made largely in cash, whereas in Kenya they were deposited in farmer's accounts. Finally, far fewer bank branches were within easy reach of most Ugandan coffee farmers, raising doubts about the likelihood of the coffee windfall being held in domestic financial assets (other than cash) to the same extent as had been possible in Kenya.

Faced with these risks, the government decided to introduce a graduated tax on coffee export earnings above a threshold. The rates and threshold were decided following extensive consultations with the coffee exporters. The coffee stabilization tax was set at 20 percent on receipts above a threshold of U Sh 1,100 per kilogram, and 40 percent on receipts above U Sh 2,200 per kilogram. The lower threshold was determined relative to a normal rate of net profit. The tax was specifically designed so that the government would save rather than spend the money during the boom, allowing the Bank of Uganda to purchase foreign exchange from the market and thus ease some of the pressures on the exchange rate without increasing reserve money.

The coffee stabilization tax came into force late in 1994. Collections amounted to US\$15 million in fiscal year 1994/95, and US\$13 million in 1995/96, the second and final year of the boom. Ex post, while the coffee tax revenue did afford modest room for intervention in the foreign exchange market, much more was gained through larger savings from general budgetary operations. In the event, the risks—reasonably perceived ex ante—did not materialize.

change in credit to government). Between the second quarter of 1994 and the first quarter of 1996, government savings with the Bank of Uganda increased each quarter as the cash flow system enabled the government to implement a tighter than budgeted fiscal policy in response to the increased inflation. The short-term fiscal response also manifests itself in reduced volatility of actual central bank financing relative to the budget. In addition, from the beginning

Box 3.3. Arguments Against the Coffee Stabilization Tax

While windfall taxation was a reasonable response to the perceived risks the coffee boom posed for macroeconomic stability, the government's argument that it was necessary to reduce exchange rate appreciation during the boom was based on a misreading of private responses to a temporary income windfall. The increase in coffee prices, triggered by a frost in Brazil, was not a unique event. Ugandan coffee farmers clearly remembered the previous boom of the late 1970s and thus would have likely understood that their income gains would be temporary. Faced with such an income surge, the rational response is to use the money to boost savings and investment rates. Initially, these savings would be liquid and then gradually converted into fixed assets over time. In aggregate, the only liquid asset that the private sector could acquire was claims on the government in the form of cash, since other financial claims net out. Hence, the coffee boom would be expected to cause an initially large increase in the demand for real money balances, followed by a decline and a surge in fixed investment.

The task of the authorities was to accommodate this private sector savings and investment strategy rather than to nullify it through taxation. Indeed, since the private sector had not invested in Uganda for more than 20 years, a private investment boom was socially highly desirable rather than an appropriate object for taxation.

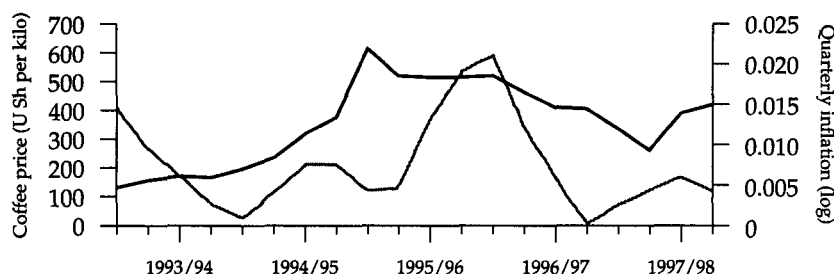
As so little revenue was collected by the tax, its effects—good or bad—on the progress of the boom were marginal. The monetary and real effects of the windfall proceeded as described above. Initially, the demand for real money balances increased sharply. Because the Ugandan economy is characterized by highly flexible prices (a legacy of the demise of long-term contracts under the stress of volatility), the private sector could achieve desired real money balances through changes in the price level.

In real terms, private fixed investment rose by 38 percent in the first year of the boom (from July 1994 to June 1995) and by an additional 17 percent in the following year. The investment rate out of the private income windfall from the coffee boom was probably well over 50 percent. Finally, by the early 1990s, Ugandan coffee farmers had below average household incomes (see chapter 4 in this volume). Hence, as shown in chapter 9, a stronger coffee tax would have been more regressive, as well as hitting private investment harder. It proved to have been unnecessary as a stabilization measure, having made only a small contribution to the significant fiscal savings that were accumulated anyway. It also had the potential to discourage coffee planting in the long term if coffee farmers anticipate that during the next coffee boom the tax will be reintroduced. This was why it was so critical to remove the tax from the statute book, even though by 1996 the price of coffee had fallen so that revenue was no longer being generated.

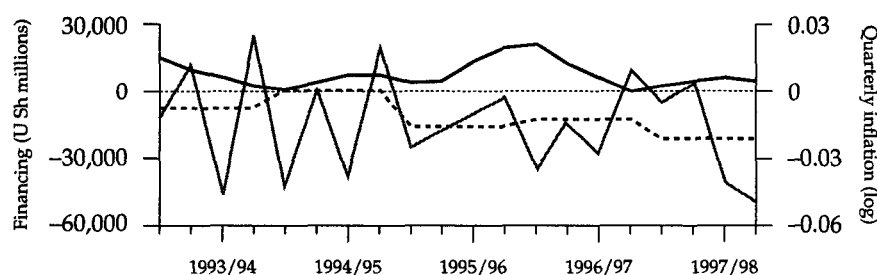
of 1994 the nominal exchange rate appreciated, which was partially countered by intervention in the foreign exchange market. Reductions in net domestic assets through tighter fiscal policy were intended to offset the monetary impact of increased net foreign assets.

Figure 3.3. Short-Term Fiscal Response to Increased Inflation, Fiscal Years 1992/93–1997/98

The producer price of coffee and inflation



Inflation, budgeted, and actual Bank of Uganda financing



Source: Ministry of Finance, Planning, and Economic Development data.

Targets, Tradeoffs, and Costs in Macroeconomic Management

The operation of the cash flow system raises a number of questions. Why target inflation when implementing the budget rather than the monetary aggregates that are used to prepare the budget? Why emphasize short-term fiscal adjustment rather than a more active use of monetary policy? What were the costs of short-term fiscal adjustments in terms of reduced quality of public spending?

Inflation Targeting

Inflation was targeted for two reasons. First, prices were flexible and responded quickly to changes in the money supply. Second, there was a three-month lag in the compilation of monetary statistics, while the consumer price index was available at the end of each month. Taken together, this meant that changes in monetary conditions showed up in prices at about the same time that they appeared in the statistics for broad money. Table 3.3 shows the rolling timetable for the compilation of cash flow and the information lags involved in

tracking the implementation of the budget and the evolution of money and prices. Looking directly at the price data sidestepped the difficulties of separating signal from noise in the monetary data, especially for the unpredictable short-run changes in money demand that are characteristic of a remonetizing economy like the one in Uganda. Price flexibility is illustrated by inflation having stopped within one quarter in 1992.

It is not that the demand for money in Uganda is fundamentally different from most other economies (see Henstridge 1999). Indeed, the long-run stability of money demand was central to the financial programming used to construct the budget and in the fiscal program agreed with the IMF. But the use of a formal money demand relationship in short-term macroeconomic management was difficult for two reasons. First, the demand for money relationships estimated for Uganda used quarterly data, which were not available quickly enough to be incorporated into the analysis behind short-term adjustments. Because many of the data were produced with a long lag, the breadth of assumptions that would have to be made in order to project money demand were more likely to be hostages to fortune than accurate inputs into short-term policy decisions. Second, in a shock prone, flexible price economy that was in the process of remonetizing, there were unpredictable short-term shifts in money demand. Even if the path of real money balances were to be convincingly projected on a quarterly basis, a judgment on whether monthly fluctuations in monetary conditions are out of line with the quarterly projections would still have to be made. The most timely and reliable data to inform such a judgment would come from current inflation, which therefore might as well be targeted directly. Trying to follow a short-term monetary program would largely have consisted of trying to work out why there was price stability when the program appeared to be off-track. Indeed, the Bank of Uganda's experience with a reserve money program, which is predicated on a stable relationship between the monetary base and broad money, has found that the remonetization of the economy and increasing confidence in financial instruments has made it difficult to sustain the assumption of a stable money multiplier. With wild fluctuations observed in the multiplier, the central bank relies on a broad range of indicators of monetary conditions, including the excess reserves held by commercial banks and the trends in the discount rates on treasury bills.

Short-Term Fiscal Adjustment versus Monetary Policy

This chapter has emphasized the role of the cash flow system and short-term fiscal adjustments in the implementation of macroeconomic policy. Fiscal adjustment both reduced demand directly and led to a reduction in credit to the government and, therefore, to a reduction in net domestic assets and base money. Fiscal adjustments were made because the scope for independent monetary policy has been too limited, even though the budgets have been consistent with macroeconomic stability since 1992.

Two monetary policy instruments were available: changing the reserve requirements of commercial banks and issuing treasury bills. In addition,

the Bank of Uganda retained control of the rediscount rate when interest rates were liberalized. However, in an uncompetitive, segmented commercial banking sector with excess liquidity, changes in the rediscount rate had little bite. Changing the banks' reserve requirements would, in principle, reduce lending at the margin, and hence lower net domestic assets and money in the economy. The central bank was unwilling, however, to change reserve requirements, because several of the smaller commercial banks were too fragile to comply without becoming bankrupt. While the argument against active use of reserve requirements might have been reasonable with regard to the immediate stability of the financial sector, it neutered one instrument of monetary policy.

What remained was the treasury bill. However, the government's judgment was that a short-term fiscal adjustment provided more monetary bite—both through a reduction in base money and a reduction in aggregate demand—for a given shilling cost, than did increased issues of treasury bills.

The volume of sales of treasury bills in the primary auction managed by the Bank of Uganda was not determined by the government's financing requirements. Since June 1992, the government has set budgets with no planned increase in domestic borrowing. The main reason for these sales was to develop a capital market, specifically a secondary market in treasury bills, within which the Bank of Uganda could conduct open market operations. Until 1996/97, however, there had been virtually no secondary trading of treasury bills. Banks held the bulk of outstanding bills (83 percent of a total of U Sh 88 billion in June 1997), so the treasury bill as an instrument of monetary policy was limited to its influence on the composition of the banking system's assets. Many commercial banks held large cash reserves because they were underlent and had a strong liquidity preference. The net effect of additional sales of treasury bills on banks' liquidity depended on whether any of these excess reserves would have gone into increased lending instead of additional treasury bills. If so, then there was some dampening of liquidity. This dampening was unlikely, however, because the reasons why banks had excess reserves in the first place had not changed. From a commercial bank's perspective, lending to the private sector was much like an equity investment, because audits had little credibility, making systematic risk assessment difficult; and foreclosure or loan recovery through the courts was difficult, if not impossible. If, for these reasons, additional treasury bills did not substitute for lending, then sales in the primary auction served as substitutes for otherwise unremunerated excess reserves, and had no impact on monetary conditions—a classic liquidity trap.

The banks also held excess reserves because of a strong liquidity preference in the absence of an interbank or overnight market. Beyond the point where additional treasury bills served to remunerate excess reserves, banks required sharply higher interest rates to compensate for the increased risk of reduced liquidity. As a result, increased primary issues of treasury bills beyond the point where they started to have a monetary impact led to a sharply higher interest cost for the government budget. As mentioned before, in the

government's view a short-term fiscal adjustment provided more monetary bite for a given shilling cost than did increased issues of treasury bills. Hence, fiscal adjustment was the preferred instrument of short-term management.

Largely as a result of a combination of macroeconomic stability and improvements in financial oversight and bank supervision, financial markets in Uganda have become more sophisticated in recent years. The level of monetization (the ratio of broad money to GDP) increased to 13 percent of GDP in 1998, compared with 10 percent in 1994. Financial savings as a ratio to GDP increased to 35 percent in 1998, compared with 27 percent in 1994. The ratio of the outstanding stock of treasury bills to broad money is 23 percent, compared with 11 percent in 1994, and bank holdings of excess reserves have been reduced. These developments have increased the potency of monetary policy and strengthened the link between the foreign exchange market and the domestic financial markets. During an episode of sharp depreciation in 1999, the central bank tightened monetary conditions using indirect monetary instruments (the rediscount rate and issues of treasury bills) with some success.

Costs of Budget Discipline

Making within-year adjustments to the releases of funds clearly disrupts original spending plans, partly because it increases volatility, and—arguably more seriously—because it weakens the budget as the instrument for allocating public resources.¹⁴ These are common objections to the use of spending cuts in implementing macroeconomic policy and to the use of cash budgets.

However, the extent to which the use of the cash flow system for macroeconomic management can be blamed for the costs is limited. Ministries could face within-year cuts to their approved budgets for two reasons. In one case, they may need to cut aggregate total spending to make up for a shortfall in the resource envelope. In another, they might need to cut one ministry's budget to accommodate extra spending by another ministry to keep total spending under control. The accommodation of powerful ministries' overspending—usually those close to the president—accounted for two-thirds of the variation between the budgeted allocations for each ministry and the eventual out-turn between 1992 and 1997 (Moon 1997). The cash flow system was not responsible for the prevalence or persistence of demands for supplementary spending—indeed, Stasavage and Moyo (1999) argue that such ill-discipline was at least as rampant prior to the adoption of the cash flow system—and in fact, it was essential for containing the damage. The combination of

14. Although assessing the microeconomic costs would be difficult, such assessments could strengthen the apparently weak connection between the release of funds and the achievement of the desired delivery of public services at the facility level (see chapter 11 in this volume).

resource-constrained budgeting *ex ante* and its implementation *ex post* using cash flow simply made abysmal budget discipline more obvious. The public spending program most frequently suffered from unexpected cuts because supplementary expenditures were approved, rather than as a result of the operation of cash flow *per se*.

Furthermore, when the loss of expenditure control results in sharply increased inflation, the real purchasing power of the cash allocations in the original budget would be diminished anyway. Therefore, cutting nominal allocations to control inflation may not be as costly for spending programs as it first appears.

In any case, the appropriate tradeoff between the costs and benefits of making expenditure cuts should extend beyond the confines of the government's expenditure program, across the entire economy. If the government decides not to cut expenditure, the benefits to spending ministries of receiving their nominal allocations—despite increased inflation—and the benefits to the integrity of the budget process have to be weighed against the costs of the increased inflation to the private sector. The indicators shown in table 3.1 imply that these costs would have been large. The impact on expenditures for social programs that would help reduce poverty (such as health and education) was minimized by designating this spending as “priority program area” expenditures, which would not be subject to cuts. In effect, protecting the priority program areas from cuts was equivalent to a contingent decision on which items would be hit if, or in most years when, budget discipline broke down.

As mentioned previously, a drawback of using intrayear adjustment of spending was that the cash flow system imposed discipline on the total budget aggregates, which undermined the budget formulation process as some ministries became increasingly skeptical whether their allocations, approved by parliament, would survive the first few months of supplementaries. Evidently, the solution to this problem is not to relax fiscal policy, but to strengthen budget discipline through political will.¹⁵

Commitments and Arrears

Achieving restraint through control of cash spending does not prevent an accumulation of commitments to spend. If, in the face of a commitment to spend, the cash for payment is not released, the spending has not been cut, it has instead been financed by the accumulation of arrears. As well as distorting the allocation of public resources, the accumulation of arrears can also lead to inflated contracts, as suppliers factor into their prices the likely delay in payment as well as a premium for the risk of not getting paid at all. A system of local letters of credit was set up to prevent suppliers from

15. The costs of poor budget discipline had been a feature of the BFP since 1995/96. From 1997/98 onward, improvements in discipline have been addressed directly in the BFP as part of the process of compiling the budget.

contracting to deliver or actually delivering goods and services unless the means of payment had been earmarked in a government account at the Bank of Uganda. This system did not prevent arrears from accumulating to a total of about U Sh 260 billion by 1999 (28 percent of domestic revenue), partly due to a cumbersome system, but mainly because suppliers appeared willing to risk delayed payment.

In 1997 it was established that no commitment was valid unless approved by the Ministry of Finance. In 1999/2000 a new system of commitment control was implemented (with technical support from the IMF) across all central government spending agencies for nonwage expenditures. As a result, overcommitments have been sharply reduced. During the first two quarters of 1999/2000, overcommitments are estimated to have totaled only U Sh 6.4 billion, compared with an annual accumulation of domestic arrears of more than U Sh 100 billion, on average, over the previous three years.

Conclusions

The essential foundations both for the subsequent reforms and the resurgence of growth and decline in poverty were the legalization of the parallel market for foreign exchange and the achievement of macroeconomic stability. These reforms originated not from conditions imposed by the World Bank or the IMF, but from within the government.

The debate about the exchange rate in 1989 and 1990, as well as the contrasting views on the gains from low inflation prior to 1992, show that the NRM government was not a monolith. A monolithic model of government cannot account for the shift away from the early experiment with revival of the control economy and revaluation in 1986/87. Once the debate on the direction of the exchange rate was settled by the early 1990s, reforms were profound and decisive.

A perhaps unusual, but effective, approach to stabilization combined a resource-constrained budget and its implementation through a monthly cash flow system. The latter gave the government the ability to respond to shocks and ensure that the intended outcome of low inflation was indeed achieved. The cash flow approach used in Uganda has proved more flexible and relatively less costly than the monthly cash budget used, for example, in Tanzania and Zambia. The cash flow system enabled annual budget implementation to be more flexibly adjusted to keep inflation low in response to changing macroeconomic conditions, a shortfall in revenue, or within-year demands for extra spending from some parts of the government.

Targeting inflation through short-term fiscal adjustment, however, involved some tradeoffs and costs. First, the demand for additional spending within the budget year confronted the Ministry of Finance with a tradeoff between preserving the budget aggregates and preserving the original budget allocations to other ministries. The resolution of this dilemma was clear: the aggregates—and macroeconomic stability—were preserved. Although this

decision disrupted some expenditure programs, the costs to the spending programs were clearly outweighed by the benefits of low inflation to the rest of the economy. This chapter argues that poor budget discipline—rather than the cash flow system that was used to manage the budget—is mostly responsible for the disruption in the spending programs.

Second, in planning fiscal policy, particularly during the period of high coffee prices and increased foreign inflows in the mid-1990s, the increased donor financing of the budget and the desire to contain an appreciation of the exchange rate posed another tradeoff. The Bank of Uganda had to balance the intervention in the foreign exchange market to contain the nominal appreciation against the fiscal adjustment needed to keep the domestic price level stable (and thereby avoid a real appreciation). This tradeoff was managed by maintaining the target of low inflation as the primary objective.

Drawbacks to a reliance on short-term fiscal adjustments include—in addition to the disruption to spending programs—the potential for accumulation of domestic arrears. However, tackling both budget discipline and arrears will become easier as the constraints that led to the adoption of a cash flow system in the first place—the limited scope for independent monetary policy and the strong likelihood of shocks—ease, and the horizon over which policy is implemented can stretch over periods longer than a month or a quarter.

The conclusion that cash flow was a vital part of the maintenance of macroeconomic stability in Uganda echoes Treasury Secretary Tumusiime-Mutebile's (1998) contention that "The Budget Framework Process and cash flow have been the two most important technical instruments in maintaining stability since 1992." Economic conditions in Uganda since 1992, including liberalized, flexible prices, thin or nonexistent financial markets, trade shocks, and flows of foreign capital, supported the use of the cash flow system as part of macroeconomic management. Moreover, Honohan and O'Connell's (1997) review of the development of monetary regimes across Africa over the last 30 years shows a trend toward such conditions across the continent. They conclude that greater fiscal restraint is needed to make the transition toward a more open and flexible economy, which, in turn, exacerbate problems of policy credibility and macroeconomic management. To the extent that Uganda's monetary conditions exist elsewhere, its successful experience with macroeconomic management may be a relevant model for other countries as well.

References

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

Adam, Christopher S., and David L. Bevan. 1997. "Fiscal Restraint and the Cash Budget in Zambia." University of Oxford, Centre for the Study of African Economies, U.K. Processed.

- Bevan, David L. 1998. "Uganda Public Expenditure Review: Macroeconomic Options in the Medium Term." University of Oxford, St. John's College, U.K. Processed.
- Bevan, David L., Paul Collier, and Jan-Willem Gunning. 1989. *Peasants and Governments: An Economic Analysis*. Oxford, U.K.: Clarendon Press.
- . 1990. *Controlled Open Economies: A Neoclassical Approach to Structuralism*. Oxford, U.K.: Clarendon Press.
- Collier, Paul, and Jan-Willem Gunning. 1996. "Policy Towards Commodity Shocks in Developing Countries." Working Paper no. 96/84. International Monetary Fund, Washington, D.C.
- Henstridge, Mark. 1997. "Implementing Fiscal Adjustment: Uganda's Cash Flow." University of Oxford, Centre for the Study of African Economies, U.K. Processed.
- . 1999. "De-monetization, Inflation, and Coffee: The Demand for Money in Uganda." *Journal of African Economies* 8(3): 345–85.
- . Forthcoming. "Fiscal Management and Macroeconomic Stability in Uganda." Working paper. International Monetary Fund, Washington, D.C.
- Honohan, Patrick, and Stephen A. O'Connell. 1997. "Contrasting Monetary Regimes in Africa." Working Paper no. 97/64. International Monetary Fund, Washington, D.C.
- Kasekende, Louis A., and Moazzam Malik. 1994. "Dual Exchange Regimes, Unification, and Development: The Case of Uganda." Paper presented at the Conference on Adjustment and Poverty in Sub-Saharan Africa, March, Accra, Ghana.
- Kasekende, Louis A., and Germina Ssemogerere. 1994. "Exchange Rate Unification and Economic Development: The Case of Uganda, 1987–92." *World Development* 22(8): 1183–98.
- Kasekende, Louis A., Damoni Kitabire, and Matthew Martin. 1996. "Capital Inflows and Macroeconomic Policy in Sub-Saharan Africa." In *International Monetary and Financial Issues for the 1990s*, vol. 8. New York: United Nations.
- Kharas, Homi, and Brian Pinto. 1989. "Exchange Rate Rules, Black Market Premia, and Fiscal Deficits: The Bolivian Hyperinflation." *Review of Economic Studies* 56(3): 435–47.
- Lizondo, José Saúl. 1987. "Unification of Dual Exchange Markets." *Journal of International Economics* 22: 57–77.
- Moon, Allister J. 1997. "Uganda's Budget Framework: Presentation to the Parliament of Uganda." Uganda Public Expenditure Review FY 97/98. World Bank, Washington, D.C. Processed.

- Morris, Stephen. 1989a. "Macroeconomic Features of the Uganda Economy and Some Policy Implications. Part One: The Relationship between Money Prices and the Parallel Market Exchange Rate." Discussion Paper no. 1. Ministry of Planning and Economic Development, Kampala.
- _____. 1989b. "Macroeconomic Features of the Ugandan Economy and Some Policy Implications. Part Two: The Impact of Official Exchange Rate Devaluation on Uganda." Discussion Paper no. 2. Ministry of Planning and Economic Development, Kampala.
- _____. 1995. "Inflation Dynamics and the Parallel Market for Foreign Exchange." *Journal of Development Economics* 46: 295–316.
- Obbo, Sam, and John Baptist Waswa. 1992 "Budget aims at 15 Percent Inflation." *The New Vision* 7(154): 1–16.
- Pinto, Brian. 1988. "Black Markets for Foreign Exchange, Real Exchange Rates, and Inflation: Overnight Versus Gradual Reform." Policy Research Working Paper no. 84. World Bank, Development Research Group, Washington, D.C.
- _____. 1989. "Black Market Premia, Exchange Rate Unification, and Inflation in Sub-Saharan Africa." *World Bank Economic Review* 3(3): 321–38.
- Republic of Uganda. 1992. "The 'Way Forward I.' Macroeconomic Strategy, 1990–1995." Ministry of Planning and Economic Development, Kampala.
- _____. 2000. "Poverty Eradication Action Plan. Second Draft." Ministry of Finance, Planning and Economic Development, Kampala.
- _____. Various years. "Background to the Budget." Ministry of Finance, Planning and Economic Development. Kampala.
- Stasavage, David, and Dambisa Moyo. 1999. "Are Cash Budgets a Cure for Excess Fiscal Deficits (and at What Cost)?" Working paper no. 99.11. University of Oxford Centre for the Study of African Economies, U.K.
- Tumusiime-Mutebile, Emmanuel. 1998. "Opening the Budget to Stakeholders: Use of MTEF/PER Process as a Catalyst for Enhanced Accountability." Paper presented at the Budget Process and Foreign Aid Workshop, November, World Bank, Washington, D.C. Processed.
- _____. 1999. "Uganda's Experience with the Medium-Term Expenditure Framework." Ministry of Finance, Planning and Economic Development, Kampala. Processed.

Part II

Household Responses and Constraints

Changes in Poverty and Inequality

Simon Appleton

According to macroeconomic data, Uganda in the 1990s was a rare economic success story in Sub-Saharan Africa. However, it has been questioned whether the growth recorded in official statistics was reflected in rising living standards, particularly for the poor. This concern was, for example, voiced in the 1997 *Human Development Report*: "The perennial concern is that the benefits of strong growth have yet to translate into measurable improvements in the standard of living for the majority of people" (UNDP 1997, p. 2).

Widespread concern about unchanging poverty levels is also reflected in the report from the Uganda Participatory Poverty Assessment Project (UPPAP), a major attempt by the Ugandan government to consult the people and hear "the voices of the poor." A summary of UPPAP's major findings based on seven districts concluded: "Through analysis of long-term trends in poverty, many local people felt that poverty was worsening in their communities...Local people reported more movement into poverty than out of it" (Republic of Uganda 1999, p. 10).

Given these perceptions one might question whether the growth apparent in the national accounts led to substantial reductions in poverty. Aside from household surveys, national accounts can draw upon little hard information on incomes from nonexport agriculture and informal sector activities, Uganda's most important income sources. Moreover, national accounts tell us nothing about how incomes are distributed.

The author is grateful to the Ugandan Bureau of Statistics for access to the data. Tom Emwanu, Johnson Kagugube, Margaret Kakande, and James Muwonge helped with some of the analysis. In addition to the editors of this volume, Lionel Demery, Jesko Hentschel, John Mackinnon, Francis Teal, and participants in a seminar at the University of Oxford provided valuable comments.

Fortunately, Uganda is one of the few Sub-Saharan countries that can convincingly address the question of what happened to poverty—as measured by private consumption—in the 1990s. This is because of a large-scale household survey program that began in 1992 with the integrated household survey (IHS). This baseline survey was followed by four monitoring surveys (MS-1, MS-2, MS-3, and MS-4) designed to monitor living standards on virtually an annual basis. The surveys have large samples—typically 5,000 households—but are particularly impressive in the number of communities sampled, typically 500. The surveys are designed to be nationally representative, although a few insecure areas were excluded (see appendix A at the end of the book for details). All five surveys rely on similar sampling procedures and questionnaires (see annex 4.1 for further details on the surveys and the adjustments needed to compare real private consumption over time).¹

This chapter uses the household data from these surveys to estimate changes in average living standards, poverty, and inequality from 1992 to 1997/98.² During this period, the growth in mean consumption per capita estimated from the household surveys matches that reported in the national accounts. Moreover, at all points of the income distribution, households are better off in 1998 than 1992. This implies that—regardless of where the poverty line is set—poverty was reduced in the period. Indeed, at the lower points of the income distribution, living standards grew more than at the mean. Consequently, inequality was reduced. Both overall growth and falling inequality contributed

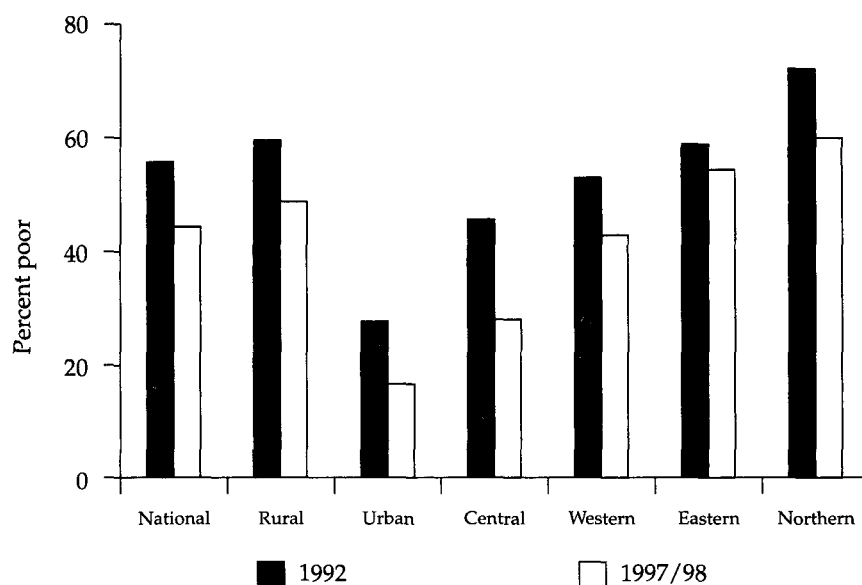
1. An earlier attempt to compare the IHS with an earlier survey, the household budget survey (HBS) of 1989, was unsuccessful (Appleton 1996). The HBS was reanalyzed as part of the preparation for this chapter, but still produced apparently incomparable results with the IHS and the monitoring surveys. Consumption in the HBS appears too high relative to the subsequent surveys. Appleton (1996) suggested that the incomparability arose from questionnaire design problems with the IHS. However, this suggestion appears less plausible given the evidence in this chapter of the comparability of the IHS results and those from the monitoring surveys. These monitoring surveys were not subject to the same supposed problems of questionnaire design as was the IHS. Sampling problems with the HBS may be a more likely explanation for the incomparability of results. Mean household size was one person higher in the HBS than in the census of 1991 and the subsequent household surveys.

2. This analysis complements the poverty study carried out using the surveys conducted by the government's Coordination of Poverty Eradication Project and Department of Statistics (Republic of Uganda 1997b). The earlier study was conducted before the release of the third and fourth monitoring surveys and used a poverty line defined as two-thirds of mean consumption per adult equivalent in the IHS. This chapter derives a poverty line based on calorie requirements and updates the analysis. It also includes some additional adjustments to ensure comparability of the consumption data, together with some further decompositions of interest. Note, however, that the two studies, despite rather different methods, agree on the general direction of poverty trends in Uganda during the period.

to poverty reduction, although growth in incomes contributed the most. That is not to say that some households did not become poorer during the period, just that such adverse movements were more than offset by other households escaping poverty. We derive an absolute poverty line for 1992 that defines around 56 percent of the population as poor (figure 4.1). By 1997/98, this proportion had fallen to 44 percent. Clearly, this is a substantial poverty reduction—more than 20 percent in just five years. The reduction in poverty was neither uniform across all regions, nor the same each year. Poverty fell most in the central region and least in the eastern region. Poverty reduction was most marked at the beginning and at the end of the period, with no gains for the poorest indicated during the first three monitoring surveys (1993/94 to 1995/96). However, poverty did fall in every region between 1992 and 1997/98; nationally, it also fell between every survey.

An apparent discrepancy exists between the findings from the household surveys and the perceptions of increased poverty as reported in the UPPAP and more widely in Uganda. It should be noted that the UPPAP uses a wider concept of poverty. This concept goes beyond the private consumption measured in the household surveys and includes insecurity and poor government services. Security is better than in the early 1980s, but the situation deteriorated in parts of the country during the household survey periods, as shown by the increasing number of districts excluded from the

Figure 4.1. Poverty in Uganda, 1992 and 1997/98



Source: Author's calculations.

sample during the course of the program. For public services, evidence exists—for example, from the Ugandan school surveys of 1996 and 2000—of an improvement, although the level of provision still remains poor. As discussed elsewhere in this volume, the universal primary education initiative of 1997 dramatically widened access to education, although perhaps at some cost to quality. The spread of AIDS constitutes a grave threat to health, although there is some evidence of falling child mortality based on the Demographic and Health Surveys of 1988 and 1995.

Aside from the differing conceptions of poverty, other methodological issues might explain the apparent discrepancy between the qualitative and quantitative evidence. One is a possible difference in the time horizon. In part, perceptions of increasing poverty may refer to trends over a longer time horizon than the five-year interval covered by the household surveys.³ Moreover, the UPPAP report had the difficult task of drawing general conclusions about poverty trends based on a mass of qualitative data. As already stated, the time trend analysis for the Iboa community tried to quantify eight factors related to poverty for seven time periods. This must be combined with similarly disaggregated data for the other 35 communities. It seems doubtful that the UPPAP attempted a quantitative aggregation of this disparate data and, indeed, at times the conclusions seem to sacrifice rigor for comprehensiveness. Moreover, as far as can be ascertained, the time trend analysis in the UPPAP provides no information about distribution within communities. The eight factors identified as related to poverty in the Iboa community—such as food availability or access to health services—appear to pertain to the community as a whole and not specifically to its poorer members. More work

3. In the UPPAP, time trend analysis was done in five-year intervals, often starting in 1970–74 and going through to 1995–99. For each five-year interval, members of local communities placed pebbles to quantify indicators or causes of poverty. For example, in the time trend diagram illustrated in the UPPAP report, the chosen community (Iboa in the Moyo district) placed 10 stones for food availability in 1970–74 and only 4 for food availability in 1995–99 (Republic of Uganda 1999, figure 2.5). This suggests a perception of greatly increasing poverty over the long term. However, for the subperiod covered by the surveys, food availability is reported not to deteriorate—remaining at four stones throughout the 1990s (up from one stone in 1985–89)—and community assessments for 2000 and beyond are relatively optimistic (eight stones). Food availability is just one of eight factors presented in the illustrative time trend diagram. However, for most of the other factors, there is no deterioration between 1990–94 and 1995–99; indeed there is substantial improvement in most factors compared with 1985–89. The illustration of the time trend analysis for the Iboa community raises questions about the conclusion of the UPPAP report that there was increasing poverty in the Moyo district. The Iboa community was one of probably only four communities visited by UPPAP in Moyo (36 communities were visited from 9 districts). However, the time trend analysis presented for the Iboa community provides no indication that poverty was increasing in the district in the 1990s.

needs to be done to reconcile the findings of the UPPAP and the survey data. At this stage, the extent to which there is a genuine contradiction is not clear, still less whether the UPPAP's analysis of poverty trends is to be preferred.

The remainder of this chapter is organized as follows. First, it outlines the growth in mean consumption per capita as reported by the household surveys between 1992 and 1997/98 and shows this growth to be close to that estimated in the national accounts. It then derives an absolute poverty line for Uganda and uses it to show the substantial reduction in poverty during the surveys. Falls in inequality are also documented, although they are shown to explain only a small part of the reduction in poverty relative to general economic growth. Poverty reduction is decomposed by economic sectors, with the cash crop sector shown to account for more than half of the fall in poverty. The chapter ends by summarizing the main results. Those interested in the methodological details of the analysis should refer to annex 4.1.

Changes in Mean Consumption Per Capita

The focus of this chapter is household private consumption per capita as a measure of individual welfare. This is not to deny that other dimensions of well-being are important. However, private consumption—including consumption of home-produced food—is a central indicator of economic welfare. We do not address the issue of intrahousehold allocation, but see Appleton, Chessa, and Hoddinott (1999) for suggestive evidence of boy-girl discrimination based on the same data. We adjust the consumption figures reported in the household surveys in a number of ways detailed in annex 4.1, perhaps the most important being to take account of regional differences in food prices. After the adjustments, the household surveys imply that real consumption per capita rose by 16.5 percent between 1992 and 1997/98 (see table 4.1). For both rural and urban areas separately, the rise was slightly less, measuring 15.9 and 11.4 percent, respectively. This discrepancy between the national and disaggregated figures can be explained by the increase in the estimate of the relative size of the urban population from 12.4 percent in the IHS to 13.3 percent in MS-4. The overall rise in mean consumption in the bottom line, fully adjusted figures is not driven by the adjustments to the data. Indeed, the adjustments lead to a downward revision of the growth implied in the unadjusted figures.

The average growth in mean consumption per capita from the first to last household survey is close to that estimated in the national accounts.⁴ Making precise comparisons is hard, because the national accounts data are reported in fiscal years (July to June), whereas the IHS and MS-4 covered something closer to calendar years (see book appendix A). The surveys from the IHS to

4. Note that the figures in table 4.1 differ from constant price consumption as reported in the national accounts, because they use the consumer price index rather than gross domestic product deflator.

Table 4.1. Estimates of Private Consumption Per Capita

<i>Fiscal year</i>	<i>National accounts</i>		
	<i>Nominal (U Sh/month)</i>	<i>Real (1989 U Sh prices)</i>	<i>Percentage growth (real)</i>
1991/92	12,094	6,205	n.a.
1992/93	16,167	6,380	2.8
1993/94	16,949	6,275	-1.6
1994/95	19,824	6,917	10.2
1995/96	22,151	7,192	4.0
1996/97	24,070	7,243	0.7
1997/98	26,067	7,414	2.4

<i>Year</i>	<i>Household surveys (U Sh per month, 1989 prices)</i>		
	<i>National</i>	<i>Rural</i>	<i>Urban</i>
IHS (1992)	5,452	4,735	10,752
MS-1 (1993/94)	5,718	4,862	11,645
MS-2 (1994/95)	6,058	5,206	12,067
MS-3 (1995/96)	6,187	5,242	12,246
MS-4 (1997/98)	6,353	5,488	11,979

n.a. Not applicable.

Note: National accounts data are in fiscal years (July 1–June 30). Real consumption is obtained using the consumer price index as a deflator.

Source: Author's calculations based on household survey data; national accounts data from the Uganda Bureau of Statistics.

MS-4 span an interval of almost exactly five years, with the mid-points of both surveys falling around August. However, in the five-year interval from fiscal year 1992/93 to fiscal 1997/98, real private consumption per capita in the national accounts rose by 16.1 percent. These figures are remarkably close to the 16.5 percent figure derived from the household surveys. The two estimates may not be strictly independent, because the household survey data were one source used in estimating consumption in the national accounts. However, some of the monitoring surveys may not have been used for the national accounts estimates, as there was a substantial lag in cleaning the data and writing the official survey reports. Moreover, both the level of consumption and the patterns of year-on-year changes were different in the macro and micro data. The household surveys reported substantially lower levels of private consumption than did the national accounts: in some cases, the discrepancy is almost a third. The household survey data also showed a smoother pattern of growth than did the macro figures. Mean consumption per capita rose strongly between each survey: by 4.9 percent between IHS and MS-1, by 5.9 percent

between MS-1 and MS-2, by 2.1 percent between MS-2 and MS-3, and by 2.7 percent between MS-3 and MS-4. The phasing of the increases in consumption over the five years was very different for urban and rural areas. In line with the national pattern, living standards in rural areas grew fairly steadily between each survey. In urban areas, most of the growth in the period occurred between 1992 and 1993/4, when real consumption per capita rose by 8.3 percent.

In summary, the household surveys broadly corroborated the improvement in living standards recorded in the national accounts. One new piece of information they provided was the rural-urban breakdown. In particular, they showed that rural areas enjoyed growth comparable to that experienced in urban areas. However, the discussion so far has been in terms of developments at the mean. To measure the reduction in poverty, we need to go further, beginning with setting a poverty line.

Defining an Absolute Poverty Line for Uganda

Uganda currently does not have an officially approved poverty line.⁵ This section constructs an absolute poverty line, reflecting the monetary cost of meeting certain basic needs. When using a poverty line to evaluate improvements in living standards of the poor over time, it is desirable to fix the poverty line in real terms. If the poverty line is made relative and allowed to rise with improvements in general living standards, then it is possible that poverty will rise despite improvement in the living standards of the poor. While such an increase in relative poverty may be interesting, our focus in this chapter is on whether poorer people have become materially better off. This is not to deny that poverty ultimately has an important relative aspect and that countries may want to set higher poverty lines as they become more affluent. However, for the relatively short period analyzed here, this does not seem to be a relevant issue.

We set the poverty line by following the approach of Ravallion and Bidani (1994). Further information on the derivation of the line is in annex 4.1. Here

5. Kikafunda, Serunjogi, and Migadde (1992) have estimated a nutrition-based absolute poverty line for Uganda using the 1989/90 HBS. They arrive at a figure of U Sh 6,745 per month per person. This is somewhat higher than the estimate in this chapter of U Sh 6,252 (1989 prices) per adult equivalent per month. The use of the HBS, which excludes much of the north region and has higher consumption estimates, may partially account for the discrepancy. There are also differences in method: Kikafunda, Serunjogi, and Migadde (1992) used regional food baskets and appear to have allowed for heavy levels of meat consumption. In the western rural and many other areas, their baskets allow the poor to eat 64 percent as much meat (in kilograms) as *matooke* (plantain) (see table 7, p.38). By contrast, in this chapter, the ratio of meat to *matooke* weights in the food basket is 1.6 percent.

we provide merely an overview. Note that a large degree of judgment is involved in setting a poverty line. Consequently, one should not attach too much importance to the estimates we derive for the level of poverty in any single year or place. Instead, attention should be focused on poverty comparisons, and indeed, on whether they are robust with regard to setting the poverty line. In common with most of the literature, the Ravallion and Bidani approach focuses on defining food-related needs and only indirectly estimates nonfood requirements. Specifically, it first defines a food poverty line based on the cost of obtaining sufficient calories given the typical food basket of the poor. This approach contains an element of circularity, as one does not know which people are poor before the poverty line has been set. However, in the case of Uganda, we focused on the food-basket of the poorest 50 percent of the population, because previous studies using similar methods had identified around half of the population as poor (Republic of Uganda 1996). We initially focus on the cost of obtaining 3,000 calories, which roughly corresponds to the energy requirements of male subsistence farmers according to the principles set by the World Health Organization (WHO 1985). Table 4.2 shows the derivation of the food poverty line, defined as the cost of obtaining 3,000 calories, using the food basket of the poorest 50 percent of the population in the first monitoring survey (MS-1). The food basket is valued in constant prices, namely, the median food prices reported in the survey. In practice, food prices differ between regions, and this variation implies different food poverty lines in nominal prices (see table 4.3).

Under the Ravallion and Bidani approach, nonfood requirements are estimated as the nonfood spending of households whose total consumption is just equal to the food poverty line. The rationale for using nonfood spending is that if households are sacrificing the food expenditure needed to meet their calorie requirements for nonfood spending, then nonfood spending should also be considered as needed. As the surveys do not provide information about nonfood prices, we allow nonfood requirements to vary by region and by rural-urban location. Table 4.3 reports the predicted food share of those whose total consumption was just equal to the food poverty line in various locations and the implied total poverty lines. We also report a national average poverty line, although in the analysis we used the poverty line specific to the location of the household.

The poverty lines reported in table 4.3 are the expenditures required to obtain 3,000 calories and meet nonfood requirements. In practice, many household members do not need 3,000 calories, as calorie requirements vary by age and by sex. We use equivalence scales to allow for this (see table A4.2). For example, children are assigned equivalence scales equal to their calorie requirements divided by 3,000. This implicitly assumes that children's nonfood requirements are lower than those of men in the same proportion as their calorie requirements. For women, such an assumption is less defensible, and instead we assume that their nonfood needs are the same as men's. Given these equivalence scales, members of a household are said to be poor when their total consumption per adult equivalent falls below the poverty line.

Table 4.2. Derivation of the Food Poverty Line
(MS-1 prices)

<i>Food item</i>	<i>Quantity (kg per month)</i>	<i>Price (U Sh/kg)</i>	<i>Calories/ kg</i>	<i>Retention ratio</i>	<i>Calories per day</i>	<i>Cost per month (U Sh 1993 prices)</i>
<i>Matooke (plantain)</i>	28.54	67	770	0.50	366	1,903
Sweet potatoes	34.12	63	1,020	0.70	812	2,133
Cassava	9.02	200	2,557	0.89	684	1,804
Irish potatoes	0.36	250	750	0.85	8	89
Rice	0.06	700	3,600	1.00	7	42
Maize (grain)	0.30	400	3,470	0.90	32	121
Maize (flour)	1.54	350	3,540	1.00	181	538
Bread	0.02	1,300	2,490	1.00	1	20
Millet	2.25	300	3,231	0.65	158	676
Sorghum	1.57	200	3,450	0.90	163	314
Beef	0.31	1,100	2,340	0.80	19	339
Other meat	0.05	1,000	2,340	0.75	3	52
Chicken	0.09	1,167	1,460	0.61	3	111
Fresh fish	0.62	467	1,030	0.60	13	290
Smoked fish	0.39	583	3,005	0.70	28	229
Eggs	0.00	2,000	1,490	0.88	0	8
Milk	0.55	400	640	1.00	12	219
Cooking oil/ghee	0.06	1,400	8,570	1.00	18	89
Passion fruit	0.10	382	920	0.75	2	37
Sweet bananas	2.34	50	1,160	0.56	51	117
Tomatoes	0.70	192	200	0.95	4	134
Cabbages	0.33	125	230	0.78	2	41
Beans (fresh)	0.73	400	1,040	0.75	19	292
Beans (dry)	2.86	350	3,300	0.75	236	1,002
Groundnuts	0.59	600	2,350	0.93	43	355
<i>Sim-sim</i>	0.45	222	5,930	1.00	89	100
Sugar	0.35	1,000	3,750	1.00	44	352
Total					3,000	11,463

Source: Author's calculations using data from MS-1 provided by the Uganda Bureau of Statistics.

Poverty Trends

Tables 4.4 to 4.8 present the poverty statistics for the five surveys (see annex 4.1 for definitions). Data are disaggregated by location, both by urban-rural and by the four regions of the country. Along with the poverty statistics, we report the percentage of people in each location and their mean household consumption per adult equivalent. We also report the contribution each location makes to each poverty statistic (that is, what percentage

Table 4.3. Poverty Lines
(1993 prices)

<i>Region</i>	<i>Predicted food share</i>	<i>Poverty line (constant prices)</i>	<i>Food poverty line (nominal)</i>	<i>Poverty line (nominal)</i>
Central rural	0.609	15,947	13,971	19,435
Central urban	0.490	17,314	14,837	22,409
Eastern rural	0.653	15,446	8,832	11,900
Eastern urban	0.557	16,548	11,300	16,312
Western rural	0.675	15,189	8,209	10,877
Western urban	0.589	16,174	9,245	13,043
Northern rural	0.638	15,610	8,410	11,452
Northern urban	0.578	16,304	9,433	13,417
National (average)	0.566	16,443	11,463	16,443

Note: Nominal and national lines are shown for information only and are not used in the analysis.

Source: Author's calculations using data from MS-1 provided by the Uganda Bureau of Statistics.

of national poverty is attributable to each location). Given that poverty statistics are estimates, it is useful to test whether changes in their values are statistically significant (Kakwani 1993). We report tests of the significance of the changes in the poverty statistics between IHS and MS-4 in table 4.9.

We report three types of poverty statistics, termed P_0 , P_1 , and P_2 . All three statistics are from the so-called $P\alpha$ or Foster, Greer, and Thorbecke (1984) class of indicators. The P_0 statistic is simply the proportion of Ugandans estimated to live below the poverty line. In the first survey, the IHS, the proportion was 56 percent. This statistic shows that absolute poverty levels were very high in Uganda. Most people did not have enough money to meet our estimate of their basic needs. Indeed, 36 percent of Ugandans lived below the food poverty line (statistics on food poverty are not reported in the tables but are available from the author on request). To restate these findings, more than one-third did not have enough even to meet only their calorie requirements, let alone any other needs.⁶ These high poverty rates are perhaps not surprising given the country's low national income (ranked sixth lowest in the world in 1992 by the World Bank [1994]). Poverty rates in urban areas were much lower than in rural areas, but were nonetheless substantial: 28 percent of urban people lived below the poverty line and 11 percent lived

6. This finding raises the question of what happens to those Ugandans who we estimate are not getting enough calories. Note that we probably overestimate malnutrition and poverty because of general measurement error (as some people may underreport consumption), and because we estimate calories obtained from food purchases made over a short recall period (some people may be living on stocks of

Table 4.4. Poverty in the Integrated Household Survey

<i>Location</i>	<i>Population</i>					<i>Contribution to</i>		
	<i>share (percent)</i>	<i>Mean CPAE</i>	P_0	P_1	P_2	P_0	P_1	P_2
National	100.0	6,900	55.7	20.3	9.90	100.0	100.0	100.0
Rural	87.6	6,091	59.7	22.0	10.81	93.8	94.9	95.6
Urban	12.4	12,608	27.8	8.3	3.48	6.2	5.1	4.4
Central	30.6	8,865	45.6	15.3	7.04	25.1	23.1	21.8
East	27.9	6,115	58.8	22.0	10.85	29.4	30.3	30.6
West	24.2	6,449	53.1	18.7	9.01	23.0	22.3	22.0
North	17.3	5,317	72.2	28.6	14.64	22.4	24.4	25.6
Central rural	22.7	6,861	54.3	18.7	8.76	22.1	20.8	20.1
Central urban	8.0	14,564	20.8	5.7	2.16	3.0	2.2	1.7
East rural	25.4	5,866	60.6	23.0	11.38	27.6	28.7	29.2
East urban	2.5	8,633	40.4	12.6	5.52	1.8	1.6	1.4
West rural	23.1	6,223	54.3	19.2	9.31	22.5	21.9	21.7
West urban	1.1	11,299	28.9	7.3	2.60	0.6	0.4	0.3
North rural	16.5	5,195	73.0	29.0	14.83	21.6	23.5	24.7
North urban	0.8	7,677	55.2	21.2	10.92	0.8	0.9	0.9

CPAE Consumption per adult per equivalent (1989 Uganda shillings per month).

Source: Author's calculations from household survey data provided by the Uganda Bureau of Statistics.

Table 4.5. Poverty Rates in MS-1

Location	Population share (percent)	Mean CPAE	Contribution to					
			P_0	P_1	P_2	P_0	P_1	P_2
National	100.0	7,281	51.2	16.9	7.48	100.0	100.0	100.0
Rural	87.4	6,327	55.6	18.6	8.27	94.8	95.9	96.6
Urban	12.6	13,885	21.0	5.5	2.02	5.2	4.1	3.4
Central	31.4	9,860	34.5	10.4	4.26	21.2	19.3	17.9
East	26.5	6,085	57.6	19.7	9.06	29.9	30.9	32.1
West	26.3	6,527	53.9	17.4	7.31	27.7	27.0	25.7
North	15.7	5,403	69.3	24.6	11.57	21.2	22.8	24.3
Central rural	23.1	7,635	41.9	12.9	5.39	18.9	17.6	16.6
Central urban	8.3	16,044	13.9	3.3	1.10	2.2	1.6	1.2
East rural	24.5	5,783	59.8	20.6	9.56	28.6	29.9	31.3
East urban	2.0	9,765	31.4	8.1	3.00	1.2	1.0	0.8
West rural	25.2	6,307	55.3	17.8	7.52	27.2	26.5	25.3
West urban	1.2	11,219	24.7	7.4	2.73	0.6	0.5	0.4
North rural	14.6	5,203	70.7	25.3	11.97	20.1	21.8	23.3
North urban	1.1	8,029	51.4	15.2	6.33	1.1	1.0	0.9

CPAE Consumption per adult per equivalent (1989 Uganda shillings per month).

Source: Author's calculations from household survey data provided by the Uganda Bureau of Statistics.

Table 4.6. Poverty Rates in MS-2

<i>Location</i>	<i>Population</i>					<i>Contribution to</i>		
	<i>share (percent)</i>	<i>Mean CPAE</i>	P_0	P_1	P_2	P_0	P_1	P_2
National	100.0	7,659	50.2	16.3	7.25	100.0	100.0	100.0
Rural	87.6	6,712	54.3	17.7	7.90	94.7	95.2	95.4
Urban	12.4	14,342	21.5	6.3	2.69	5.3	4.8	4.6
Central	31.8	10,983	30.3	8.3	3.38	19.1	16.2	14.8
East	28.5	5,681	65.3	23.4	11.10	37.0	41.0	43.6
West	25.3	6,839	50.9	15.2	6.41	25.6	23.6	22.4
North	14.5	5,677	63.5	21.5	9.67	18.2	19.1	19.3
Central rural	23.7	8,995	36.3	9.9	4.01	17.1	14.4	13.1
Central urban	8.1	16,815	12.6	3.8	1.52	2.0	1.9	1.7
East rural	26.3	5,411	67.1	24.4	11.61	35.1	39.4	42.1
East urban	2.2	8,945	43.4	11.9	4.91	1.9	1.6	1.5
West rural	24.1	6,563	52.1	15.6	6.60	25.0	23.1	21.9
West urban	1.2	12,264	25.6	6.6	2.62	0.6	0.5	0.4
North rural	13.5	5,506	64.9	21.9	9.80	17.5	18.2	18.3
North urban	0.9	8,181	41.8	15.6	7.75	0.8	0.9	1.0

CPAE Consumption per adult per equivalent (1989 Uganda shillings per month).

Source: Author's calculations from household survey data provided by the Uganda Bureau of Statistics.

Table 4.7. Poverty Rates in MS-3

<i>Location</i>	<i>Population</i>		<i>Contribution to</i>					
	<i>share (percent)</i>	<i>Mean CPAE</i>	P_0	P_1	P_2	P_0	P_1	P_2
National	100.0	7,759	49.1	16.4	7.64	100.0	100.0	100.0
Rural	86.5	6,742	53.7	18.1	8.49	94.5	95.4	96.1
Urban	13.5	14,273	19.8	5.6	2.23	5.5	4.6	3.9
Central	28.8	10,672	30.4	8.2	3.16	17.8	14.4	11.9
East	30.8	6,463	58.4	21.4	10.83	36.6	40.0	43.6
West	25.1	7,371	46.3	14.5	6.29	23.6	22.1	20.7
North	15.4	5,525	70.2	25.1	11.84	22.0	23.4	23.8
Central rural	19.8	8,383	37.4	10.2	3.94	15.1	12.3	10.2
Central urban	9.0	15,731	14.8	3.8	1.44	2.7	2.1	1.7
East rural	28.7	6,066	60.4	22.3	11.35	35.3	38.8	42.6
East urban	2.1	11,877	31.6	9.2	3.74	1.4	1.2	1.0
West rural	23.8	7,066	47.9	15.0	6.54	23.2	21.8	20.4
West urban	1.3	13,014	16.8	4.3	1.66	0.4	0.3	0.3
North rural	14.2	5,276	72.5	25.9	12.28	21.0	22.5	22.8
North urban	1.1	8,633	41.2	14.0	6.34	1.0	1.0	0.9

CPAE Consumption per adult per equivalent (1989 Uganda shillings per month).

Source: Author's calculations from household survey data provided by the Uganda Bureau of Statistics.

Table 4.8. Poverty Rates in MS-4

Location	Population share (percent)	Mean CPAE	P_0	P_1	P_2	Contribution to		
						P_0	P_1	P_2
National	100.0	8,078	44.4	13.7	5.91	100.0	100.0	100.0
Rural	86.7	7,127	48.7	15.2	6.56	95.0	95.8	96.3
Urban	13.3	14,264	16.7	4.3	1.65	5.0	4.2	3.7
Central	30.0	10,958	27.9	7.6	3.04	18.9	16.7	15.5
East	28.5	6,739	54.3	18.3	8.20	34.9	38.0	39.6
West	24.9	7,369	42.8	11.0	4.03	24.0	20.1	17.0
North	16.5	6,226	59.8	21.0	10.00	22.2	25.2	27.9
Central rural	21.3	8,957	34.5	9.6	3.91	16.6	15.0	14.1
Central urban	8.7	15,874	11.8	2.7	0.91	2.3	1.7	1.3
East rural	26.3	6,336	56.8	19.2	8.67	33.6	36.8	38.6
East urban	2.2	11,455	25.2	7.1	2.74	1.3	1.2	1.0
West rural	23.7	7,097	44.0	11.4	4.15	23.5	19.7	16.7
West urban	1.2	12,589	19.7	4.6	1.57	0.5	0.4	0.3
North rural	15.4	5,988	61.8	21.7	10.36	21.4	24.3	26.9
North urban	1.2	9,406	34.0	11.0	5.19	0.9	0.9	1.0

CPAE Consumption per adult per equivalent (1989 Uganda shillings per month).

Source: Author's calculations from household survey data provided by the Uganda Bureau of Statistics.

Table 4.9. T-Test Statistics for Hypothesis of Equality of Poverty Statistics in IHS and MS-4

<i>Location</i>	P_0	P_1	P_2
National	13.98	18.62	18.67
Rural	10.37	14.50	14.80
Urban	10.64	10.85	9.17
Central	12.61	14.04	12.86
East	2.99	5.33	6.13
West	6.37	11.75	13.13
North	6.69	8.05	7.44
Central rural	9.83	11.15	10.37
Central urban	5.70	6.17	5.03
East rural	1.97	4.03	4.74
East urban	6.80	6.48	6.18
West rural	4.98	9.51	10.74
West urban	4.02	3.85	3.12
North rural	4.86	6.08	5.69
North urban	6.78	6.93	5.96

Source: Author's calculations from household survey data provided by the Uganda Bureau of Statistics.

below the food poverty line. Poverty rates showed pronounced regional differences. In the poorest area, northern rural, 73 percent lived below the poverty line. However, poverty was widespread in all areas. Even in the most prosperous location, central urban, more than one in five people lived below the poverty line. The other poverty indicators, P_1 and P_2 , show similar patterns across the country. The P_1 index can be interpreted as the per capita aggregate poverty gap, that is, the mean shortfall of the welfare of the poor from the poverty line, expressed as a proportion of the poverty line and averaged across the population as a whole. The P_2 index is the per capita aggregate poverty gap squared.⁷

Absolute poverty remained pervasive at the end of the four surveys. However, it did fall substantially. In MS-4, 44 percent people were poor compared

food obtained earlier). Moreover, people who are genuinely not obtaining enough calories may still be able to function adequately, because a safety margin is built into the World Health Organization estimates of calorie requirements. However, not obtaining enough calories may prevent the very poor from engaging in energy-intensive activities, leading to destitution or worse. High rates of child stunting in the country suggest that undernutrition is a genuine and widespread problem.

7. The advantage of the P_1 indicator over P_0 is that it reflects how far below the poverty line the poor are. The advantage of the P_2 indicator over P_1 is that it will fall if income is redistributed from those who are poor to those who are even poorer. Both

with 56 percent in the IHS. The 21 percent fall in the headcount was accompanied by a 17 percent rise in mean consumption per adult equivalent. This implies an elasticity of poverty with respect to growth of approximately -1.24 . This elasticity is rather low (in absolute terms): for example, in Nigeria, the figure was estimated to be -1.45 , while in Ghana it was put at -1.73 (World Bank 1995). However, this seems to reflect the high level of the poverty line rather than any regressive aspect of Uganda's pattern of growth. Using a lower poverty line, the food poverty line, the growth elasticity is higher, at -1.8 . This reflects the larger proportionate fall in the number of people living below the food poverty from 36 percent to 25 percent during the period. The other P_α indices also show marked declines, especially the P_2 index. Whereas the P_0 indicator fell by 21 percent, P_1 fell by 33 percent and P_2 by 40 percent. By any standards, the fall in poverty over a period of only five years has been substantial.

As poverty rates have fallen, the cost of interventions to reduce poverty has also fallen (although this is somewhat offset by population growth). The P_1 index is proportional to the cost (per adult equivalent) of eliminating poverty through perfectly targeted transfers. Our estimates imply that the minimum estimate of the cost of eliminating poverty through transfers has fallen by more than a quarter.⁸ The P_1 index for the IHS implies a total annual cost of eliminating poverty through perfect transfers ("the simple sum") of U Sh 711,419 million (1993/4 prices) or US\$594 million (using the 1993 official exchange rate). The corresponding figures for 1997/98 are U Sh 555,378 million (1993/4 prices) and US\$464 million.⁹

Poverty fell in both rural and urban areas during the five-year period. Mean living standards rose faster in rural areas: the mean rise in consumption per

advantages come at the cost of having indicators that are less immediately intuitive than the simple headcount P_0 . For this reason, we often refer to the P_0 when all three indicators yield qualitatively similar results.

8. The total cost of eliminating poverty through perfect targeting is given by $n \cdot P_1 \cdot Z$, where n is the population and Z the poverty line. We include Bundibugyo, Gulu, Kasese, and Kitgum in the population, although they were excluded from the estimate of P_1 . As these districts are poorer than Uganda as a whole, we will have understated the cost (by around two percentage points in 1992).

9. It is tempting to compare these figures with Uganda's external assistance in 1993 of US\$531 million. Uganda's present external assistance is roughly equal to the cost of eliminating poverty through perfect targeting. However, one cannot assume that poverty could be eradicated by channeling external assistance into transfers to the poor. As shown in chapter 2 in this volume, the assistance currently has a considerable impact in reducing poverty and thus, channeling it to transfers would worsen the poverty gap that had to be filled by transfers, given that transfers are unlikely to be perfect. An alternative assumption is that targeting is infeasible, in which case transfers must be uniform. The P_1 measure gives a ratio of the cost of eliminating poverty through perfectly targeted transfers relative to that of uniform transfers. In 1997/98, it would have cost US\$3,387 million to eradicate poverty through

adult equivalent was higher in rural areas than in urban areas (17 percent compared with 13 percent). However, focusing on the urban mean may be misleading. Poverty statistics fell proportionately more in urban than in rural areas. The headcount fell by two-fifths in urban areas, and the proportionate fall in rural areas was less than one-fifth. Perhaps surprisingly, living standards in central urban areas grew modestly, by 9 percent, between the first and last surveys. This may be partly a consequence of in-migration: the estimated share of the country's population in these areas rose by 0.7 percent, a proportionate increase in the size of the central urban population of 9 percent. Other urban areas experienced large improvements in living standards, with northern and eastern towns seeing rises in mean consumption of 23 and 33 percent, respectively.

All regions had lower poverty in 1997/8 than in 1992, regardless of which $P\alpha$ statistic is used or whether the poverty is measured relative to the total poverty line or just the food poverty line. Furthermore, all these reductions in poverty are statistically significant (see table 4.9). However, the magnitude of the falls varied greatly. Mean consumption per adult equivalent rose most strongly in the central region, by 24 percent, and most modestly in the eastern region, by 10 percent. The corresponding figures for the western and northern regions were 14 and 17 percent, respectively. These movements in average living standards are reflected in the changes in the poverty statistics. The central region saw the sharpest fall in poverty, with the headcount falling by more than a third, from 46 to 28 percent. In the east, the headcount fell by only five percentage points. In the north and west, the headcount fell by 10 and 13 percentage points, respectively.

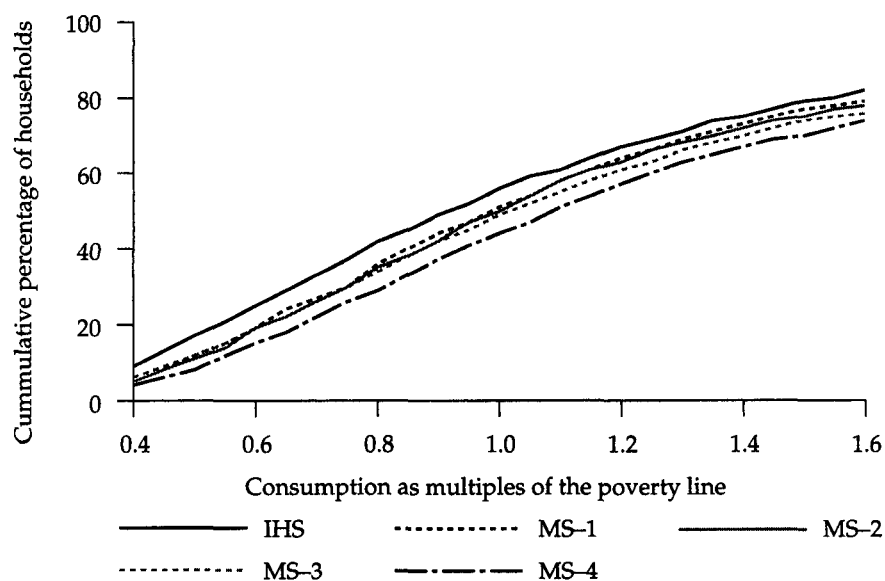
The poverty gap, P_1 , was halved in the central region, but fell by only 17 percent in the eastern region. One measure of the severity of poverty, P_2 , fell by 57 percent in the central region, but only 24 percent in the eastern. The net effect of these regional disparities was to widen the gap in living standards between the central and eastern regions. In 1992, the central region accounted for 25 percent of the poor and the eastern region accounted for 29 percent. By 1997/98, the central region accounted for only 17 percent of the poor compared with the eastern region, which accounted for 38 percent. Defining

uniform transfers to all Ugandans (assuming no administrative costs). Furthermore, if the transfers were used to fund private consumption, they would have to be perpetual. Poverty would be eliminated in one year but would return in the next. One-off transfers may have permanent benefits to the extent that they are saved and invested, but such saving would imply transfers would have to be correspondingly higher to raise the consumption of the poor to the poverty line. Substantial external assistance is likely to continue in the fairly long term, but donors are unlikely to pay indefinitely. Finally, part of the external assistance is made as loans rather than grants or tied to particular imports. Nonetheless, it remains a legitimate question whether external assistance could make a larger impact on poverty if it were channeled more directly to the poor.

poverty relative to the food poverty line only, the contrast is even starker. Although the eastern and northern regions account for less than half the population surveyed in 1997/98, they accounted for three-fifths of those whose total consumption was insufficient even to meet their calorie needs. (In 1992, they accounted for just over half.) It is noteworthy that this occurred during a time of administrative and fiscal decentralization. These institutional changes are surely not responsible for the increasing spatial disparity in welfare and poverty; however, the widening geographic inequalities may warrant greater government redistribution between regions.

The conclusion that poverty fell between the IHS and MS-4 is robust with regard to the choice of poverty line. Figure 4.2 shows the results of dominance analysis by plotting the poverty incidence curves for the five surveys. The poverty incidence curves plot the headcount indices on the y axis against different poverty lines (expressed as multiples of the original poverty line) on the x axis. As the poverty incidence curve for the IHS is above that for the MS-4, for all poverty lines there would be a higher headcount in the IHS than in the MS-4. Given such first-order dominance, it also follows that poverty would be higher in the IHS than MS-4 for all absolute poverty lines and for all $P\alpha$ statistics other than P_0 . By contrast, the poverty incidence curve for MS-3 intersects that for MS-1 and MS-2 at several points, implying that the MS-3 curve does not wholly dominate them. In particular, for very low poverty lines—those around 50

Figure 4.2. Poverty Incidence Curves, 1992–97



Source: Author's calculations.

percent of the poverty line—the headcount is higher for MS-3 than for MS-1 and MS-2. This implies that the position of the very poorest households may have deteriorated between MS-1 and MS-3.

The emphasis of the discussion in this section and, indeed, in most of the chapter is on comparing the first and last surveys. Movements in living standards during the intervening surveys are not stressed. However, being able to track changes in living standards on a yearly basis is useful in determining whether the change appears to be incremental or merely driven by one or another survey year being somehow atypical, for example, having an exceptionally good or bad harvest. As already noted, mean living standards grew between each survey, although the growth was strongest between the first three surveys (IHS to MS-2). The headcount index at the national level also fell between each survey. This fairly steady year-on-year growth and poverty reduction is reassuring, because it implies that the improvement in living standards in the last survey, as compared with the first, is not driven by atypical conditions such as a year of abnormal weather conditions. That established, there has been considerable variation in growth and poverty reduction between each of the five surveys, especially at the regional level. For example, whether poverty was reduced between MS-2 and MS-3 is questionable. The P_2 index actually worsened, while the P_1 index remained constant. The time path of poverty reduction has varied particularly at the regional level. Some poverty indicators worsened for the western region between IHS and MS-1. The west appears to bounce back between MS-1 and MS-2, but the eastern region and other urban areas experienced worsening poverty. Between MS-1 and MS-2, poverty indicators worsened in the north. The headcount in the central region rose between MS-3 and MS-4. Clearly poverty reduction was not smooth and continuous across all regions throughout the period.

Inequality and Growth

Poverty statistics focus only on the lower part of the distribution of welfare. Even within that part the statistics can mask important features due to the aggregation involved. It is therefore more informative to look at the distribution in its entirety, which figure 4.2 does. A nongraphical way of presenting the distribution is to report the values of consumption per adult equivalent at the median and at other deciles (table 4.10). The median rise in living standards between the IHS and MS-4 was 19 percent, two percentage points higher than the rise in the mean. As implied by the dominance analysis, consumption per adult equivalent was higher in MS-4 than in the IHS at all deciles. Comparing the relative gains (not tabulated), the lower (poorer) deciles tend to experience a greater rise in living standards. The rise in consumption per adult equivalent is 27 percent at the bottom decile, 23 percent at the second decile, and 21 percent for the third poorest. Disaggregating

Table 4.10. Consumption Per Adult Equivalent at Each Decile
(1989 U Sh per month)

<i>Decile</i>	<i>IHS</i>	<i>MS-1</i>	<i>MS-2</i>	<i>MS-3</i>	<i>MS-4</i>
<i>National</i>					
1	2,487	2,900	2,901	2,792	3,162
2	3,235	3,640	3,657	3,664	3,992
3	3,958	4,355	4,415	4,472	4,799
4	4,667	4,995	5,195	5,227	5,575
5	5,459	5,847	5,936	6,011	6,478
6	6,394	6,732	6,793	7,053	7,406
7	7,591	7,923	8,038	8,370	8,971
8	9,182	9,708	9,892	10,461	10,786
9	12,233	12,796	13,641	14,174	14,170
<i>Rural</i>					
1	2,393	2,809	2,800	2,694	3,061
2	3,107	3,452	3,552	3,494	3,833
3	3,777	4,163	4,216	4,226	4,534
4	4,430	4,744	4,881	4,959	5,267
5	5,183	5,423	5,589	5,661	6,016
6	5,917	6,267	6,359	6,487	6,898
7	6,975	7,292	7,361	7,509	7,922
8	8,320	8,516	8,854	9,135	9,729
9	10,552	10,680	11,376	12,194	12,126
<i>Urban</i>					
1	4,102	4,746	4,519	4,596	5,172
2	5,368	6,247	6,129	6,338	6,972
3	6,715	7,789	7,376	8,103	8,570
4	8,147	9,455	8,804	9,375	9,894
5	9,523	11,365	10,313	11,544	11,408
6	11,162	13,103	12,906	13,402	13,231
7	13,424	15,001	16,158	15,364	15,795
8	16,623	18,447	20,147	18,752	20,143
9	22,003	24,577	27,696	26,207	27,372

Source: Author's calculations from household survey data provided by the Uganda Bureau of Statistics.

into rural and urban areas, the pattern in rural areas is close to that in the country as a whole. However, in urban areas, the picture is rather different. For a start, the median rise in consumption per adult equivalent in urban areas during the period was 20 percent, substantially more than the 13 percent rise in mean consumption per adult equivalent. Similarly, large rises were apparent for all urban deciles. Consequently, mean consumption per adult equivalent provides a misleading picture of the overall improvement

in living standards of the urban population.¹⁰ Using the median rather than the mean implies that urban living standards have risen faster than rural ones. In urban areas as in rural areas, there was again a tendency for consumption to rise more at the lower deciles. For example, consumption rose by 26 percent at the bottom decile; for the second and third deciles the rise was 39 and 28 percent, respectively.

Focusing on growth at the median and at each decile implies a rather different time path from that implied by growth at the mean. Both perspectives agree that there was substantial growth of more than 5 percent between the IHS and MS-1. However, growth between MS-3 and MS-4 is also high (more than 5 percent) at the median, but less than half that at the mean. Viewed at the median, growth between MS-1 and MS-3 was modest (2.8 percent). Indeed, during this period, the poorest 20 percent of the population did not experience noticeable improvements in living standards and the poorest got poorer. Consumption per adult equivalent at the bottom decile was 4 percent lower in MS-3 than in MS-1, while for the second decile, living standards were essentially unchanged.

Table 4.11 reports the Gini coefficients for the surveys as a measure of the overall inequality in consumption per capita. The Gini coefficient, and hence inequality, falls between the first and last surveys. This indicates that the lower deciles saw greater rises in living standards than the more affluent. The improvement in the progressivity of the distribution is most marked in urban areas.¹¹

The fall in inequality within Uganda has made some contribution to poverty reduction, but most of the gains can be attributed to overall growth. This is shown by a decomposition of the change in poverty statistics between IHS and MS-4 following Datt and Ravallion (1992). We decompose the change in a poverty indicator P between two years, t_1 and t_2 into three components: growth, G ; distribution, D ; and a residual, R :

$$P_{t_2} - P_{t_1} = G + D + R.$$

The growth component, G , is the difference between the initial poverty indicator and what would have arisen from distributionally neutral growth.

10. Consumption seems to have fallen during the surveys for some households who were in the top 10th of the urban population. Because these households have high consumption, their fortunes are influential in determining the mean rise in consumption per adult equivalent, which is calculated in the macroeconomic way by summing consumption across all households and dividing that sum by the population. Whether the apparent fall in the living standards of the top 10th of the urban population is genuine requires further investigation. However, it is not central to this chapter given our focus on the poor.

11. Like the discrepancy between mean and median growth in urban areas, this was partly driven by the apparent fall in consumption among the top 10 percent of the urban population.

Table 4.11. Gini Coefficients for Uganda

<i>Survey</i>	<i>Rural</i>	<i>Urban</i>	<i>National</i>
IHS	0.326	0.394	0.364
MS-1	0.296	0.365	0.345
MS-2	0.320	0.396	0.365
MS-3	0.325	0.373	0.366
MS-4	0.311	0.345	0.347

Source: Author's calculations from household survey data provided by the Uganda Bureau of Statistics.

That is to say, if there was the same mean per capita consumption, M , as in year t_2 , but the same relative distribution (Lorenz curve, L) as in t_1 , then

$$G = P(M_{t_2}, L_{t_1}) - P_{t_1}.$$

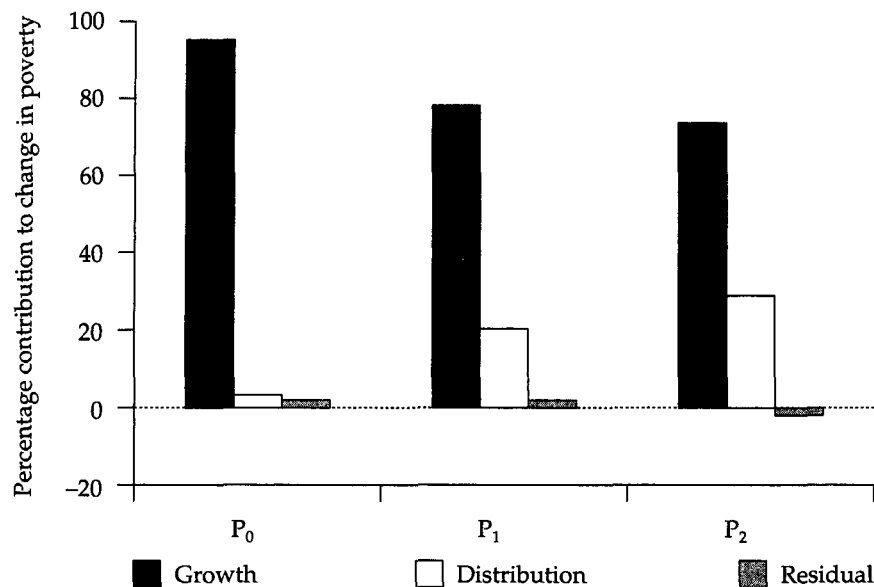
The distribution component, D , is the difference between the initial poverty indicator and what would have arisen from a pure distributional change; that is, if there was the same mean per capita consumption as in year t_1 but the same relative distribution as in t_2 , then

$$D = P(M_{t_1}, L_{t_2}) - P_{t_1}.$$

Figure 4.3 shows the results of this decomposition. Growth accounts for 95 percent of the fall in the percentage of Ugandans in poverty. Improvements in distribution account for only 3 percent of the fall. For the other poverty indices, the contribution of shifts in the distribution of welfare rises relative to that of growth, but remains secondary. For the P_1 index, distributional changes account for a fifth of the fall in poverty, while for the P_2 index, they account for 29 percent.

Sectoral Decomposition of Poverty Changes

Poverty statistics can be disaggregated in many ways. One interesting disaggregation is by economic sector, as this provides a potential link between macroeconomic events and welfare of households. Table 4.12 classifies households into mutually exclusive sectors roughly corresponding to those used in standard national accounts. With two exceptions, the classification is based on the main industry in which the household head works. One exception is for households that grew coffee. These households are defined as cash crop households, regardless of the head of the household's occupation. Typically, such households will obtain more revenue from food crops, but are still assigned to the cash crop sector. The other exception is for households where the head is not working (mainly households with retired heads). These households were placed into a separate category "not working," although some members may be generating income. The classification is a convenience designed to obtain mutually exclusive assignments of households to sectors

Figure 4.3. Growth and Redistribution Decomposition, 1992–1997/98

Source: Author's calculations.

given the data constraints (which include the absence of data on income by sector in the monitoring surveys). In reality, households may work in many industries, and in some cases the main industry in which the head works may not be the household's most important source of income.

We disaggregated poverty by sector for the IHS and for MS-3 (tables 4.12 and 4.13). We could not carry out the disaggregation in MS-4 because the survey did not identify which crop farmers grew cash crops. In 1992 most Ugandans (70 percent) lived in households where the head's main activity was crop farming.¹² Around one-third of those individuals lived in households growing some nonfood cash crop. This reflects the fact that coffee growing was widespread, despite the fact that in 1992/93 it accounted for only around 3 to 4 percent of total crop agricultural revenue (World Bank 1996). There is some evidence of movement into cash crops during the period of the surveys; for example, the size of the sector increased from covering 23 percent of people in the IHS to covering 27 percent in MS-3. However, there is no evidence of a movement out of agriculture; indeed, the sector grew slightly

12. Henceforth, for ease of expression, we will refer to people as being in a sector if their head's main activity is in that sector. This should not be taken to imply that all the people said to be in the sector actually work in the sector.

107 **Table 4.12. Poverty by Sector of Household Head, IHS**

Sector	Population share (percent)	Mean CPAE	Contribution to					
			P_0	P_1	P_2	P_0	P_1	P_2
National	100.0	6,900	55.7	20.3	9.90	100.0	100.0	100.0
Food crop	47.2	5,649	64.1	24.5	12.32	54.3	57.0	58.8
Cash crop	23.4	6,027	60.4	20.7	9.59	25.4	23.8	22.7
Noncrop agriculture	2.7	6,642	55.0	22.2	11.31	2.6	2.9	3.1
Mining	0.1	9,418	31.5	2.6	0.21	0.0	0.0	0.0
Manufacturing	3.7	8,009	43.6	15.8	7.63	2.9	2.9	2.9
Public utilities	0.1	9,089	33.6	5.6	1.62	0.1	0.0	0.0
Construction	1.3	10,656	36.4	11.5	4.58	0.9	0.8	0.6
Trade	6.7	11,864	25.2	7.2	3.11	3.0	2.4	2.1
Hotels	0.5	10,054	25.8	8.1	3.30	0.2	0.2	0.2
Transport and communication	1.5	9,787	31.5	11.0	5.05	0.9	0.8	0.8
Miscellaneous services	1.6	12,561	26.6	10.2	5.03	0.8	0.8	0.8
Government services	6.8	10,104	36.2	10.5	4.49	4.4	3.5	3.1
Not working	4.3	6,929	58.2	22.9	11.65	4.5	4.8	5.0

CPAE Consumption per adult equivalent.

Source: Author's calculations from household survey data provided by the Uganda Bureau of Statistics.

Table 4.13. Poverty by Sector of Household Head, MS-3

<i>Sector</i>	<i>Population</i>		<i>Contribution to</i>					
	<i>share (percent)</i>	<i>Mean CPAE</i>	<i>P₀</i>	<i>P₁</i>	<i>P₂</i>	<i>P₀</i>	<i>P₁</i>	<i>P₂</i>
National	100.0	7,764	49.1	16.4	7.64	100.0	100.0	100.0
Food crop	44.2	5,813	62.1	22.5	10.99	55.8	60.6	63.5
Cash crop	26.7	7,519	46.0	11.9	4.52	25.0	19.4	15.8
Noncrop agriculture	2.1	8,197	40.2	14.5	6.89	1.7	1.8	1.9
Mining	0.2	5,974	74.2	12.7	2.85	0.3	0.1	0.1
Manufacturing	3.3	10,181	27.1	8.7	3.60	1.8	1.7	1.6
Public utilities	0.1	13,192	11.3	1.5	0.19	0.0	0.0	0.0
Construction	1.1	9,695	35.0	8.7	3.02	0.8	0.6	0.4
Trade	6.9	13,248	20.0	4.5	1.66	2.8	1.9	1.5
Hotels	1.0	11,972	19.3	5.1	1.65	0.4	0.3	0.2
Transport and communication	1.9	14,084	14.8	6.6	3.23	0.6	0.8	0.8
Miscellaneous services	2.2	11,428	27.9	10.8	4.88	1.2	1.4	1.4
Government services	5.5	11,387	29.5	7.7	2.90	3.3	2.6	2.1
Not working	4.9	7,662	62.1	29.0	16.60	6.3	8.7	10.8

CPAE Consumption per adult equivalent.

Source: Author's calculations from household survey data provided by the Uganda Bureau of Statistics.

in terms of population share during the surveys. Trade and government services were the next most populous sectors, each covering 7 percent of Ugandans. Trade did not change in size during the surveys, although households in the government sector decreased from 6.8 percent in the IHS to 5.5 percent in the MS-3. The “not working” sector was the next largest sector, growing from 4.3 to 4.9 percent. Manufacturing remained fairly constant at around 3.5 of the population. Other sectors covered 2 percent or less of the population, with some sign of growth in the size of the service sector.

The food crop sector was the poorest of the major sectors in 1992/93, and this sector experienced only relatively modest declines in poverty. The P_0 and P_1 indicators fell by less—both absolutely and relatively—than those for the country as a whole. Cash crop farming was the second poorest sector in the IHS, but this sector experienced dramatic declines in poverty between the IHS and MS-3. Regardless of the poverty indicator used, the reduction in poverty in the cash crop sector was more than twice as large as that in the country as a whole.¹³ These improvements in poverty were driven by an above average rises in mean consumption per adult equivalent, which rose by a third in the sector. One factor underlying these gains was the rise in the world price for coffee during the period. The unit price of Ugandan coffee exports was as follows:

<i>Fiscal year</i>	<i>Price (US\$/kg)</i>
1991/92	0.86
1992/93	0.82
1993/94	1.14
1994/95	2.55
1995/96	1.72
1996/97	1.38
1997/98	1.57

Source: Republic of Uganda (1994, 1997a, 2000).

At the height of the coffee boom, Uganda was receiving export prices for coffee that were triple those in 1992. Other factors were also important. Poor weather conditions in coffee growing areas depressed output in 1991/92. Output was also likely to have been enhanced by the price and market liberalization policies in the coffee subsector. Although these were initiated in 1990, a lagged response in output was likely because of the time needed for newly planted coffee trees to bear fruit.

13. This comparison is fairly straightforward, because poverty rates in the cash crop sector were of a similar magnitude to those in the country as a whole in the IHS. Between the IHS and MS-3, the headcount fell by 24 percent for the cash crop sector; for the country it fell only half as much—by 12 percent.

Poverty fell in nearly all sectors. One exception was mining, although this result may be questionable, given the very small sample size. In addition, there was an increase in the headcount defined relative to the food poverty line in the miscellaneous service sector (and mean consumption per adult equivalent fell), but other poverty statistics for that sector improved slightly. However, perhaps the most notable exception to the generally favorable trends was in the nonworking sector, where all poverty indicators worsened despite rising mean consumption per adult equivalent. The headcount rose only slightly, but this rise masks more serious deterioration in other indicators. The P_1 statistic rose by more than a quarter and the P_2 statistic by two-fifths.

The cash crop sector was not the only one to experience reductions in poverty much above the national trend. Although manufacturing and trade started from much lower initial levels of poverty, both saw greater proportionate reductions. Hotels, construction, and transport and communications also performed strongly. The government sector lagged somewhat behind the country as a whole in terms of growth in mean per capita consumption, although poverty rates fell comparably.

It is possible to decompose the national change in poverty into the effects of changes in poverty within sectors and movements between sectors (Ravallion and Huppi 1991). This allows one to assess whether poverty has fallen because people within certain sectors have become better off or because people have moved to more affluent sectors. If P_{it_1} is a poverty indicator for time t_1 , then:

$$\begin{aligned} P_{it_2} - P_{it_1} &= \Sigma(P_{it_2} - P_{it_1})n_{it_1} && \text{intrasectoral effects} \\ &+ \Sigma(n_{it_2} - n_{it_1})P_{it_1} && \text{intersectoral effects} \\ &+ \Sigma(P_{it_2} - P_{it_1})(n_{it_2} - n_{it_1}) && \text{interaction effects,} \end{aligned}$$

where n_{it_2} is the proportion of the population in sector i at time t_2 and P_{it_1} is the poverty indicator for sector i at time t_1 . The interaction effects tell us whether people switched out of or into sectors where poverty was falling (if positive, people moved into sectors where poverty was falling).

Applying this methodology to Uganda, table 4.14 shows that an improvement in the conditions of cash crop farmers and their families was responsible for more than half of the improvement in poverty between the IHS and MS-3. Improvements in the lot of food crop farmers made a more modest contribution to the fall in the headcount, but these accounted for around a quarter of the improvement in other poverty indicators. Other sectors made more modest contributions, with trade, manufacturing, and government services being the more noticeable (largely due to their size). The table also reveals the worsening poverty of those in households whose head was not working. Population shifts between sectors also help explain some of the improvement in poverty, but their contribution is less, only around 2 to 4 percent. Interaction effects were positive, implying that people moved into sectors where poverty was falling faster, such as cash crop farming.

Table 4.14. Sectoral Decomposition of Changes in Poverty between IHS and MS-3

<i>Sector</i>	<i>Percentage contribution to</i>		
	P_0	P_1	P_2
Food crop	14.1	24.2	27.7
Cash crop	50.8	52.6	52.6
Noncrop agriculture	6.0	5.3	5.2
Mining	-0.5	-0.2	-0.1
Manufacturing	9.3	6.8	6.6
Public utilities	0.3	0.1	0.1
Construction	0.3	1.0	0.9
Trade	5.3	4.8	4.3
Hotels	0.5	0.4	0.4
Transport and communication	3.8	1.7	1.2
Miscellaneous services	-0.3	-0.2	0.1
Government services	6.9	4.8	4.8
Not working	-2.5	-6.8	-9.4
Total intrasectoral	94.0	94.3	94.4
Total intersectoral	2.9	3.3	3.7
Total interaction	3.0	2.4	1.9

Source: Author's calculations from household survey data provided by the Uganda Bureau of Statistics.

Summary and Conclusions

The data on private consumption from five recent Ugandan household surveys provide a picture of rising living standards in accordance with the macroeconomic data on growth. The finding that urban living standards have risen is unsurprising, given the many indicators of strong performance of nonagricultural sectors and the visible progress in the major towns. However, the household survey data is perhaps the strongest evidence available that living standards in rural areas have also improved commensurately with the macroeconomic statistics. The growth in the household surveys was not driven by any one year being atypical. Average living standards improved between each of the five surveys. Moreover, the growth was broadly based as it was shared across the income distribution. Real consumption per capita has risen for all deciles, implying a reduction in poverty regardless of where the poverty line is set. Indeed, living standards grew most rapidly for the poorer deciles, leading to a fall in inequality.

We drew an absolute poverty line for Uganda, sufficient to meet calorie needs given the typical diet of the bottom half of the population and to meet minimum nonfood requirements. The line implies that 56 percent of Ugandans were poor in the first survey in 1992. This percentage fell to 44

percent in last survey in 1997/98, a significant and substantial reduction in poverty during a relatively short interval of five years. The reduction in poverty is explained mainly by growth, although falling inequality also contributed. Poverty reduction has been uneven across economic sectors, with those engaged in cash crop farming, manufacturing, and trade faring particularly well. The improvement in the living standards of those growing cash crops accounts for more than half of the fall in poverty during the period. Although the data generally imply improvements in welfare, growth was not uniform, and a number of less favorable trends were identified. Regional disparities were exacerbated during the period, with the central region growing the most strongly and the eastern region lagging behind. At the median, living standards rose more in urban areas than in rural areas. Finally, poverty worsened in the first four surveys for those households where the head was not working.

The rise in living standards observed in the surveys is evidence of broadly based growth. Although there is much debate about whether growth “trickles down,” such terminology is clearly inappropriate here. If anything, growth in living standards has been strongest among poorer households. Nonetheless, many questions remain concerning implications for the future and for our understanding of the recent past. The period considered is relatively short—five years—and whether the impressive reduction in poverty observed here can be sustained in the long term has yet to be determined. Note that the growth in the living standards of the very poorest was somewhat erratic, with no improvements between 1993/94 and 1995/96. The extent of the reduction in poverty in the future will partly depend on whether growth can be sustained, but also on how growth is distributed. On the latter point, the experience of 1992–98 may be a poor guide for the future, because growth at that time was driven partly by the coffee boom and partly by a process of recovery from the economic collapse of the 1970s and 1980s.

The temporary nature of the coffee boom raises the issue of whether the associated rise in living standards observed will only be temporary. A merit of using consumption rather than income to measure welfare is that, according to the permanent income hypothesis, temporary windfalls will have less effect on consumption. Indeed, empirical research has tended to confirm that export crop farmers do often save heavily out of any windfalls resulting from price booms (Bevan, Collier, and Gunning 1993). Consequently, consumption is unlikely to fall with the end of coffee boom and, indeed, the last survey, MS-4, provides no evidence that it has. However, whether future growth will have the same effect on poverty as that arising from the coffee boom is not clear. Much will depend on the sources of growth, such as the extent to which the poor derive income from growing sectors or can enter such sectors. One reason why growth during the period has reduced poverty so much is that before the boom, coffee farmers were as poor as the average Ugandan.

More generally, the period studied may mark Uganda's transition from recovery to fresh growth. Although long-term comparisons are problematic, it appears that Uganda has not yet returned to the real per capita income levels enjoyed in the early 1970s. The process of recovery to achieve those income levels may have involved a pattern of growth that is quite different from what will arise with subsequent development. Recovery has necessitated the rehabilitation of traditional export crops, the restoration of the public sector, and a reversal of the retreat to subsistence. Although predicting the nature of future growth is hard, it is unlikely to be a simple continuation of the processes of recovery. These considerations imply a need to continue monitoring poverty and living standards at the microeconomic level.

Annex 4.1. Methodology

This annex explains the main assumptions and principles that underlie the results reported in this chapter. More detailed explanations are provided in an extended version of this chapter available upon request from the author.

Obtaining Consistent Estimates of Consumption

Table A4.1 reports the estimates of consumption per capita as calculated in the official survey reports and after a number of adjustments.¹⁴ There were six adjustments:

- *The exclusion of Kasese, Kitgum, Gulu, and Bundibugyo districts.* Exclusion of these districts was necessary because fears about safety meant that large parts of these districts were not covered in MS-4. These four districts included 6.9 percent of Uganda's population in the 1991 census (Republic of Uganda 1995). They are relatively poor, so that their omission raises mean consumption per capita by 1.8 percent in the IHS and by 2.3 percent in the MS-1.
- *Adjustment for public transport fares.* The IHS omitted an item for fares on public transport. To adjust for this, a value for such an item was imputed using the regional shares in the MS-1.¹⁵ Omission from the IHS of health expenditures for Arua district was dealt with in a

14. The figures differ very slightly from those in the official survey reports, perhaps due to subsequent cleaning of the data.

15. This is a striking example of sensitivity to questionnaire design. Both the IHS and MS had an item for "other transport expenses," but only the MS questionnaire explicitly mentioned public transport fares as an example. To adjust for the change in questionnaire design, we did not include the item as reported in the IHS, but instead assumed the item had the same share as in the MS-1 (with separate shares for rural and urban areas).

Table A4.1. Adjusted Comparison of Mean Consumption Per Capita
(U Sh per month)

<i>Mean consumption per capita</i>	<i>HIS 1992/93</i>	<i>MS-1 1993/94</i>	<i>MS-2 1994/95</i>	<i>MS-3 1995/96</i>	<i>MS-4 1997/98</i>
<i>National</i>					
As calculated in official reports	11,574	13,195	15,221	17,499	20,540
1. Excluding Gulu, Kasese, Kitgum, and Bundibugyo	11,786	13,501	15,388	17,721	20,747
2. Adjusting for public transport fares	11,981	n.a.	n.a.	n.a.	n.a.
3. Revaluing home consumed food at market prices	12,769	14,748	16,643	18,568	21,976
4. Adjusting for regional prices	13,187	15,267	17,064	18,973	22,139
5. Adjusting for inflation (1989 prices)	5,452	5,825	6,058	6,187	6,353
6. Reweighting MS-1	5,452	5,718	6,058	6,187	6,353
<i>Rural</i>					
As calculated in official reports	9,547	10,116	12,470	14,303	17,210
1. Excluding Gulu, Kasese, Kitgum, and Bundibugyo	9,675	10,351	12,564	14,411	17,367
2. Adjusting for public transport fares	9,788	n.a.	n.a.	n.a.	n.a.
3. Revaluing home consumed food at market prices	10,633	11,685	13,887	15,323	18,714
4. Adjusting for regional prices	11,400	12,571	14,669	16,082	19,141
5. Adjusting for inflation	4,701	4,794	5,206	5,242	5,488
6. Reweighting MS-1	4,735	4,862	5,206	5,242	5,488
<i>Urban</i>					
As calculated in official reports	25,869	34,092	34,334	37,194	42,047
1. Excluding Gulu, Kasese, Kitgum, and Bundibugyo	26,697	35,177	35,312	38,929	42,746
2. Adjusting for public transport fares	27,471	n.a.	n.a.	n.a.	n.a.
3. Revaluing home consumed food at market prices	27,858	35,833	36,085	39,362	43,205
4. Adjusting for regional prices	25,805	33,822	33,957	37,498	41,647
5. Adjusting for inflation	10,752	12,919	12,067	12,246	11,979
6. Reweighting MS-1	10,752	11,645	12,067	12,246	11,979

n.a. Not applicable.

Source: Author's calculations from household survey data provided by the Uganda Bureau of Statistics.

similar manner. These adjustments together raise the mean consumption figure for the IHS by 1.7 percent.

- *Revaluing home-consumed food at market values.* Interviewers were supposed to make sure that respondents valued home consumption of food in farm-gate prices. Farm-gate and market prices were estimated based on the unit values in the surveys for home consumption and purchases of food, respectively.¹⁶ Estimates were done separately by region and urban-rural location (that is, eight sets of prices were identified). The revaluation increased the estimated value of home consumption of food by approximately 30 percent.
- *Adjusting for regional prices.* Food prices are markedly higher in some areas of Uganda, particularly in urban areas, than they are in others. It was possible to use unit values for purchases of major food items to construct regional food price indexes for each survey. Median unit values were used to make the results insensitive to outliers. Nonfood prices were assumed to be constant across the country. It is sometimes argued that nonfood prices may be higher in rural areas due to transport costs, but this is not well established. In a study of the Côte d'Ivoire, Grootaert and Kanbur (1994) found nonfood prices to be generally lower in rural areas than in urban areas. The regional price adjustment is important primarily when making intracountry (for example, urban-rural) comparisons rather than intertemporal comparisons.¹⁷
- *Adjusting for inflation.* Adjusting for inflation is probably the most important adjustment when making comparisons over time. The composite national consumer price index (CPI) was used as the price deflator and expenditures were converted into 1989 prices. Although the CPI is only collected for major urban areas, it does appear fairly reliable. During the period, there were no price controls or other distortions. Furthermore, an earlier exercise for the period 1989–92 using unit values from household survey data had largely corroborated the CPI.

16. This was complicated by the fact that quantities could be reported in different units, including some unspecified measures such as "heaps," "bunches," and so on. Where possible only metric measures were used. For some items most units codes were nonmetric, in which case only reports with a single unit code were used to avoid having to make different units comparable. It was not necessary to convert quantities into metric units except when calculating calories per shilling for the food poverty line. For that purpose, conversion factors from Kayiso (1993) were used for nonstandard unit codes for the few items where output was never reported in metric units.

17. It does raise the overall national expenditures somewhat, because prices were adjusted to survey median values. Urban areas were oversampled, and this effect is not corrected for when calculating median values, so the survey prices disproportionately reflect higher urban prices.

- *Reweighting MS-1.* MS-1 assigned low weights to certain households that were either previously surveyed in the IHS or were in enumeration areas surveyed in the IHS. Subsequent monitoring surveys did not weight such households differently from others. Consequently, MS-1 was reweighted to make its population multipliers comparable to those in MS-2 and MS-3. The main impact of this adjustment was to remove a rather implausible deterioration in urban living standards between MS-1 and MS-2.

Setting the Poverty Line

The MS-1 data are used to calculate an absolute poverty line. This is derived from a food poverty line, showing the cost of meeting calorie requirements given the typical diets of poor Ugandans, and an estimate of the cost of meeting nonfood requirements.

CALORIE REQUIREMENTS. Lipton and Ravallion (1995) identify the energy requirements set by the World Health Organization (WHO 1985) as the most widely used official estimates. Consequently, we adopted these guidelines for Uganda. WHO calorie requirements vary by body size, age, sex, daily activities, pregnancy, and lactation. We followed the principles laid out by WHO in adjusting for these factors. Our calculations were based on the assumption that adults are engaged in farming, and we estimated energy requirements based on the time use data provided in the IHS. The calculations were involved; however, our results yielded similar multiples of basal metabolic rates to those given by WHO in their illustrative examples of a subsistence farmer and a rural woman in a developing country (WHO 1985, tables 10 and 14). The estimated calorie requirements by age and sex are presented in table A4.2. We first define the poverty line according to the needs of a man aged 18 to 30. This poverty line can then be compared with household consumption per adult equivalent, where the adult equivalence scales measure needs relative to a man aged 18 to 30.

THE FOOD POVERTY LINE. Many combinations of foods (food baskets) could meet the requirement of 3,000 calories. We focus on the food basket of the poorest 50 percent of Ugandans, ranked by consumption per adult equivalent. Previous work using the IHS data defined a poverty line based on the consumption patterns of the bottom 50 percent and found that more than half of Ugandans lived below this line (World Bank 1996). To calculate the food poverty line, we first use the MS-1 data to estimate the mean quantities of 28 major food items (see table 4.2) consumed by the poorest 50 percent. These mean quantities constitute a reference food basket: the typical food basket of the poor. We then estimated how many calories were generated by the reference food basket. We did this calculation using the calorific values of East African foods as reported by West (1987) (see table 4.2). For some foods,

Table A4.2. Daily Calorific Requirements and Equivalence Scales

Age	Male		Female	
	Calorie requirement	Equivalence scale	Calorie requirement	Equivalence scale
0	755	0.25	700	0.23
1	1,200	0.40	1,140	0.38
2	1,410	0.47	1,310	0.44
3	1,560	0.52	1,440	0.48
4	1,690	0.56	1,540	0.51
5	1,810	0.60	1,630	0.54
6	1,900	0.63	1,700	0.57
7	1,990	0.66	1,770	0.59
8	2,070	0.69	1,830	0.61
9	2,150	0.72	1,880	0.63
10	2,190	0.73	2,015	0.67
11	2,340	0.78	2,130	0.71
12	2,440	0.81	2,225	0.74
13	2,560	0.85	2,295	0.77
14	2,735	0.91	2,370	0.79
15	2,875	0.98	2,385	0.88
16	2,990	1.00	2,425	0.89
17	3,090	1.02	2,435	0.89
18–29	3,025	1.00	2,350	0.87
30–39	2,960	0.99	2,325	0.87
40–59	2,960	0.99	2,295	0.86
60+	2,290	0.86	1,830	0.77

Note: Equivalence scales for children aged 14 and under are obtained by dividing calorific requirements by 3,000. Equivalence scales for adults are given by $0.42 + 0.58 \times (\text{calorie requirements}/3,000)$.

Source: Calorie requirements are author's calculations from the IHS based on guidelines from WHO (1985).

part of the food weight was inedible or lost in preparation. Estimates of the ratio of the food retained for consumption are given in table 4.2. Multiplying the mean quantities of foods consumed by their calorific value and retention rates, we estimated that the poorest 50 percent of Ugandans consumed around 1,373 calories per day per person (not per adult equivalent). Consequently, the typical diet of poor Ugandans would have to be scaled upward by a factor of 2.18 to generate 3,000 calories per person per day. Scaling up the reference food basket by this factor gave us the food basket that was costed to identify the food poverty line. The total cost of the food basket, which represents our food poverty line, is U Sh 11,463 per month (in the average prices of the MS-1 survey; these MS-1 prices must be deflated by 2.63 to be converted to the 1989 prices used in reporting most real expenditures in this chapter).

NONFOOD REQUIREMENTS. We followed Ravallion and Bidani (1994) in identifying nonfood requirements, *NF*, as the nonfood expenditure of those whose expenditure is just equal to the food poverty line, z_f . The rationale for this is that, because at this level of welfare the poor have sacrificed some of their need for calories, the nonfood expenditures they have chosen to give priority to should also be regarded as meeting essential needs. Different locations were allowed different nonfood requirements. On average, the model predicts a mean food share of 0.566 for households whose total consumption is just sufficient to meet their calorie requirements (see the second column in table 4.3). This gives a national poverty line of U Sh 16,443 per adult equivalent per month (MS-1 prices). Taking a purchasing power parity exchange rate of U Sh 369 to the U.S. dollar, this is equivalent to US\$44.56 per adult equivalent a month. (At the official exchange rate of U Sh 1,195 per U.S. dollar, it amounts to US\$13.76 a month.) In the case of Uganda, the line is equivalent to US\$34 per capita per month, and hence is comparable to the US\$1 a day poverty line sometimes used for international poverty comparisons by the World Bank.

Rather than use a single "all Uganda" poverty line, the lines were allowed to differ by location because estimated nonfood requirements vary (the third column of table 4.3). Predicted food shares were much lower in urban areas than in rural areas, for example, 0.49 in the central urban compared with 0.68 in western rural. Consequently, the western rural had the lowest poverty line, U Sh 15,189 (MS-1 prices) per adult equivalent per month, while the central urban had the highest, U Sh 17,314.¹⁸ These regional differences in poverty lines are relatively modest. However, note that a single food basket was used for all regions and was valued in constant prices. Because food prices are much higher in urban areas, the difference between urban and rural poverty lines is much greater when valuing in nominal terms (and not at constant prices).¹⁹ In nominal terms, the poverty line for central urban was 106 percent higher than that for western rural.

The derived poverty lines are based on the calorie requirements of a Ugandan man aged 18 to 30. To use the lines to assess poverty with households of different demographic composition, we need a set of equivalence scales to measure the needs of different age and sex groups. We used relative calorie

18. That western rural should have the lowest poverty line raises some doubts about the appropriateness of working with a national food basket. One reason why the food share may be predicted to be higher in western rural (and hence the poverty line lower) is that it is more expensive to obtain sufficient calories using *matooke*, a favored staple in the western region.

19. The food poverty lines in nominal terms (fourth column of table 4.3) are not equal to the food poverty lines in national prices scaled by our estimated regional food price index. This is because the food price index was based on the consumption patterns of the whole population, whereas the poverty line is based on the consumption patterns of the poorest half of the population.

requirements to measure relative food needs. All adults are assumed to have equal nonfood needs regardless of sex or age. For calculating equivalence scales for adults, we assumed that 58 percent (the mean food share) of the scale is equal to calorie requirements divided by 3,000. The remaining 42 percent of the scale was assumed to be the same for all adults. Small children can more reasonably be said to have lower nonfood requirements. Rather arbitrarily, we assumed that children's nonfood requirements are lower than those of men by the same proportion as their relative calorie requirements. The resulting equivalence scales are reported in table A4.2.

References

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

- Appleton, Simon. 1996. "Problems of Measuring Changes in Poverty over Time: The Case of Uganda 1989–1992." *Institute of Development Studies Bulletin* 27(1): 43–55.
- Appleton, Simon, I. Chessa, and J. Hoddinott. 1999. "Are Women the Fairer Sex? Looking for Gender Differences in Gender Bias in Uganda." University of Oxford, Centre for the Study of African Economies, U.K. Processed.
- Bevan, David, Paul Collier, and Jan Gunning. 1993. "Trade Shocks in Developing Countries: Consequences and Policy Responses." *European Economic Review* 37(2–3): 557–65.
- Datt, Gaurav, and Martin Ravallion. 1992. "Growth and Redistribution Components of Changes in Poverty Measures: A Decomposition with Application to Brazil and India in the 1980s." *Journal of Development Economics* 38(2): 275–95.
- Foster, James, Joel Greer, and Erik Thorbecke. 1984. "A Class of Decomposable Poverty Measures." *Econometrica* 52(May): 761–66.
- Grootaert, Christian, and Ravi Kanbur. 1994. "A New Regional Price Index for Côte d'Ivoire Using Data from the International Comparisons Project." *Journal of African Economies* 3(1): 114–41.
- Kakwani, Nanak. 1993. "Statistical Inference in the Measurement of Poverty." *Review of Economics and Statistics* 75(4): 632–39.
- Kayiso, P. K. 1993. "Final Report on Conversion Factors and Regional Price Indices." Ministry of Finance and Economic Planning and Program to Alleviate Poverty and the Social Cost of Adjustment, Kampala. Processed.
- Kikafunda, Joyce, Louise Serunjogi, and Michael Migadde. 1992. "Final Report on Establishment of a Nutrition Based Absolute Poverty Line

- for Uganda." Ministry of Finance and Economic Planning and Program to Alleviate Poverty and the Social Cost of Adjustment, Kampala. Processed.
- Lipton, Michael, and Martin Ravallion. 1995. "Poverty and Policy." In Jere Behrman and T. N. Srinivasan, eds., *The Handbook of Development Economics*, vol. III. Amsterdam Elsevier.
- Ravallion, Martin, and Benu Bidani. 1994. "How Robust Is a Poverty Line?" *World Bank Economic Review* 8(1): 75–102.
- Ravallion, Martin, and Monica Huppi. 1991. "Measuring Changes in Poverty: A Methodological Case Study of Indonesia during an Adjustment Period." *World Bank Economic Review* 5(1): 57–82.
- Republic of Uganda. 1994. "Background to the Budget 1994–1995." Ministry of Finance and Economic Planning, Kampala.
- _____. 1995. "The 1991 Population and Housing Census Analytic Report," vol. 1, "Demographic Characteristics." Ministry of Finance and Economic Planning, Entebbe.
- _____. 1996. "Background to the Budget 1995–1996." Ministry of Finance and Economic Planning, Kampala.
- _____. 1997a. "Background to the Budget 1997–1998." Ministry of Planning and Economic Development, Kampala.
- _____. 1997b. "Poverty trends in Uganda, 1989–1995." Discussion Paper no. 1. Ministry of Finance and Economic Planning, Coordination of Poverty Eradication Project and Statistics Department, Kampala.
- _____. 1999. "Uganda Participatory Poverty Assessment: A Summary of Key Findings and Policy Messages." Ministry of Finance and Economic Planning, Kampala.
- _____. 2000. "Background to the Budget 2000–2001." Ministry of Planning and Economic Development, Kampala.
- UNDP (United Nations Development Programme). 1997. *Uganda Human Development Report*. Kampala.
- West, Clive. 1987. "Food Composition Table." Wageningen Agricultural University, Department of Human Nutrition, De Dreijen, Netherlands. Processed.
- WHO (World Health Organization). 1985. "Energy and Protein Requirements." WHO Technical Report Series no. 724. Geneva.
- World Bank. 1994. *World Development Report: Infrastructure for Development*. New York: Oxford University Press.

- . 1995. "The Social Impact of Adjustment Operations: An Overview" Report no. 14381. Operations Evaluations Department, Washington, D.C.
- . 1996. *Uganda: The Challenge of Growth and Poverty Reduction*. A Country Study. Washington, D.C.

Rural Households: Incomes, Productivity, and Nonfarm Enterprises

Klaus Deininger and John Okidi

During the past decade, Uganda's economy has shown remarkable growth, which has translated into a substantial reduction in poverty. For growth to be sustainable and to reduce poverty in a sustainable fashion, it will be critical to increase agricultural productivity and rural nonfarm employment. This is because about 80 percent of the labor force is concentrated in agriculture, but the sector receives less than half of the total income. In addition, more than two-thirds of the earned income of the poorest decile comes from agriculture. Enabling the poor to accumulate additional human and physical capital and increasing the returns to assets they already own through technical progress, increased diversification, market integration, commercialization, and growth of rural nonfarm enterprises will, therefore, be key elements of any strategy aimed at equitable growth and broadly based poverty reduction. The purpose of this chapter is to assess the extent of progress toward these goals and to explore obstacles that need to be overcome. Data from three different household and community surveys were used, including the 1992/93 integrated household survey, the 1993/94 monitoring survey, and the first round of the 1999/2000 national household survey (see appendix A at the end of the book).¹

Use of the 1999/2000 Uganda national household survey would have not been possible without the excellent performance of the Uganda Bureau of Statistics survey team under Jackson Kanyerezi and James Muwonge, the careful data editing under Tom Emwanu, and the contribution of Bart Minten in questionnaire design and enumerator training. The authors are deeply indebted to all of them.

1. Although enough observations (about 4,800 households) are available to make inferences that are statistically representative at the regional level, note that all the means discussed in this chapter refer to sample rather than population averages, because final weights are not yet available for the latter survey.

This chapter first reviews major changes that occurred in the rural sector between 1992 and 1999. It then analyzes the determinants of changes in household income using a panel of approximately 1,000 households that were interviewed in both 1992/93 and 1999/2000. Finally, the chapter explores production, input demand, and the establishment of nonfarm enterprises using information from 1992/93 and 1993/94 surveys.

A Panorama of Rural Uganda

To gain a better understanding of the rural environment, this section introduces the historical evolution of Uganda's rural sector and then describes changes in output structure, technology, operation of factor markets, and access to infrastructure and other services that occurred between 1992 and 1999. The purpose of presenting such a summary is to provide a descriptive overview of some of the issues the rural population faces; the extent to which these conditions have changed; and the scope for further improvements in providing rural households with access to technology, services, and infrastructure. Indeed, while the descriptive evidence provides a clear indication that there has been a change for the better, for example, as regards asset ownership, it also indicates that significant interregional and rural-urban differences persist, especially in access to infrastructure and technology.

Historical Background

During 1971–85 Uganda's rural sector suffered from a combination of ill-founded nationalization of assets, problems related to civil strife, and agricultural price disincentives. These social and economic problems were due to implicit and explicit taxation of export crops through monopoly marketing boards, the associated inefficiencies in input and output markets, and overvalued exchange rates. The combined effect of these factors was to discourage many rural producers from risking exposure to markets and make them shift to food crop production and subsistence farming. For example, cotton production declined from a peak of 87,000 tons in the early 1970s to about 2,000 tons in the mid-1980s, as producing for the market was no longer profitable. A similar decline occurred in tea and, although less dramatic, in coffee. Price disincentives, withdrawal of financial intermediaries, lack of infrastructure maintenance, and deterioration in the delivery of public goods all led to the successive decapitalization of the rural economy, erosion of international competitiveness, and a secular decline in productivity.

To reverse these trends, since the late 1980s the government has attempted to reduce biases against rural producers. Coffee marketing and exports were liberalized and direct export taxation was abolished (though reintroduced temporarily during the 1994–95 coffee boom). Similar measures were taken in the cotton sector, although progress has been slower. Agricultural output grew at an annual rate of 4 to 4.5 percent in real terms during the last 10

years. However, given the low level from which the sector started, this performance is less impressive than one may think. In reality, agricultural growth has been well below the average growth rate of the economy as a whole (6 to 7 percent), suggesting that a variety of structural impediments have thus far limited the supply response of the rural sector (see Belshaw, Lawrence, and Hubbard 1999 for a critical review).

Nevertheless, agricultural growth has played an important role in reducing poverty. As shown by Appleton (chapter 4 in this volume), the incidence of poverty decreased nationally from 56 percent in 1992 to 44 percent in 1997. A decomposition analysis indicates that this was mostly due to growth rather than to redistribution. Agricultural production for the market was strongly correlated with the reduction in poverty: sectoral decomposition shows that cash (export) crop farming households account for half of the poverty reduction achieved between 1992 and 1997. This suggests that greater agricultural commercialization could play an important role in lifting the large majority of poor food crop and subsistence producers out of poverty.

The importance of rural sector growth for poverty reduction is illustrated by the fact that in 1999, agriculture accounted for more than two-thirds of households' earned income, and land accounted for about half the value of the total asset endowment even of the poorest decile in the population. Any measures that raise agricultural income and the returns to land would therefore yield significant and immediate benefits for the rural poor. It is against this background that the next section discusses output structure, the operation of factor markets, and access to services in more detail.

Structure of Output and Technology

This section uses community survey evidence to highlight the changes in the relative importance of main commodities grown by Ugandan households, their yields, and the number of producers between 1992 and 1999.² What emerges is a pattern whereby, with the exception of cotton and a number of fruits, traditional agricultural production in the north appears to have been relatively stagnant, and in many cases, characterized by declining yields. Other regions, especially the west, emerge as more dynamic, having diversified into vegetables, while at the same time expanding in traditional commodities such as maize, beans, millet, and cassava. Evidence also suggests a major role for the transfer and adoption of improved technology. Technology helps both to arrest diverging trends across regions (as in maize and beans, tomatoes, and cabbage), and to halt declining yields, often through disease, as in the case of coffee and *matooke* (plantain).

2. The available community survey data include more than 500 communities across Uganda. A community typically corresponds to a village.

Building on the evidence on commodities, this study also examined specific factors associated with the use of technology and the functioning of factor markets. During the period under study, livestock ownership expanded considerably, creating opportunities for a sustained increase in the use of mechanical technology as well as the establishment of integrated systems of production and organic manuring. Even though evidence points to increased ownership and use of ox plows, their share remains extremely low. This suggests that the scarcity of complementary factors of production, such as labor, capital, and land, may constrain further expansion. The data also point to extremely low levels of organic fertilizer use to improve soil fertility (about 3 percent of farms use inorganic fertilizer and about 6 percent use manure). At the plot level, the data indicate a strong correlation between the adoption of high-yielding varieties (HYV) and fertilizer use (the simple correlation coefficient is 0.18).

CHANGES IN OUTPUT AND YIELDS. Changes in the output mix and in yields of main commodities are important indicators of producer response to shifts in incentives and opportunities in marketing and technology. They reveal whether or not the expected diversification is actually occurring. At the same time, they provide an indication of the adequacy of existing technology. This section uses community-level information on 14 main commodities grown in Uganda to make such inferences.³ It begins with staple crops and proceeds to export and nontraditional commodities, exploring the share of communities where the specific crop is grown;⁴ how the number of producers has changed since 1992; whether yields increased or decreased during 1992–99; and the main reason reported by communities for changes in yields (table A5.1).⁵

Maize, the main staple for the most of the population, is grown in 75 percent of communities countrywide, with 61 percent of villages having virtually everybody grow maize. Maize cultivation expanded significantly between 1992 and 1999: 36 percent of communities reported an increase in the number of producers and only 11 percent reported a decrease in the number of producers. In 36 percent of communities in the east and 30 percent of communities in the central region, maize yields increased, attributable to improved management practices. By comparison, maize yields dropped in 60 percent of communities in the north and 43 percent of communities in the east, with the drops being attributed mainly to weather-related factors. In the north, this appears to have led to a significant move out of maize cultivation. Data

3. The survey contains information on 20 commodities.

4. The categories are “by all or many”, “by some” (up to one half), and “by none” of the producers.

5. Although the original answer for both the number of producers and yields was given on a scale from one to five, these are collapsed into two categories to improve the readability of table A5.1.

indicate that in 37 percent of communities the share of maize producers decreased, in marked contrast to the rest of the country. It is important to examine the extent to which this reflects the region's comparative advantage, that is, whether there is scope for producers to substitute for maize with other commodities that are more profitable under local conditions. If such a substitution is not profitable, adaptive research to expand varieties and/or techniques used to grow maize would be needed.

As beans are often grown together with maize, trends observed in beans were similar, including their almost universal importance. Only 20 percent of communities reported that nobody plants beans, while in 64 percent of the villages everybody grows them. All regions except the north showed marked increases in the number of communities where beans were grown. Seventy percent of the communities in the north reported a decline in the yields. At the same time, in the west yields declined in 40 percent of communities but increased in 30 percent of villages, suggesting that there may be gaps in technology that could be easily bridged.

In view of its drought resistance, millet is most important in the north, where almost 70 percent of communities report that everybody grows millet, followed by the west (60 percent), the east (33 percent), and the center (8 percent). Only 15 percent of communities in the north reported that nobody grows millet. It is therefore surprising that about 20 percent of communities in the north and east reported a decline in the number of millet producers, compared with 43 percent of communities in the west reporting an increase. This change in the relative importance of production appears to be caused mainly by changes in yields, which were reported to have declined in almost two-thirds of northern and one-third of eastern communities, but increased in about one-third of western communities. In view of the crop's drought resistance, weather was almost universally mentioned as the main underlying factor for yield decreases, a fact that would warrant attention.

Sorghum is most important in the west, followed by the east and the north, while it is almost nonexistent in the central region. The number of producers shows a moderate increase in the west, together with a moderate to significant decrease in the east and north. Declining yields experienced in 31 percent of northern communities (as compared with 21 percent of western ones) appear to be the main reason for the reduced emphasis on this commodity in the north.

Groundnuts are of major importance in the north, the west, and the east, but less important in the center. In contrast to the commodities discussed earlier, groundnuts show a marked pattern of declining yields nationwide: about one-third of communities in the east and west and two-thirds in the north reported declining yields while only about 15 percent report yield increases.

Matooke was produced in about 50 percent of communities. The main production areas are in the western region, where the crop was grown in 82 percent of communities (almost universally in 55 percent and by about half in 26 percent). While of moderate importance in the central and eastern region, *matooke* was grown only in about 10 percent of communities in the north.

Production expanded in the western and central regions, but contracted in the east and remained virtually constant in the north. Almost 60 percent of yield decreases in communities in the west and 25 percent of yield decreases in communities in central region were attributed to diseases or the weather.

While the commercial market for cassava is limited, it provides an important source of calories for home consumption. Indeed, cassava is universally grown in almost half of Uganda's villages and by some producers in another quarter of the country's villages. Producers in the central region and the north appear to have shifted out of cassava, whereas the number of producers in the west and the east has increased over time. Yield declines appear to have been most marked in the north (where two-thirds of communities reported a decline) and the central region (45 percent), but were relatively equally balanced with yield increases in the remainder of the regions.

Cultivation of coffee, Uganda's main earner of foreign exchange, dominates in the western, central, and eastern regions, but is nonexistent in the north. Although the profitability of coffee was high, the geographic expansion of coffee growing was limited to the east, where 16 percent of the communities increased production and 12 percent of communities decreased production. While changes observed in the west were moderate, 30 percent of communities in the central region reported a decline in the number of coffee producers (as compared with 7 percent that reported an increase). The major reason appears to have been disease. Given the macroeconomic importance of coffee and the forward and backward linkages in the economy, efforts to reduce vulnerability to diseases, and where possible to expand cultivation, have showed a high payoff.

Cotton, Uganda's other main cash crop, is important mainly in the north and the east, where about two-thirds and one-third of communities, respectively, reported cotton cultivation. The sector has been characterized by a long history of neglect, which over time has resulted in significantly reduced output. The fact that the number of cotton producers has increased in half of the communities in the north and a quarter of the communities in the east indicates that the dislocations associated with the past have given way to a more sustained path of consolidation and renewed growth. The expansion of the area growing cotton appears to have been accompanied by technology-driven yield increases in most communities, which is particularly encouraging. Although data on total output and profits will be needed before more definite conclusions can be drawn, the signs are hopeful.

Few national statistics are available on the importance of fruits and vegetables, two categories of products that are often considered indispensable for moving Uganda's agricultural sector up the value added chain. While a survey of communities cannot substitute for a more detailed assessment of Uganda's comparative advantage, potential markets, and opportunities for expansion into agroprocessing, the new community-level data suggest that the focus on traditional crops that characterizes Uganda's

agricultural service is likely to miss out on an important element of region-specific diversification.

For example, tomatoes, which were being grown in about 40 percent of communities nationwide, have achieved a level of geographical coverage greater than that of cotton and almost equal to that of coffee. The west clearly dominated, with 10 percent of communities where virtually everybody grew tomatoes, while 57 percent of communities in the west, 47 percent in the east, 22 percent in the center, and 16 percent in the north reported at least some tomato producers. The number of producers increased in 15 percent of villages and decreased in 4 percent of villages nationwide. Yields showed a divergent pattern whereby a significant increase in the central and, to a lesser extent, the eastern region was counterbalanced by a marked drop in yields in the west. The adoption of the improved management techniques that are reported to have caused the yield increase in the central region could be transferred to the west. Improved management techniques could smooth the path for future expansion of production.

Although grown in a slightly more limited number of communities than tomato, cabbage is another high-value product that has recently attained significance. While the western and eastern regions still dominated in cabbage production, the center appears to be catching up and, in a pattern that appears to be similar to the one observed for tomatoes, these regions registered considerable increases in yields (which were universal for all the communities where the crop is produced). Compared with this increase in yields, many communities in the west experienced a disease-related decrease in yields.

Tree crops that are relatively drought resistant might provide an opportunity for expansion of production in the north that, according to the 1999/2000 community survey data, seems to have done rather badly in terms of overall agricultural performance, with the exception of cotton. Production of mangoes is clearly dominated by the north, with near-universal coverage in 43 percent of communities and some coverage in another 25 percent of communities. Only the western region, with 20 percent near-universal coverage and some coverage in 10 percent of communities, approaches this level of coverage. Currently, mangoes do not seem to provide a basis for sustainable expansion. Contrary to conditions in the west, where the number of producers increased in 14 percent of communities, the number of producers decreased in other regions. The situation is similar with respect to oranges, which were grown universally in 20 percent and to some extent in 37 percent of northern communities. Disease-related declines in yields that were observed in more than half of the communities (that is, virtually everywhere the crop was grown) point toward a significant deficit in terms of technology. As such technology should be easily available from other countries, more detailed examination of the reasons underlying its limited current adoption, as well as the scope for better cultural practices, would be important. An examination of these issues might open up opportunities for nontraditional agricultural growth in the north.

Passion fruit is another recently introduced high-value crop on which few nationally aggregate production estimates are available.⁶ Evidence at the community level suggests that the crop was almost universally grown in about 9 percent of communities in the west, and was of some importance in 16 percent of communities nationwide. The number of producers increased in 11 percent of communities in the west and 9 percent in the north. While yield increases were reported from 11 percent of communities in the north attributed mainly to improved labor use, 19 percent of western communities experienced a weather-related yield decline.

USE OF TECHNOLOGY. In addition to being an important investment item in traditional agricultural societies, livestock ownership can affect agricultural performance by increasing producers' ability to use animal traction and mechanical technology to expand the area cultivated, perform necessary activities in a more timely manner, and through provision of manure maintain soil fertility and make use of higher-yielding varieties. The latter is relevant, because at least part of the decline in yield observed in some of the commodities may have been caused by lack of investment in soil improvement through either organic or inorganic fertilizer. Moreover, enabling producers to expand their cultivated area beyond the current average farm size of 1.5 to 2 hectares per household will require a shift from hand-hoe technology to animal traction. This shift is important, as some regions of Uganda still have potential for further expansion of cultivated areas.⁷

The data point to an increase in the ownership of livestock in the 1990s (table A5.2, panel 1). During 1992–99, the number of households owning livestock increased from 11 to 20 percent for cows, 4 to 7 percent for bulls, and 1 to 2 percent for oxen. The increase was distributed equally across regions, suggesting a broad pattern toward higher levels of investment in agricultural technology. The value of livestock owned increased by 36 percent (from U Sh 0.74 million to U Sh 1,004 million per household), which is a substantial investment given that a high share of households did not own livestock at all in 1992. Although overall levels of plow ownership are still low, and the rate of expansion was much slower than in the case of livestock, 4 percent of producers, compared with 2.5 percent in 1992, were reported to own plows. The eastern and northern regions reported that approximately 7 percent of

6. Given the focus of most conventional production surveys on traditional commodities, it is unlikely that reliable information on the economic importance of any recently introduced high-value crops exists at the moment. While they were at least included as separate categories in the 1999/2000 national household survey, it is not clear whether the training of enumerators was sufficient to make them probe for such nontraditional crops in each case.

7. Estimates put the potential for increasing the cultivated area from 5 million hectares in 1992 to as much as 18 million hectares (World Bank 1996).

producers owned plows, the highest levels of plow ownership among the regions. Note, however, that 70 percent of communities nationwide (48 percent in the north) reported that nobody uses ox plows. Given the relative land abundance and the relatively small areas cultivated in the north (which suggests scope for greater use of animal traction to increase the area cultivated), it is particularly surprising that plow use seems to be slightly lower there than in the east, where about 15 percent of communities reported "many" users of ox plows. In addition, even though ox plow use increased in about 20 percent of eastern and 35 percent of northern communities, its use declined in others. Compared with ox plows, tractor use decreased rapidly in most of the communities (22 percent showed a decrease and only 4 percent showed an increase). The decreased tractor use probably reflects a legacy of unsustainable mechanization in earlier years.

As illustrated in panel 4 of table A5.2, the share of food crop area planted in HYV tripled during the period, albeit from a very low level. Growth occurred fairly uniformly across regions, with the level of HYV use being highest in the eastern region. Community data suggest that, in addition to an increased number of producers who used these varieties within specific villages, the number of HYV also spread geographically. However, in 43 percent of communities nationwide (70 percent in the north), there was still no use of HYV, and only in about 7 percent of communities were HYV used by half or more of the population.

In line with the limited spread of HYV, the use of fertilizer (a strong complement to HYV) was low, with an average of 3 percent reporting use, based upon a reported use of 5 percent in the north to 2 percent in the more fertile west. More producers used pesticides than fertilizer (7 percent nationally, ranging from 11 percent in the center to 3 percent in the west). Also, the application of manure to improve soil fertility was slightly higher than that of fertilizer, with 6 percent nationally reporting manure use. The large interregional variation (from 1 percent of producers using manure in the north to 13 percent in the center region), despite fairly uniform levels of livestock ownership, suggests that further examination is warranted with regard to the determinants of the use of investments to enhance soil fertility.

Factor Markets

Ability to access credit is important to finance the expansion of productive activities, to obtain working capital, and to insure against risk. The data show a large increase in the share of producers who have access to credit, from 8 to 16 percent between 1992 and 1999. While this information suggests that the past contraction of the credit system has been largely reversed, it does not imply that further improvements, both on the supply and the demand side, could not yield significant economic benefits. The majority of credit was used for production rather than consumption. About one-third of producers in the sample had not obtained credit, either because the bank was too far away

or because the producers lacked collateral. Due to a combination of highly covariate risks and high levels of poverty, the scope for informal credit in the northern region appears to be particularly limited, implying that formal institutions are much more important in the north.

Land rights and land markets link credit, productive efficiency, and poverty. Obviously, in view of the findings, the scope for secure, formal land rights to help producers access credit appears to be important. Moreover, if the non-farm economy becomes more vibrant, the scope for realizing efficiency gains from better functioning of land rental markets will increase significantly. Indeed, the greater importance of off-farm employment could underlie the rapid expansion of land rental markets observed between 1992 and 1999.

CREDIT MARKETS. Data for 1999 suggest that households' access to credit improved considerably since 1992. In 1999 about 16 percent of households nationwide had access to credit, ranging from 24 percent in the west and 6 percent in the north (table A5.3, panel 1). Comparing this with the 9 percent of households who had an outstanding loan in 1992, the data suggest that access to credit at the household level has expanded considerably.⁸ The fact that the number of households having access to credit now is almost equal to those who ever had access to credit confirms this conclusion.⁹

To determine whether producers are credit constrained, that is, whether unsatisfied demand for credit exists under present conditions, a closer look was taken at the reasons given for nonuse of credit. Table A5.3, panel 1 shows that 42 percent did not apply because they did not need credit, and 19 percent did not apply because they did not know how to apply. Taking these two groups together still leaves 40 percent who appeared to have creditworthy projects, but did not apply.¹⁰ Only 6 percent failed to apply because interest rates were too high, suggesting that the cost of credit was no longer the most important factor limiting access to and use of credit. By contrast, 22 percent did not apply because they lacked security (even though the majority owned

8. As informal credit was explicitly included in 1992/93, there should be little bias due to differences in the survey methodology, except possibly differences in the extent of enumerator training.

9. In the 1992 survey, only 9 percent of households nationwide (4 percent in the northern region) had an outstanding loan during the survey period, with sharp differences in mean loan sizes between urban (U Sh 242,000) and rural (U Sh 66,000) areas. Moreover, even though about half the number of loans was made in rural areas, these areas received only about one-tenth of the total available credit, most of which was concentrated in the central region, which is close to urban centers. From a sectoral perspective, loans were heavily concentrated in trade (44 percent of loans as well as amounts), services (19 percent), and livestock farming (15 percent). Crop farming (12 percent) ranked much lower.

10. Although households that do not know where to apply may be credit constrained, they are included in the category of nonconstrained producers to err on the conservative side.

land and all owned other assets). An additional 12 percent failed to apply because the bank was too far away. This suggests that about one-third of the producers who did not use credit would, at a given cost, appear to be able to benefit from an increased ability to use existing assets as collateral and from expansion of financial infrastructure.

Indeed, less than half of the communities nationwide (44 percent) had access to formal credit, with considerable regional differences reported (table A5.3, panel 2). The availability of formal credit was relatively high in the west (65 percent of communities) and very low in the north, where only 20 percent of communities had access to formal credit. The government's Entandikwa scheme continues to be the most widely available source of formal credit and, therefore, of loans, followed by banks and cooperatives.¹¹ In the north, there was not a single community with a bank branch. The second half of panel 2 illustrates sources that were available in the past, but have since closed. Clearly, many communities where cooperatives have in the past provided loans are no longer doing so. In 13 percent of communities, Entandikwa schemes closed down as well. The majority (55 percent) of those who obtained credit received it from relatives or community funds, followed by cooperatives and government sources (21 percent), nongovernmental organizations (16 percent), banks (5 percent), and other businesses (3 percent). As mentioned earlier, the pattern in the north differs markedly from that in other regions: relatives were considerably less important than elsewhere.

The survey indicates (table A5.3, panel 3) that a large share of loans (45 percent) was used to establish nonagricultural enterprises, followed by expenditures on education and health (24 percent), purchase of inputs (15 percent), agricultural investments in land and livestock (9 percent), and household goods (7 percent). Note the regional differences, especially between the north and other regions. In the north, the emphasis on nonconsumptive use of credit was even more pronounced than in the other regions.

LAND RIGHTS AND LAND MARKETS. Land rights and land markets are important for a number of reasons. First, land to which secure property rights (as normally documented through a formal title document) exist can serve as collateral for formal credit. Second, land markets are important to enhance agricultural productivity and household welfare by shifting land toward its most productive use, either through sales or through rental.¹² Finally, secure land rights are normally a precondition for households to be willing to undertake

11. Entandikwa is a government soft loan scheme targeted at the poor with the primary objective of providing start-up capital for household business enterprises. The credit program was started in the mid-1990s as a revolving fund to facilitate and move households out of poverty. The program has suffered from a low recovery rate for several reasons, including people's view of the fund as a government handout.

12. The difference between sales and rental markets to land is explained, for example, in Deininger and Binswanger (1999) and Deininger and Feder (2000).

the investments necessary for sustainable increases in land productivity and/or to maintain soil fertility.¹³ Deininger (2000) demonstrates the importance of land rights for investment to enhance soil fertility, for land values, and for land market participation, and shows that more secure land ownership increases the probability of applying manure (but not fertilizer), the value of the land, and farmers' propensity to rent out land. Building on this finding, this section focuses on the extent to which land rental and land sales markets function and on the aggregate incidence of land conflicts.

The land rental market helps equalize land access. In 1999, the operation of rental markets helped to reduce the Gini coefficient from 0.57 for owned land, a figure that puts Uganda in the middle league of countries internationally, to about 0.50 for operated land.¹⁴ In addition to improving access to land, land rental markets are also likely to make a contribution to higher allocative efficiency. Panel 4 of table A5.3 indicates that the participation in land rental markets in the central region was high, with 25 percent of producers having reported to have rented in land and 12 percent having rented out land in 1999. Note that much of the activity in land rental markets was of recent origin. Even considering only households that cultivated land in 1992, participation in rental markets more than doubled between the two periods.¹⁵ The share of households renting land increased from 10 percent in 1992 to 24 percent in 1999, with the greatest increase observed in the east and the west. Similarly, the share of households renting out land increased from 5 to 12 percent in the central region, with the highest absolute increase in the east. Complementing this with information on the number of communities where land rental was practiced, the only region where a significant increase in this figure was observed was the north (from 9 to 25 percent).

Information on land sales was only available at the community level (table A5.3, panel 5). This information shows that land prices differed markedly across regions, with the west (U Sh 526,840 per acre) being the highest and the north (U Sh 56,860 per acre) being the lowest. Not surprisingly, land sales transactions were rare in the north where they were reported in only 13 percent of the

13. There is some controversy as to the importance of land title in the African context in general (see Besley 1995; Brasselle, Frédéric, and Platteau 1997; Platteau 1996), and for Uganda in particular (Baland and others 1999). See Deininger (2000) for a more elaborate discussion and econometric evidence on the importance of land rights in Uganda.

14. The Gini coefficient is a widely used measure of inequality that varies between a value of one (for perfect inequality) to zero (for perfect equality). Land Gini coefficients are in the 0.8 to 0.9 range in Latin America and in the 0.4 to 0.5 range in Asian countries.

15. Doing so avoids the need to count households that did not exist in 1992, but which obtained land either through rental or through a pre-inheritance transfer while parents were still alive between 1992 and 1999.

communities, compared with 64 percent in the central region, 63 percent in the west, and 58 percent in the east. A number of communities (11 percent) recorded more than 5 land transactions per year. Also, the activity of land rental markets increased in about 40 percent of the communities during 1992–99. More detailed investigation at the household level will be needed to make inferences on the impact of land sales on efficiency and welfare.

Land conflicts were reported by 52 percent of communities (table A5.3, panel 6). While land conflicts were virtually absent in the north (where they were reported only in 16 percent of communities, they were of considerable importance in the west (70 percent), the east (58 percent), and the central region (51 percent). In addition to having the highest incidence of land conflicts, the west also appears to be characterized by a considerable increase in land conflicts: in 21 percent of communities, land conflicts increased significantly, and in 15 percent they increased somewhat. One of the distinguishing features of the central and western regions is that most land is held under *mailo* tenure, which indicates that there is considerable scope for improving tenure security on such lands.¹⁶

Infrastructure, Services, and Social Capital

Regression estimates reported by Larson and Deininger (in chapter 6 in this volume) suggest that when transaction costs were reduced, the extent to which producers participated in the market was affected by the infrastructure and other public services. Examination of the 1992/93 and 1999/2000 survey data indicates that, both at the household and the village level, the extent of changes in access to extension and infrastructure has been modest. The ease of linking to infrastructure is illustrated in table A5.4, panel 1, which gives the average time taken (in minutes), using the most common means of transport from a community in each of the regions to different infrastructure items in 1999. The average household had to spend 25 minutes to get to the next feeder road, 75 minutes to reach a tarred road, an hour to reach a bus or a truck that could transport agricultural produce, and 48 minutes to reach a taxi. Access to other services also required considerable amounts of time: to reach a hospital took 56 minutes, a factory employing more than 10 people took 63 minutes, and a post office or telephone took 70 and 75 minutes, respectively. The table also illustrates the high level of regional variation, and that changes in access to infrastructure have still been quite limited. Households in the north generally had to spend about double the time of the national average: 65 minutes to reach the next feeder road and more than 2 hours to reach the next tarred road, truck, telephone post office, and hospital. According to the group of village leaders interviewed in the community survey, infrastructure access improved

16. *Mailo* is a form of freehold tenure that was awarded to local kings and nobles by the British when they colonized the country in 1900 (Brett 1973).

in a limited number of communities between 1992 and 1999, with 7 percent at the national level reporting improved access. Moreover, improvements in infrastructure appear to have been concentrated in the east and central regions (12 and 10 percent, respectively). Only 1 percent of communities in the north experienced improvements in infrastructure during the period.

One of the explicit goals of agricultural extension is to help farmers cope with the challenges posed by an environment where fast-changing crop pests and diseases pose a consistent threat to production and welfare. In this context, it is encouraging to note that coverage with extension services increased from 11 percent of farmers in 1992 to 17 percent in 1999 (table A5.4, panel 2). This increase appears at the household level to have been highest in the north, resulting in relatively equal regional coverage in 1999. In the west, the private sector was of far greater importance than public extension agents. According to community-level information, extension workers were the main source of information in 31 percent of communities in the east, 21 percent in the west, and 17 percent in the central region, but in none of the communities in the north. In virtually all the northern communities (96 percent) the radio was the main source of information on agricultural practices (table A5.4, panel 2). Also, in all regions households relied more on the radio than on extension workers for information on technology. One reason for this may be that, despite the apparent expansion of extension services' coverage, the vast majority of producers meet the extension agent only once a year. Only 5 percent of producers nationally, according to the survey, have had contact with an extension worker more than twice a year, and this percentage has remained virtually constant throughout the period.

At the village level, about 64 percent reported that the community was not at all reached by extension services (table A5.4 panel 3). The majority of producers were reached in about 21 percent of communities in the west and 1 percent in the north. Neither community nor individual data indicate any gender bias in such access.¹⁷ A regionally distinct pattern of expansion and reduction of extension access is apparent: extension access increased in 31 percent of communities in the west and 27 percent in the center, whereas the east and north seem to have been characterized by large-scale withdrawal. Access to extension services decreased in 31 percent of eastern and 20 percent of northern communities.¹⁸ All these observations may be useful, together with the importance of having access to timely information at different stages in the production process and strategies to complement attention to traditional extension with mass media and private sector sources. For example, in 41

17. Data from the 1999/2000 national household survey indicate that access to extension information was virtually equal between male and female producers.

18. Note that this information, which is given for the same community at two points in time, does not suffer from limitations regarding statistical representativeness.

percent of communities in the west, the private sector had overtaken both the radio and the public service as the primary information source.

Access to veterinary services appears to be better than access to extension services (table A5.4, panel 4). Of the 82 percent of communities that reported cattle ownership, 66 percent had veterinary services available (the lowest coverage was observed in the north, with 48 percent). The public sector still provided the majority of these services (70 to 80 percent). Coverage with artificial insemination was low (12 percent of communities) and confined to the central (23 percent) and eastern (19 percent) regions.

Issues of governance, violence, and social capital affect economic activity in low-income communities where the scope for formal contract enforcement is limited and, as a consequence, many economic exchanges rely on trust and reciprocity, often within informal kinship networks. While there were few indicators on governance, the data point to a marked increase in the incidence of civil strife, which affected about 8 percent of households in 1992 and 13 percent in 1999 (table A5.4, panel 5). The pattern of increase was regionally uneven; the largest increase (from 8 to 18 percent) was noted in the west. Compared with other regions, civil strife in the north remained constant, affecting 10 percent of households in both periods. Similarly, the number of households affected by property thefts increased from 13 to 20 percent, while physical attacks remained almost constant, increasing in the aggregate from 7 to 9 percent from 1992–99.

To construct an indicator of social capital endowments, households' reaction to exogenous shocks during the last seven years was evaluated.¹⁹ This indicator is defined as the percentage of households which, having experienced a shock, received help or gifts from community members. Results indicated that the distribution was fairly equal across the country, with between 30 and 40 percent of households receiving help to cope with shocks and with interregional and intertemporal changes being relatively minor (table A5.4, panel 5).

Intertemporal Changes in Household Income

While the foregoing analysis provides an interesting account of changes in the productive and social environment that can give useful insights for government policy, it does not establish a clear link between households' productive capacity and their overall well-being. This section aims at providing such a link by analyzing the determinants of growth in incomes at the household level during 1992 and 1999. The main findings are that growth in Uganda

19. The shocks considered include an illness of one month or longer (56 percent), abandonment or separation (9 percent), loss of permanent job (6 percent), and loss of productive assets (22 percent).

has been propoor, that in a liberalized environment the opportunities provided by households' endowments of physical capital and their access to electricity and financial services were of great importance, and that unobserved region-specific effects still had a large impact.

The Panel Data and Descriptive Evidence

To make inferences about the factors that have contributed to higher rates of income growth, over and above mere cross-sectional correlation, regression analysis was used for the 953 panel households for which information was available from both the 1992/93 and the 1999/2000 surveys.²⁰ While using data from the same households enabled making inferences on growth, in large household surveys that contain a panel element, attrition may be high and generally follows a systematic pattern (Deaton 1997). Indeed, a probit regression for attrition (not reported) indicates that mobility and thus attrition was much higher for households located in urban areas (7 percent), that had access to electricity (6 percent), whose head was younger (each additional year of age increases the marginal probability of staying in the sample by 0.5 percent), who had fewer children below the age of 14 (each child increases the marginal probability of staying in the sample by 1.8 percent), and more people above 60 (each older person decreases the probability of staying by 3.9 percent). Attrition rates were also slightly higher (3 and 5 percent, respectively) in the east and north.

Table 5.1 summarizes income sources of panel households and their evolution over time. In 1992 and 1999 households received about 72 percent of their income from own-agricultural enterprises. By contrast, the share of income from agricultural wages declined considerably, from 9 to 4 percent, whereas income from nonagriculture, both in its wage and its nonwage component, increased. Across regions, the most marked change observed was a drop in the importance of agricultural self-employment income from 81 to 72 percent in the north, accompanied by an increase of nonagricultural enterprise income from 5 to 13 percent. Similar increases in nonfarm income were observed for the remainder of the regions, although agricultural enterprise income in these regions remained more stable.

Figure 5.1 depicts the cumulative distribution of earned income in both years for panel households. The distinct shift of the distribution to the right indicates an unambiguous improvement in income levels (consistent with second-order stochastic dominance). Thus, even though one cannot exclude the possibility that some households saw their income drop during the period,

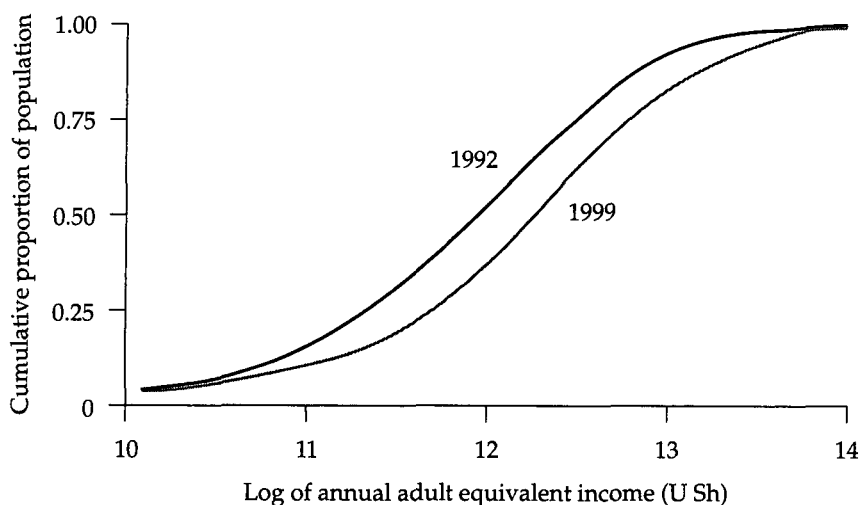
20. Income instead of expenditure is used here to be able to decompose income by source (agriculture and nonagriculture). Given that income and expenditure distributions are relatively similar in both years, it is unlikely that use of expenditure would lead to radically different results.

Table 5.1. Income Sources for Panel Households by Region, 1992 and 1999
(percent)

<i>Category</i>	<i>National</i>		<i>Central</i>		<i>Eastern</i>		<i>Northern</i>		<i>Western</i>	
	<i>1992</i>	<i>1999</i>	<i>1992</i>	<i>1999</i>	<i>1992</i>	<i>1999</i>	<i>1992</i>	<i>1999</i>	<i>1992</i>	<i>1999</i>
Own agricultural enterprise	71.3	72.0	71.6	72.6	65.4	66.4	80.5	71.6	72.3	75.9
Agricultural wages	9.0	4.1	9.1	4.3	8.0	4.0	9.8	4.7	9.4	3.6
Nonagricultural enterprise	10.1	12.7	10.7	12.9	14.8	16.1	5.0	12.6	7.7	10.1
Nonagricultural wages	9.7	11.2	8.7	10.3	11.8	13.5	4.7	11.2	10.6	10.4
Number of observations	911		274		233		102		302	

Note: Only earned income is considered. Remittances, rental income, and so on, are therefore not included.

Source: Authors' calculations based on the 1999/2000 national household survey and the 1992 integrated household survey.

Figure 5.1. Cumulative Distribution of Income, 1992 and 1999

Source: Authors' construction from the 1992 and 1999 household survey data.

income levels in the aggregate showed a marked increase. The mean annual increase in household income, which was used as the dependent variable in the regressions reported later, was about 7 percent, indicating a considerable increase in overall household welfare.

Analysis of Income Growth

To identify initial conditions that are associated with higher subsequent income growth, and in particular, whether household- or location-specific characteristics are quantitatively more important, we regressed the annualized rate of income growth at the household level on initial household characteristics, community characteristics, and a set of regional or provincial dummy variables.²¹

Results from the regressions are summarized in table A5.5 where, to improve readability, the dependent variable is the growth rate of income in percentage terms.²² A cursory look at the table reveals that initial household

21. As misreporting of income would imply that outliers could introduce considerable error into the dependent variable, we report results from a least absolute deviation (LAD) estimator rather than from ordinary least squares (OLS). The former estimation technique gives lower weight to outliers, thereby reducing the possibility that extreme observations will have an unduly strong impact on the results. Results from LAD are very similar to those obtained by OLS (the latter are not reported here, but are available from the authors).

22. To illustrate the quantitative impact of certain independent variables in subsequent discussion, their values are assumed to shift from the 25th to the 75th percentile.

characteristics are important. If the household head has one additional year of education, the increase in annual income growth is estimated to be between 0.55 and 0.63 percentage points. Shifting a household from zero years of education (the 25th percentile) to seven years of education (the 75th percentile) would increase annual income growth by 3.9 to 4.4 percentage points. One could expect households with younger heads to be able to adjust more swiftly to changing economic circumstances and show higher levels of income growth; bridging the interquartile range (25 and 48 years) would be expected to increase growth by between 3.2 and 2.6 percentage points. Contrary to the opinion (and the evidence from simple cross-sectional correlations) that a higher initial number of household members is associated with lower levels of per capita income, households with more members (initially) saw higher subsequent income growth because of higher levels of family labor or the potential for consumption smoothing through informal family networks. The magnitude of the estimated coefficient is significant; a shift from 2.38 to 4.48 adult equivalents would be expected to increase income growth by 1.5 to 1.7 percentage points.

Including households' initial asset endowments and income levels in the regression demonstrates that, despite the positive correlation between income and assets (0.13), the two variables have very different effects in the long term. While there has been divergence in assets, households appear to have converged strongly in income. In other words, households with higher levels of initial assets experienced higher levels of income growth, whereas households with high levels of initial income experienced lower subsequent income growth. This would imply that, during the period under review, the character of the growth process gave households with low initial levels of income opportunities to catch up, although possession of physical assets and—more important from a quantitative point of view—human capital, greatly improved their ability to do so.²³ To illustrate the magnitude of the associated effects, note that the difference in assets between the 25th and the 75th percentile of the asset distribution would have affected income growth by less than a percentage point. By contrast, an equivalent shift in the income distribution would have had a dramatic impact of about 7 percentage points on subsequent income changes.

To examine whether, as is often asserted, gender bias posed structural obstacles for female households, two dummies were included, one if a household were headed by a female in 1992, and one for widowed households. Contrary to a popular perception and in line with findings in the recent literature (for example, Appleton 1996), there seemed to be little evidence of bias against female households. To the contrary, female headship emerged as a positive, although not statistically significant, characteristic, confirming the notion that women did enjoy opportunities in the trade and service sectors

23. Indeed, a dummy for households that were below the poverty line in 1992 is highly significant and positive.

(Kwagala 1999). Widowed headship was negative as expected, but not significant at conventional levels of confidence.

As a proxy for access to infrastructure at the household level, a dummy variable was included. That variable equaled one if the household were connected to electricity in 1992. The magnitude of the coefficient is quite large, although it was significant at the 10 percent level only in one of the equations.

The three location-specific characteristics included are the distance to public transport in 1992, whether the community had access to a bank in 1992, and a rural dummy. The rural dummy was positive (although insignificant), suggesting that policy-induced biases against rural areas were reduced in 1992–99. Distance to transport was negative (although insignificant). Access to banks emerged not only as the most significant, but also as quantitatively important (2.2 percent) in the regression with regional dummies. The significance of the coefficient decreased once district dummies are included. One would expect this result, because within districts there was much less variation in access to banks, so that part of the impact was absorbed in the district-specific intercept.

Household characteristics, in particular education, played an important role in income growth. Within a sound macroeconomic framework that provides incentives to the private sector, raising the population's levels of educational attainment appears as an important means of raising income growth, helping households overcome structural disadvantages, and reducing poverty. At the same time, given the significance of initial asset levels, any measures that would improve the asset position of the poor, for example, by strengthening property rights to resources they already own, could have a significant impact on poverty.

While the analysis suggests that observed location-specific characteristics are less important than household characteristics, we also noted the magnitude and statistical significance of the regional dummies for both the eastern and northern regions. In these two regions annual income growth would be expected to be 4.2 to 4.3 percent lower than elsewhere in the country. This points to the presence of unobserved factors that have a profound impact on subsequent growth. Exploring such factors in more detail would be an interesting topic for future analysis.

To summarize, in line with the analysis of consumption poverty (chapter 4 in this volume), growth appears to have been overwhelmingly propoor during 1992–99. Households who had lower initial income saw considerable increases in their income. At the same time, the eastern and the northern regions appear to be characterized by structural barriers, for example, climatic endowments and access to technology, not directly related to observable community attributes. This suggests not only a need for further analysis of the nature of these differences, but also a more comprehensive and integrated approach to promoting growth in these regions that links improved technology and nonfarm employment. The importance of financial infrastructure suggests that mechanisms at the household level (for

example, expanding the range of assets that can be used as collateral) and at the community level could be important.

Agricultural Productivity and Nonfarm Enterprises

More detailed analysis would be necessary to test the extent to which the factors identified earlier, that is, households' education and physical assets, access to financial infrastructure, and technology, are relevant to the growth of agricultural productivity. Such analysis is not yet possible, because complete data on agricultural production will only be available when the two rounds of the 1999/2000 survey of crops will have been completed. However, data from earlier household surveys can be used to examine both determinants of agricultural productivity and the start-up of rural nonfarm enterprises. The rationale for including the latter is that, as a large and growing literature has demonstrated, complementing agricultural with nonfarm income offers many advantages and a potential for sustained growth.²⁴ At the same time, credit and output market imperfections and households' endowments are likely to have similar effects on the scope for agricultural investment and for diversification into off-farm activities.

Stylized Facts

At least three stylized facts characterize rural areas in Uganda. First, informational imperfections give rise to high levels of credit rationing. Second, transaction costs drive a wedge between buying and selling prices for different commodities, thereby generating a wide margin within which it is economically rational for producers to remain self-sufficient. Third, households' endowments of human and physical capital are important not only from an efficiency point of view, but also for their ability to access markets.

Credit market imperfections have implications for the use of recurrent inputs in agriculture as well as for investment in nonfarm activities. Even if

24. The ability to complement agricultural incomes with nonagricultural enterprise activity is important for households to improve their ability to smooth consumption; reduce their exposure to risk and vulnerability (Reardon and Taylor 1996); and facilitate more efficient use of family, and especially female, labor during agricultural slack periods (Lanjouw and Lanjouw 1997). Rural nonfarm activity has been shown to be an important determinant of regional economic growth and households' ability to escape poverty in Asian countries such as China, India, and Thailand (Hayami 1998), and in South Africa and Zambia (Hazell and Hojjati 1995). Better linkages between the farm and nonfarm economy are believed to be important for broader development and have been argued to be of particular relevance in a predominantly agriculture-based economy such as Uganda (Bigsten and Kayizzi-Mugerwa 1995). Income from nonagricultural sources can also serve to generate funds for agricultural investment, especially where access to credit is limited (Reardon and Taylor 1996).

starting up a nonfarm enterprise (or the use of productivity-enhancing purchased inputs) would allow a household to increase the returns to all factors of production, doing so normally requires a minimum amount of liquidity or access to credit. Farmers who are not credit constrained will have a level of purchases of productive inputs or investment in nonfarm enterprises that will be closer to the optimum than those who are credit constrained. Credit constraints are affected not only by asset ownership, but also by proximity to financial services. Hence, in addition to households' levels of wealth (to be used either directly or as a collateral) and education, lack of access to financial infrastructure could reduce input use and investment in nonfarm enterprises below the socially optimal level.²⁵

Transaction costs in output markets that arise, among others things, from distance to infrastructure, drive a wedge between purchase and sales prices of agricultural commodities. That difference in prices makes it rational for producers to remain self-sufficient, implying that price incentives will not affect their behavior and the shadow price of different factors may deviate significantly from what a commodity would command in the market.²⁶

Households' asset endowments will, in line with the foregoing discussion on credit constraints and assets, and when markets for land, labor, or capital are imperfect, directly affect the level of agricultural input use and longer-term investment. For example, if, through the ability to use them as collateral, ownership of assets is an important determinant of credit access, ownership of even nonproductive assets should affect the intensity of use of purchased inputs for credit constrained (but not credit unconstrained) farmers.

To explore these issues empirically, we used three approaches here. First, to provide insight concerning the optimality of input use, a production function was estimated that included traditional inputs (own and hired labor, seeds, fertilizer, and other inputs) plus other productivity-enhancing factors such as education and agricultural experience. Coefficients from this production function were used to indicate not only the impact of household

25. Credit unconstrained farmers will equate the marginal value product of each of the inputs (hired labor, fertilizer, and home-produced seeds) to its market price. Consequently, fertilizer will be applied optimally, that is, exactly to the point where its marginal return equals the market price. Transaction costs in output markets increase the amount of seeds consumed and/or used as an input to agricultural production over and above the optimum without such transaction costs, irrespective of whether or not a farmer is credit constrained.

26. Output as well as market and price risk could explain deviations from profit-maximizing input quantities as well. However, it is difficult to construct a model that would explain the pattern of overapplication of one and underapplication of another input. If output or market price risk is a concern, farmers should store their wealth in a less risky asset than putting seeds into the ground.

characteristics on agricultural productivity but, more interestingly, to make inferences on the degree to which input is optimal.²⁷

Second, to identify whether credit constraints affected input use demand functions for different types of inputs (labor, seeds, and a fertilizer and purchased seed combination) were estimated. This allowed us to test to what degree these variables were affected by endowments rather than policy-related factors. If credit market imperfections are an important determinant of demand for purchased inputs (by increasing shadow prices for capital), exogenous capital constraints should enter demand functions for purchased, but not for home-produced, inputs. Similarly, it is possible to identify the impact of availability of government services and other facilities on input demand.

Finally, a probit equation for start-up of nonagricultural enterprises was estimated. Clearly, households' endowments with physical and human capital, as well as community characteristics, would be expected to affect such investment. In addition, if, as hypothesized, the availability of financial infrastructure affects households' ability to obtain credit for investment and working capital, households located closer to, say, banks, should be more likely to invest in and to continue to operate nonfarm enterprises.

Agricultural Production and Productivity

The estimation of the production function used data from 528 panel households that were interviewed in the 1992/93 integrated household survey and the 1993/94 monitoring survey (see Deininger and Okidi 2000 for more detailed description of the data). Descriptive statistics were similar to the ones discussed earlier, and thus are not reported separately. Mean annual output value for the sample was about U Sh 190,000, ranging from U Sh 221,000 in the central region to U Sh 147,000 in the northern region. Farm household size averaged 4.9 people who cultivated an average of two hectares of land. About 17 percent of sample households used hired labor, with

27. If input use is correlated with unobservable characteristics of the household (for example, managerial ability) or the farm (for example, soil quality), coefficient estimates from a cross-section are likely to be biased. *A priori* determination of the sign of the bias will be difficult, in view of the multitude of potential unobservable or omitted variables. For example, fertilizer use is likely to be higher on low-quality soils, leading to an underestimation of the impact of fertilizer. At the same time, if better managers apply more fertilizer, possibly because local input traders who have at least some knowledge about producers' managerial ability are willing to approve higher lines of credit for them, the coefficient of fertilizer would capture such unobserved ability and therefore be biased upward. Panel data methods can be used to overcome this problem under the condition that unobservable variables are time-invariant (Mundlak 1978), an assumption that is likely to be satisfied in this case.

total household expenditure on hired labor averaging U Sh 15,800. While virtually all producers in the sample used seeds, only 7 percent used fertilizer, pesticides, or other purchased inputs—a figure that was even lower (2 to 3 percent) in the western and northern regions. The mean value of nonland farm and other household assets together amounted to about U Sh 26,000 per producer. About a quarter of the farm households were female-headed and 11 percent were headed by widows. Eleven percent of households lived in communities that received advice from extension workers. Heads of sample households were on average 42 years old and had attended school for about 4 years. Mean experience, computed as the age of the agricultural enterprise, amounts to almost 20 years, implying that the average agricultural producer started an independent farming enterprise at the age of 23. Producers were also asked whether they had any difficulty in accessing sufficient credit to run their enterprise, a question that was answered positively by 54 percent of the whole sample. All households who answered this question affirmatively were classified as credit constrained, irrespective of whether or not they had actually received credit. Classifying households this way suggests that credit constraints have acquired increased importance: while only 50 percent of producers had been credit constrained in 1992, 60 percent had problems in accessing credit in 1993.

Results from the pooled ordinary least squares (OLS) regression and the fixed and random effects panel estimations of the production function are reported in table A5.6.²⁸ The random-effects specification is the most appropriate.^{29,30} Therefore, the subsequent discussion focuses on the coefficients from this estimator.

With an elasticity of 0.36 and 0.28, respectively, labor and land were the obvious main inputs into agricultural production. For producers using hired labor, the point estimate for the production elasticity of hired labor at the mean was 0.25, which was significantly lower than the production

28. To accommodate the fact that more than 90 percent of the farmers in the sample did not use purchased inputs and more than 80 percent did not hire labor, a specification was adopted where a zero-one dummy variable for fertilizer and hired labor use was included as well as the product of these dummy variables and the observed input of fertilizer and hired labor.

29. While the coefficients obtained from the fixed-effects regression are consistent, they may be inefficient due to the failure to take account of variation within individual observations. The random effect estimator, which takes this variation into account, would be preferable if there were no correlation between the fixed effects and the error term. A Hausman test fails to reject the hypothesis of equality between the coefficients from fixed and random-effects estimation, suggesting that the random-effects specification is the most appropriate.

30. The test statistic is distributed according to a χ^2 distribution with 20 degrees of freedom, and the value of 25.02 is below the critical values for the 5 percent (31.41) and the 10 percent (28.41) level.

elasticity for family labor. Indeed, equality of the coefficients on own and hired labor could be rejected at any conventional level of significance, suggesting that, in line with the literature, supervision constraints limit substitutability between family and hired labor (see, for example, Frisvold 1994). Farm assets were shown to have a production elasticity of slightly above 6 percent, which, given that they entered the production function in value terms, was equivalent to their economic return. Farming experience made a clearly positive contribution to productivity, the magnitude of which increased rapidly up to about 5 to 8 years and flattened off subsequently, reaching its maximum at 24.5 years.

Household education is relevant for production outcomes. One additional year of education by the household head is estimated to increase productivity by 5 percent, in addition to a positive return on farming experience. The lack of significance of the squared term suggested nondecreasing returns to education in agricultural production over the range observed in the sample. The point estimate of the coefficient is large, suggesting that having universal primary education (seven years completed) for the population of farm operators would increase production by 15 percent at the margin.³¹ This is consistent with the weaker and more indirect evidence for payoffs to education found by Appleton and Balihuta (1996) based on 1992 data. It contrasts, however, to the result by Bigsten and Kayizzi-Mugerwa (1995) who found that in the preliberalization period, returns to education were negligible. Assuming that their result can be taken to be representative for the whole of Uganda,³² this would provide evidence that economic liberalization, in particular the elimination of monopoly marketing in the agricultural sector had, by 1992/93, created an environment where returns to education increased. While a community's access to roads does not affect agricultural productivity, it may affect the quantities of input used through its impact on prices. Compared with the importance of education, a surprising finding is that community-level access to extension services (a variable that is available only at the community level), although positive, remained insignificant, and that for 1992–93, productivity seems actually to have decreased. Examining the degree to which different trends—at the national or the regional level—have emerged in the interim would be of great interest.

31. Re-estimation of the same model with only the level of education entered does not change the magnitude of the coefficient.

32. While they only had a small sample (200 households), they surveyed one of the most dynamic and technologically advanced agricultural districts. As the received wisdom in the literature is that education is of value in dynamic environments characterized by economic and technological change, it is very likely that failure to find positive returns to education in this area implies the lack of such returns in other districts as well.

Efficiency of Input Use and Determinants of Factor Demand

In addition to obtaining information on the determinants of productivity in general, a main objective of estimating the production function was to examine the degree to which the use of inputs has been economically optimal. Indeed, coefficients from the random effects estimation point toward underutilization of purchased inputs. Shifting farmers who do not use fertilizer to the mean level of fertilizer consumption (about U Sh 3,900) observed in the sample would increase output by almost 50 percent (U Sh 8,900), thereby providing a more than 100 percent return on the required outlay. Similarly high returns are found for a marginal increase in fertilizer use among producers who already apply fertilizer. For example, applying U Sh 1,000 more of fertilizer would increase output by U Sh 2,200, again, a more than 100 percent return. Even with provisions for transport costs, the use of fertilizer would appear to be an attractive investment, with rates of return significantly above the cost of credit.³³ The observed underuse of fertilizer may therefore point toward the existence of credit market imperfections. While farmers use too little fertilizer, regression results suggest that they apply more than the optimum amount of home-produced seeds.³⁴ Although there is clear evidence of inefficient input use, the production function by itself did not indicate the degree to which imperfections in financial or input markets may be responsible for this inefficient use.

This question provided a motivation for testing whether credit constraint was a factor underlying the apparently suboptimal factor use. To do so, we needed information on whether or not households were credit constrained, something that cannot be directly observed. To make inferences on their credit worthiness, we used producers' responses to the question that asked whether they had difficulty accessing credit to run their enterprise. Data show that only about half of the households who failed to obtain credit were credit constrained in this sense, while many farmers who obtained credit had difficulty in getting the credit they wanted, and thus were actually credit constrained.³⁵

33. Noting that even the most remote producers are less than 600 kilometers from Kampala, transport costs would at most increase fertilizer prices by 20 percent (assuming a fertilizer price of US\$300 and a transportation cost of US\$0.1 per ton-kilometer).

34. If anything, the coefficient on this variable is biased downward, because in the case of perennials, producers obtain output even without having applied seed in the current production cycle (and there is no measure of the production stock applied).

35. The cross-tabulation of constrained producers with actual loan recipients (for the whole sample) is as follows:

	<i>Constrained</i>	<i>Unconstrained</i>	<i>Total</i>
Received no loan	3,931	5,159	9,090
Received a loan	181	652	833
Total	4,112	5,811	9,923

Given the small number of households who actually used fertilizer and the fact that only a few changed from nonusers during the short period observed, there was too little variation over time to make inferences on input demand from the panel estimation. We therefore pooled observations for 1992 and 1993 using maximum likelihood and OLS estimators for fertilizer, hired labor, and seed use, all of them normalized per hectare of land used. We also included the total value of assets rather than individual components.

The second column in table A5.7 illustrates results for the use of purchased inputs. As hypothesized, capital constraints significantly reduced the propensity to use fertilizer. By contrast, the possession of assets and land, which can be used as collateral in credit markets, increased the probability of fertilizer use. The positive sign of family size suggests that fertilizer and family labor complement each other. While neither experience nor age had a significant effect, fertilizer use increased more than proportionately with higher levels of household education. Also, the coefficient of access to extension in the fertilizer demand equation was positive and significant. This suggests that extension helps increase the intensity of fertilizer use, thereby bringing the producer closer to the profit-maximizing optimum. Distance to infrastructure was, as predicted, negative and significant, which reflects, in part, a price effect. Regional dummies indicate that in all regions the propensity to use fertilizer was much lower than in the central region.

As all households in the sample used seeds, we estimated an OLS equation of the quantity of seed used. The results, listed in the fourth column of table A5.7, suggest that, contrary to what was found for fertilizer, capital constraints increased farmers' propensity to use seeds. The area of land owned had a significant and negative impact, whereas more family labor and higher levels of assets increased the level of seeds applied per hectare, possibly by allowing more intensive cultivation. In contrast to fertilizer use, which decreased significantly over time, farmers actually increased the rate of application of home-produced seeds. Together with the lack of significance for virtually any other variable (education, extension, distance to infrastructure) except regional dummies, this implies that farmers without sufficient access to working capital tried to substitute home-produced inputs for purchased inputs.

The use of hired labor was determined mainly by household characteristics such as the amount of land owned, the gender of the household head, the amount of assets owned, and the household head's level of education. All these variables have a strong, positive impact on labor use. The impact of asset ownership (human as well as physical capital) suggests that well-educated and well-endowed households established nonagricultural enterprises. Finding out why these households choose to adjust through the labor rather than through the land rental market is important. As theory suggests that the latter would provide superior incentives that would increase productive efficiency, identifying the obstacles to proper functioning of the land rental market could answer this question.

Nonagricultural Enterprise Start-Ups

During 1988–92 a considerable number of new enterprises sprang up, most in the trade sector. Almost 50 percent of all households, and almost one-third in rural areas, started a nonagricultural enterprise during this period. The sectoral composition of new enterprises established differs between regions. New farm enterprises dominate in the national aggregate and in the eastern and northern regions. The opposite is true for the central and western regions, where nonfarm enterprises exceeded farming enterprise start-ups. Of the nonfarm businesses that were established during the period, most were in trade (26 percent of households), followed by manufacturing, hotels, and other services. Even within the trade sector, regional variation was pronounced (34 percent of households started a trade enterprise in central region, but only 13 percent in the northern region).³⁶

Empirical results (table A5.8) suggest that new trade enterprises did not require large physical assets, but that enterprise start-ups were critically dependent on a minimum level of education. As coefficients in table A5.8 are marginal probabilities (at the mean of all other variables), they can be directly interpreted. For example, having a bank in the community increased the probability of a household diversifying into trade by 5.6 percent; similar to directly connecting to infrastructure a household living at the mean distance (33 kilometers) from a road in the north. A household whose head has completed primary education was about 5 percent more likely to establish a trading enterprise than one who did not attend school. There was no gender bias against starting a trading activity. Recent immigration had a significant and negative impact (by about 2.5 percentage points), supporting the conjecture that trade requires longer presence in a community to build trust and acquire information on the individuals that are likely to be involved in transactions so as to assess their creditworthiness accurately. The fact that high levels of initial assets were insignificant may indicate that with relatively low barriers to entry (with the exception of education), the returns from trading activity were generally low and once individuals had acquired sufficient levels of wealth, it paid for them to diversify into other areas. To the degree that trade enterprises can serve as a point of entry into the off-farm economy

36. Prior to a discussion of the results, two technical issues need to be addressed. First, to control for agroclimatic and other endowments that affect placement of infrastructure, we include mean community income as one of the independent variables. Second, to avoid reverse causality whereby the establishment of enterprises after 1987 but before 1992/3 has led to increased wealth—rather than the other way—it is necessary to include the household's initial capital stock. Unfortunately, we have only asset levels at the beginning for 1992. As results from re-estimating the same equations for enterprises started up only in 1992 (in which case our asset measure clearly reflects initial conditions) were virtually identical, the five-year regressions are reported here.

and a springboard to accumulate resources and experience to make the transition to other stages, the results suggested that education, financial services, and road access are important determinants of off-farm diversification.

The number of enterprises established in other sectors was not only much lower, but they were apparently less dependent on infrastructure access and completely independent of educational levels. The establishment of crop farm enterprises in a relatively land-abundant economy such as Uganda seems to be even more strongly correlated with life cycle phenomena. While households starting nonagricultural enterprises do so at a more advanced age, the opposite was true for household heads establishing a farming enterprise. The strongly negative coefficient on age, together with almost universal involvement of households in the rural farm economy, could indicate that farm enterprises serve as an important first stepping stone into the nonfarm economy. The positive coefficient on recent in-migration is likely to capture households who migrated in search of land or were displaced through war. Livestock and crop enterprises shared a location in relatively distant areas. There are, however, a number of marked differences. The significance of asset ownership and age of the household head suggests that new livestock enterprises generally occurred at a later stage in the life cycle, a finding that is supported by the bias against female-headed households and the positive significance of household size (reflecting the need for additional household members to care for livestock). Both these results supported the conclusion that, although financial services and education improved the efficiency of the traditional farming sector, they were not an essential precondition for establishing livestock or crop enterprises.

Even though they were based on earlier data, the results from the analysis of agricultural productivity and of nonagricultural enterprise start-ups were quite consistent with those from the earlier discussion of income growth between 1992 and 1999. There was no indication of a conflict between growth in agriculture and the nonagricultural rural sector. To the contrary, the main factors contributing to agricultural productivity (education, financial infrastructure, and asset ownership) were also key to improving economic performance in the nonfarm sector. Contrary to earlier studies, which found negligible returns to education in the prereform period, we find that education has become an important determinant of both agricultural and nonagricultural activity. This suggests that Uganda's broad macroeconomic and sectoral reforms succeeded in restoring incentives and in increasing returns to private factors of production. It also implies that by focusing on broad improvements in educational achievement, the government has identified—and is aiming to improve—one of the key constraints to future economic growth and poverty reduction in rural areas.

The fact that community income levels emerged as the quantitatively most important determinant of nonfarm enterprise start-ups provides further indication for complementarity between farm and nonfarm sectors. The rural sector's ability to respond to the changed economic environment

and incentive framework has been constrained by imperfections in factor markets, especially access to productive infrastructure. Limited progress in improving productivity indicates that in addition to improving levels of human capital and the functioning of factor markets, greater efforts are required to improve the availability and awareness of improved technology through research and extension.

Uganda has thus far seen an organic evolution of the off-farm sector based on agricultural income growth. This evolution is in marked contrast to countries where unequal initial asset distribution (for example, education and land) has led to an unequal distribution of off-farm income, thereby causing further polarization of the income distribution (Feldman and Leones 1998; Lanjouw 1998). To maintain this relationship that, thus far, seems to have prevented increases in overall income inequality, it will be essential to ensure a regional balance in policies aimed at promoting education, infrastructure, and agricultural productivity to ensure broad access to economic opportunities. Failure to do so will not only cut the tight link between growth and poverty reduction that has been characteristic for Uganda thus far, but also threaten the sustainability of economic growth in a more fundamental way.

Conclusions

Noting the critical importance of rural income growth for overall poverty reduction in Uganda, this chapter combined descriptive evidence and econometric analysis to highlight the accomplishments of the past and to outline the challenges that Uganda faces in the future. The community- and household-level data suggest accomplishments in a number of areas, namely:

- During 1992–99 levels of per capita income grew significantly without deterioration in income distribution. Households with low income levels in 1992, but with human and physical capital assets, were able to benefit the most from overall growth.
- Cotton output has recovered and shows strong signs of growth, especially in the northern region. Similarly, nontraditional crops (tomatoes, cabbage, and fruit) are grown more widely and could provide a basis for diversification and sustained income growth in rural areas. Half of the communities (villages) in the north reported that both the number of cotton producers and cotton yields increased between 1992 and 1999. In the eastern region 25 percent of communities reported increases in the number of growers and yields.
- The extent of livestock ownership has increased significantly (the number of owners more than doubled) as has investment in rural areas. The use of HYV has also increased considerably, albeit both from very low levels.
- The functioning of rural factor markets has improved and the number of land rental transactions and the share of producers with access to

credit have increased strongly. More interesting, most of the credit obtained is used for productive investment, suggesting that producers are aware of and make use of new economic opportunities.

- The share of producers who have access to extension services and primary school enrollments have increased greatly in rural areas. Given the importance of education for agricultural productivity and the start-up of nonfarm enterprises, this could provide the basis for more knowledge-based development in the future.
- Although agriculture remains the mainstay of the rural economy, rural households have used opportunities to diversify into off-farm income generation and establishment of nonagricultural enterprises. Analysis of the determinants of nonfarm enterprise start-ups illustrates the crucial role of education and access to financial markets.

At the same time, despite the indisputable successes, there is little room for complacency:

- With the exception of cotton, the north has seen little agricultural diversification and growth. In the rest of the country, output remains variable, mainly due to crop diseases. Differential performance by communities even within the same region suggests that better access to existing technology and information could offer large scope for increasing productivity.
- Despite continued efforts, extension service coverage remains limited, and 64 percent of communities reported not having access to an extension worker. Similarly, about a quarter of producers reported not having used credit due to the nonavailability of a bank.
- Land conflicts exist in about half of the communities. Unless cost-effective ways are found to implement recent land legislation, these conflicts and other tensions could easily threaten social stability and rapid development.

The analysis in this chapter demonstrates that the government's strong focus on rural areas has resulted in a propoor growth pattern and has provided the preconditions for a revival of the rural sector. However, it also demonstrates that technology, financial services, and infrastructure will be needed to improve levels of human capital and structurally transform the rural sector. In all these respects Uganda has the potential to teach valuable lessons to other African countries that have recently embarked on programs of liberalization.

Annex 5.1. Tables of Estimation Results

Table A5.1. Changes in Extent of Production, Number of Producers, and Yields of Main Commodities, 1992–99

Crop and region	Current production crop is grown by			Changes since 1992 (percent)				Reason for yield change
	50%–100%	0%–50%	0%	Number of producers		Yields		
				Increased	Decreased	Increased	Decreased	
<i>Matooke</i>								
Central	33.3	23.0	43.7	20.7	14.9	14.9	25.3	Disease
Eastern	10.6	31.3	58.1	8.9	21.2	7.8	18.4	Disease
Northern	2.0	8.2	89.8	4.1	3.1	2.0	5.1	n.a.
Western	55.4	26.4	18.2	31.1	20.9	13.5	58.8	Weather
National	25.8	24.0	50.2	16.4	16.6	9.6	28.7	Weather
<i>Maize</i>								
Central	54.0	5.7	40.2	34.5	2.3	29.9	13.8	Fallow
Eastern	60.3	10.1	29.6	40.2	2.8	35.8	9.5	Other
Northern	48.0	26.5	25.5	14.3	36.7	12.2	60.2	Weather
Western	73.6	14.2	12.2	47.3	8.8	28.4	43.2	Weather
National	60.7	13.7	25.6	36.3	10.9	28.1	29.7	Weather
<i>Beans</i>								
Central	51.7	11.5	36.8	31.0	8.0	26.4	20.7	Fallow
Eastern	50.8	30.2	19.0	41.3	7.3	25.1	13.4	Other
Northern	73.5	11.2	15.3	11.2	21.4	11.2	70.4	Weather
Western	81.8	4.7	13.5	51.4	6.8	29.1	39.2	Weather
National	64.3	16.0	19.7	36.7	10.0	23.8	33.0	Weather

(table continues on following page)

Table A5.1 continued

Crop and region	Current production crop is grown by			Changes since 1992 (percent)				Reason for yield change
	50%–100%	0%–50%	0%	Number of producers		Yields		
				Increased	Decreased	Increased	Decreased	
<i>Sorghum</i>								
Central	2.3	16.1	81.6	5.7	2.3	3.4	3.4	n.a.
Eastern	31.3	24.6	44.1	7.8	16.2	13.4	16.2	n.a.
Northern	27.6	18.4	54.1	4.1	18.4	4.1	30.6	Weather
Western	33.1	35.1	31.8	16.2	8.8	14.2	20.9	Weather
National	26.2	25.0	48.8	9.2	12.1	10.2	18.2	Weather
<i>Millet</i>								
Central	8.0	11.5	80.5	8.0	3.4	5.7	3.4	n.a.
Eastern	33.0	29.1	38.0	9.5	20.1	8.9	31.3	Weather
Northern	68.4	16.3	15.3	7.1	22.4	8.2	61.2	Weather
Western	59.5	18.2	22.3	42.6	8.1	31.1	20.3	Weather
National	43.2	20.5	36.3	18.4	14.3	14.6	29.1	Weather
<i>Groundnut</i>								
Central	20.7	26.4	52.9	20.7	12.6	16.1	23.0	Animals
Eastern	31.8	39.1	29.1	17.9	31.3	16.2	34.1	Disease
Northern	37.8	31.6	30.6	14.3	36.7	8.2	66.3	Weather
Western	37.2	36.5	26.4	31.1	10.8	14.2	33.8	Weather
National	32.6	34.8	32.6	21.5	23.2	14.1	38.3	Weather

(table continues on following page)

Table A5.1 continued

Crop and region	Current production crop is grown by			Changes since 1992 (percent)				Reason for yield change
	50%–100%	0%–50%	0%	Number of producers		Yields		
				Increased	Decreased	Increased	Decreased	
<i>Cassava</i>								
Central	32.2	26.4	41.4	12.6	35.6	6.9	44.8	Disease
Eastern	36.3	28.5	35.2	33.5	26.3	29.1	26.8	Disease
Northern	59.2	25.5	15.3	15.3	27.6	15.3	65.3	Weather
Western	61.5	14.2	24.3	45.3	6.1	25.7	31.8	Disease
National	47.3	23.4	29.3	29.9	22.3	21.7	38.7	Disease
<i>Coffee</i>								
Central	19.5	25.3	55.2	6.9	29.9	2.3	39.1	Disease
Eastern	21.2	19.6	59.2	16.2	12.3	12.8	16.8	Disease
Northern	0.0	1.0	99.0	1.0	0.0	0.0	0.0	n.a.
Western	27.0	27.0	45.9	18.2	19.6	6.1	32.4	Disease
National	18.6	19.1	62.3	12.3	15.0	6.6	21.9	Disease
<i>Cotton</i>								
Central	1.1	6.9	92.0	4.6	2.3	3.4	4.6	n.a.
Eastern	9.5	28.5	62.0	24.6	8.9	21.8	8.4	Technology
Northern	30.6	35.7	33.7	50.0	11.2	48.0	16.3	Other
Western	2.0	3.4	94.6	3.4	3.4	0.7	1.4	n.a.
National	10.0	18.9	71.1	19.9	6.6	17.6	7.2	Other

(table continues on following page)

Table A5.1 continued

Crop and region	Current production crop is grown by			Changes since 1992 (percent)				Reason for yield change
	50%–100%	0%–50%	0%	Number of producers		Yields		
				Increased	Decreased	Increased	Decreased	
<i>Tomato</i>								
Central	5.7	16.1	78.2	14.9	2.3	17.2	2.3	Input and labor use
Eastern	3.9	43.6	52.5	16.2	5.6	10.1	7.3	Disease
Northern	2.0	14.3	83.7	10.2	0.0	5.1	8.2	Weather
Western	10.1	47.3	42.6	17.6	5.4	1.4	20.9	Disease
National	5.7	34.4	60.0	15.2	3.9	7.8	10.5	Disease
<i>Cabbage</i>								
Central	2.3	8.0	89.7	9.2	1.1	10.3	0.0	n.a.
Eastern	3.9	35.2	60.9	2.8	5.6	2.8	6.7	Disease
Northern	1.0	9.2	89.8	2.0	0.0	0.0	3.1	n.a.
Western	4.7	48.0	47.3	11.5	7.4	0.0	22.3	Disease
National	3.3	29.3	67.4	6.3	4.3	2.7	9.4	Disease
<i>Mango</i>								
Central	3.4	4.6	92.0	0.0	4.6	2.3	1.1	n.a.
Eastern	1.1	8.9	89.9	0.0	0.0	0.0	0.0	n.a.
Northern	42.9	25.5	31.6	2.0	5.1	3.1	36.7	Weather
Western	19.6	10.1	70.3	14.2	0.7	1.4	3.4	n.a.
National	14.8	11.7	73.4	4.5	2.0	1.4	8.2	Weather

(table continues on following page)

Table A5.1 continued

Crop and region	Current production crop is grown by			Changes since 1992 (percent)				Reason for yield change
	50%–100%	0%–50%	0%	Number of producers		Yields		
				Increased	Decreased	Increased	Decreased	
Orange								
Central	2.3	3.4	94.3	0.0	0.0	0.0	2.3	n.a.
Eastern	1.1	27.4	71.5	2.2	6.7	0.6	3.4	n.a.
Northern	20.4	36.7	42.9	2.0	1.0	2.0	53.1	Disease
Western	2.0	6.8	91.2	3.4	3.4	0.0	6.8	n.a.
National	5.3	19.1	75.6	2.1	3.5	0.6	13.7	Disease
Passion fruit								
Central	1.1	2.3	96.6	2.3	0.0	0.0	1.1	n.a.
Eastern	0.0	23.5	76.5	1.1	4.5	0.6	1.1	Reduced fallow
Northern	1.0	15.3	83.7	9.2	0.0	11.2	1.0	Labor use
Western	8.8	16.9	74.3	10.8	1.4	2.0	9.5	Weather
National	2.9	16.4	80.7	5.7	2.0	2.9	3.5	Weather

n.a. Not applicable.

Source: Authors' calculations based on key informant interviews in 512 communities; integrated household survey 1992/93 and the national household survey 1999/2000.

Table A5.2. Changes in Technology and Input Use, 1992–99*Panel 1. Ownership of livestock and mechanical equipment (percent of household level)*

<i>Region</i>	<i>Owning cows in</i>		<i>Owning bulls in</i>		<i>Owning oxen in</i>		<i>Owning plow in</i>		<i>Value of livestock owned (million U Sh)</i>	
	1999	1992	1999	1992	1999	1992	1999	1992	1999	1992
Central	15.7	7.8	4.1	2.2	0.2	0.1	0.9	0.7	1,182.03	956.08
East	22.1	11.9	8.7	4.4	4.4	2.1	7.2	4.1	612.46	354.20
North	18.3	8.9	8.9	4.7	2.7	1.6	6.7	4.3	844.10	586.88
West	22.4	13.7	7.9	4.4	0.2	0.1	2.0	1.6	1,444.22	1,130.03
Total	19.8	10.7	7.2	3.8	1.8	0.9	4.0	2.5	1,004.42	738.36

Panel 2. Use of ox plows, community level (percent)

<i>Region</i>	<i>Used by</i>					<i>Increased</i>		<i>Did not change</i>	<i>Decreased</i>	
	100%	75%	50%	25%	0	>25%	0–25%		0–25%	> 25%
Central	0.0	0.0	0.0	3.4	5.0	0.0	3.5	87.9	1.7	6.9
East	2.6	14.5	6.6	26.3	50.0	11.2	9.9	51.3	5.3	22.4
North	0.0	0.0	0.0	52.3	47.7	1.2	34.5	41.7	2.4	20.2
West	0.0	0.0	0.7	3.7	95.6	3.7	1.5	81.3	0.8	12.7
Total	0.9	5.1	2.6	21.3	70.1	5.4	11.2	63.8	2.8	16.8

(table continues on following page)

Table A5.2 continued

Panel 3. Use of tractor, community level (percent)

Region	Used by					Increased		Did not change	Decreased	
	100%	75%	50%	25%	0	>25%	0–25%		0–25%	> 25%
Central	0.0	0.0	1.6	9.8	88.5	1.7	1.7	73.3	10.0	13.3
East	0.0	2.0	1.3	22.4	74.3	0.0	4.6	64.5	9.2	21.7
North	0.0	0.0	0.0	6.2	93.8	0.0	0.0	81.3	1.3	17.5
West	3.0	2.2	0.7	5.9	88.2	3.0	3.0	79.9	3.0	11.2
Total	0.9	1.4	0.9	12.4	84.4	1.2	2.8	73.7	5.9	16.4

Panel 4. Use of hybrid seeds, fertilizer, and pesticides (percent)

Region	Household-level data					Community-level data				
	Area planted to HYV in		Use of			Fertilizer used by		Pesticides used by		
	1999	1992	Manure	Fertilizer	Pesticides	0%–50%	0.0%	>50%	0%–50%	0.0%
Central	5.0	1.1	13.3	3.4	11.4	21.3	78.7	4.9	23.0	62.3
East	9.1	3.7	1.9	3.0	9.6	15.2	84.8	13.3	35.4	45.6
North	3.2	0.9	0.6	4.6	3.3	8.5	91.5	1.1	2.1	91.5
West	1.2	0.3	6.4	1.6	3.1	10.3	89.7	8.1	22.1	67.6
Total	4.8	1.6	5.8	3.0	7.1	13.1	86.9	8.0	22.7	64.1

(table continues on following page)

Table A5.2 continued

Panel 5. Use of hybrid seeds and changes in such use, community level (percent)

Region	Hybrid seed used by					Increased		Did not change	Decreased	
	100%	75%	50%	25%	0%	>25%	0%–25%		0–25%	> 25%
Central	0.0	1.6	0.0	59.0	39.3	18.0	26.2	42.6	3.3	9.8
East	0.0	9.2	6.6	55.3	29.0	10.5	19.1	44.1	11.2	15.1
North	1.2	2.4	2.4	23.5	70.6	2.4	10.7	66.7	2.4	17.9
West	1.5	1.5	2.3	51.1	43.6	6.8	33.1	44.4	6.8	9.0
Total	0.7	4.4	3.5	48.3	43.2	8.8	22.8	48.4	7.0	13.0

HYV High-yielding varieties.

Source: Authors' calculations from the 1999/2000 national household survey.

Table A5.3. Changes in Functioning of Credit and Land Markets, 1992–99*Panel 1. Credit use, household level (percent)*

<i>Region</i>	<i>Household had a loan</i>		<i>Reason for not applying</i>				
	<i>In past</i>	<i>In 1999</i>	<i>No need</i>	<i>Don't know</i>	<i>No bank</i>	<i>No security</i>	<i>High rates</i>
Central	15.4	11.8	38.0	18.4	9.6	27.1	6.8
East	20.2	20.0	37.2	17.3	12.3	28.5	4.7
North	6.1	6.3	49.3	21.4	14.1	11.3	4.0
West	24.0	23.7	47.1	18.6	10.8	16.2	7.4
Total	17.6	16.5	42.1	18.7	11.5	21.9	5.9

Panel 2. Credit availability (n = 432) (percent)

<i>Region</i>	<i>Source of formal credit</i>					<i>Institution closed down</i>			
	<i>Total availability^a</i>	<i>Bank</i>	<i>Entandikwa^b</i>	<i>Registered cooperative</i>	<i>Local cooperative</i>	<i>Total</i>	<i>Bank</i>	<i>Entandikwa</i>	<i>Cooperative</i>
Central	49.2	23.0	32.8	4.9	10.0	32.8	6.4	14.8	24.4
East	38.2	13.2	25.7	5.3	9.2	36.9	1.5	19.7	23.9
North	20.0	0.0	10.6	7.1	4.7	10.6	1.2	3.5	7.9
West	64.7	21.1	34.6	13.5	19.6	28.0	4.8	11.3	29.9
Total	44.3	14.4	26.5	8.1	11.6	28.3	3.0	13.2	21.8

(table continues on following page)

Table A5.3 continued

Panel 3. Credit use, household level (percent)

Region	Source of loan					Purpose of loan				
	Bank	Cooperative/ government	NGO	Business	Relatives	Household goods	Education/ health	Inputs	Enterprise ^c	Land ^d
Central	6.1	14.7	27.8	3.5	48.0	5.1	16.0	12.0	54.3	12.6
East	1.7	13.7	16.7	2.3	65.7	7.0	29.6	6.6	49.4	7.4
North	8.2	35.3	29.4	3.5	23.5	1.3	6.3	40.5	50.6	1.3
West	7.0	26.7	5.5	4.2	56.7	10.6	28.2	15.9	34.8	10.6
Total	5.2	20.6	16.2	3.4	54.7	7.4	23.9	14.5	45.1	9.1

Panel 4. Land use and land rental markets, household level (percent)

Region	Cultivated land (in acres)		Renting in land		Renting out land	
	1999	1992	1999	1992	1999	1992
Central	2.53	1.91	25.3	9.7	12.3	5.4
East	2.26	1.54	30.4	7.5	13.4	5.5
North	1.77	1.29	10.6	3.1	8.3	2.7
West	2.28	1.58	23.2	6.0	5.7	1.3
Total	2.25	1.60	24.0	7.1	10.1	3.8

(table continues on following page)

Table A5.3 continued

Panel 5. Land sale and rental markets, community level (percent)

Region	Land price U Sh thousands/ acre	Number of annual land sales				Land sales market activity			Land for rental available ^e	
		0	1–2	3–5	> 5	Increased	Constant	Decreased	1999	1992
Central	466.38	35.7	16.1	30.4	17.9	37.7	32.1	30.2	53.2	53.2
East	459.89	42.0	18.2	28.0	11.9	28.1	48.2	23.7	66.3	66.3
North	56.86	86.9	4.8	7.1	1.2	6.6	93.4	0.0	24.7	9.3
West	526.84	37.0	20.7	28.9	13.3	42.3	46.9	10.8	63.0	54.1
Total	398.23	48.6	16.0	24.4	11.0	29.9	54.3	15.8	55.2	49.5

Panel 6. Prevalence of land conflicts, community level (percent)

Region	Number of land conflicts			Increased		Did not change	Decreased	
	0	1–5	> 5	>25%	0%–25%		0–25%	> 25%
Central	48.3	45.0	6.7	4.9	11.5	52.5	13.1	18.0
East	41.9	49.3	8.8	4.0	12.7	64.0	12.7	6.7
North	84.3	13.3	2.4	0.0	6.0	94.0	0.0	0.0
West	30.8	56.7	12.5	21.3	14.7	56.6	2.2	5.1
Total	48.2	43.6	8.3	8.8	11.9	65.8	7.0	6.5

NGO Nongovernmental organization.

a. As communities may have more than one source of formal credit, the percentages in this column will not necessarily be equal to sums of subsequent columns.

b. Entandikwa is a government credit scheme.

c. Establishment of enterprise.

d. Purchase of land or livestock.

e. Land rental is practiced in the community.

Source: Authors' calculations based on 1999/2000 national household survey.

Table A5.4. Changes in Access to Infrastructure, Services, and Governance, 1992–99

Panel 1. Access to infrastructure and other facilities (community level)

Region	Time taken in minutes to									Changes ^a
	Feeder road	Tarred road	Bus	Taxi	Truck	Post	Telephone	Hospital	Factory	
Central	9	42	49	35	47	45	46	46	39	10.3%
East	18	63	52	43	47	55	61	48	58	12.2%
North	66	123	87	78	115	131	139	119	107	1.0%
West	20	80	55	42	52	62	66	41	66	3.4%
Total	26	75	59	48	61	70	75	57	63	7.2%

Panel 2. Access to extension advice and main source of information on technology (percent)

Region	Household level				Community level				
	1–2 contacts a year		> 2 contacts a year		Main source of information on technology				
	1998	1992	1998	1992	Radio	Extension agent	Private sector	Farmers	Other
Central	18.5	13.3	10.5	10.8	64.8	16.7	3.7	13.0	1.9
East	15.9	8.9	2.9	3.2	38.4	30.5	7.3	6.0	17.9
North	15.5	8.1	1.1	1.4	96.3	0.0	3.7	0.0	0.0
West	16.9	11.9	5.9	5.6	23.3	20.9	41.1	6.2	8.5
Total	16.8	10.7	5.3	5.5	48.6	19.7	16.6	5.8	9.4

(table continues on following page)

Table A5.4 continued

Panel 3. Farmers' access to extension worker, community level (percent)

Region	Access to extension worker by region					Increased		Did not change	Decreased	
	100%	75%	50%	25%	0%	>25%	0%–25%		0–25%	> 25%
Central	0.0	8.2	3.3	21.3	67.2	6.7	20.0	65.0	6.7	1.7
East	2.0	10.6	4.6	28.5	54.3	4.7	9.4	55.0	7.4	23.5
North	0.0	1.2	1.2	7.3	90.2	1.3	1.3	77.5	1.3	18.8
West	9.6	11.9	1.5	18.5	58.5	9.7	21.6	56.7	3.0	9.0
Total	3.7	8.9	2.8	20.3	64.3	5.9	13.2	61.2	4.7	14.9

Panel 4. Cattle ownership and access to veterinary services, community level (percent)

Region	Holding cattle	Veterinary services are			
		Available	Public	Private	Do artificial insemination ^b
Central	90.3	67.7	53.2	19.4	22.6
East	87.7	77.2	66.0	14.2	18.5
North	80.6	48.4	35.5	9.7	1.1
West	73.8	63.8	55.3	13.5	5.7
Total	82.3	65.9	54.8	13.8	11.6

(table continues on following page)

Table A5.4 continued

Panel 5. Physical violence, household level

Region	Percentage of households suffering from						Social capital ^c (percent)	
	Theft in		Civil strife in		Physical attack in			
	1999	1992	1999	1992	1999	1992	1992	1998
Central	17.5	10.6	8.0	3.6	7.8	6.6	33.0	33.0
East	22.1	13.5	15.2	10.1	10.5	8.6	40.1	40.1
North	21.1	16.8	10.3	10.4	9.3	7.4	39.7	35.3
West	19.1	12.9	18.4	7.8	8.3	6.9	31.1	26.8
Total	19.9	13.1	13.3	7.7	8.9	7.4	35.7	34.1

a. Whether or not changes in infrastructure access occurred between 1992 and 1999

b. Veterinaries that practice artificial insemination (AI)

c. As explained in the text, social capital is defined as the share of households that, after experiencing a shock, received assistance from their communities.

Source: Authors' calculations based on the 1999/2000 national household survey.

Table A5.5. Determinants of Household-Level Income Growth, 1992–99

	Robust regression estimates				
Item	Coefficient	t	Coefficient	t	Mean
Initial household characteristics					
Head's education in 1992	0.5522	4.11	0.6304	4.75	4.23
Head's age in 1992	-0.1395	-4.36	-0.1136	-3.55	36.76
Household members (adjusted equality) in 1992	0.7222	2.36	0.8511	2.81	3.55
Assets in 1992 (U Sh 1,000)	0.0004	5.48	0.0001	4.66	3489.96
Income in 1992 (U Sh 1,000)	-0.0122	-28.39	-0.0113	-26.33	833.03
Female headed in 1992	0.6900	0.54	1.4081	1.10	0.24
Widowed in 1992	-2.1066	-1.19	-1.1334	-0.64	0.11
Electricity available in 1992	2.6040	1.40	3.4671 ^a	1.81	0.10
Initial community characteristics					
District to public transport in 1992	-0.0253	-0.92	-0.0028	-0.10	11.90
Bank within 10 kms in 1992	2.2289	2.15	1.4444	1.32	0.38
Rural	2.4523	1.21	1.5507	0.75	0.91
Regional dummies					
Eastern region	-4.6649	-3.65			0.25
Northern region	-4.2278	-2.62			0.12
Western region	0.5006	0.42			0.34
Intercept	15.3028	5.20	18.6727	3.85	
R ² adjustment/F	76.620		25.790		
Number of observations	953		953		

Note: Numbers in bold indicate that the estimated coefficient is statistically significant at the conventional level.

a. Coefficient is significant at 10 percent.

Source: Authors' calculations based on 1999/2000 national household survey and the 1992 integrated household survey.

Table A5.6. Results from the Agricultural Production Function Estimation

<i>Item</i>	<i>OLS pooled</i>		<i>Fixed effects</i>		<i>Random effects</i>	
	<i>Coefficient</i>	<i>t</i>	<i>Coefficient</i>	<i>t</i>	<i>Coefficient</i>	<i>z</i>
Family labor	0.3324	18.10	0.2228	2.04	0.3599	6.13
Hired labor dummy	-1.3746	-7.50	-1.6366	-2.35	-1.7190	-3.17
Hired labor (log)	0.1663	8.73	0.1814	2.51	0.2003	3.57
Seed (log)	0.0970	18.43	0.1028	4.92	0.0949	6.00
Fertilizer dummy	-1.4709	-7.67	-1.7179	-2.24	-1.9080	-3.30
Fertilizer (log)	0.1996	8.60	0.2418	2.65	0.2773	4.04
Other inputs (log)	0.0242	8.29	0.0296	2.59	0.0219	2.51
Land (log)	0.5140	18.76	0.1985	1.89	0.2842	3.74
Farm assets (log)	0.0564	8.99	0.0368	1.56	0.0633	3.61
Nonfarm assets (log)	0.0016	0.77	0.0043	0.52	0.0027	0.43
Female head dummy	-0.1291	-5.34	-0.1663	-0.77	-0.1437	-1.77
Experience (log)	0.0152	7.76	0.1960	0.71	0.4904	2.53
Experience (log) squared	-0.0002	-6.84	-0.0333	-0.63	-0.0759	-2.01
Age of head	0.0002	0.06	0.0280	1.11	0.0154	1.39
Age of head squared	0.0000	-0.43	-0.0003	-1.14	-0.0001	-1.29
Head's years of education	0.0382	5.40	-0.0297	-0.61	0.0497	2.13
Head's education years squared	-0.0028	-4.76	0.0042	1.08	-0.0016	-0.79
Access to extension	0.0119	0.37	0.1844	1.67	0.1295	1.53
Time dummy	-0.1358	-5.62	-0.0346	-0.48	-0.1315	-2.17
Road distance	-0.0004	-2.36	-0.0004	-0.60	0.0003	0.71
Rural dummy	0.1045	3.76			0.0597	0.70
Western dummy	-0.0182	-0.65			-0.1486	-1.73
Eastern dummy	-0.3660	-12.61			-0.3312	-3.61

(table continues on following page)

Table A5.6 continued

Item	OLS pooled		Fixed effects		Random effects	
	Coefficient	t	Coefficient	t	Coefficient	z
Northern dummy	-0.5927	-18.80			-0.5925	-5.53
Constant	7.3323	70.02	7.1287	9.96	6.4980	18.47
Number of observations	8,651		1,046			1,046
R ² adjustment	0.3101		0.2505			0.3224
Hausman test						23.38

Note: Numbers in bold indicate that the estimated coefficient is statistically significant at the conventional level.

Source: Authors' calculations based on the 1992 integrated household survey and the 1993/94 first monitoring survey (MS-1).

Table A5.7. Demand Functions for Fertilizer, Seeds, and Hired Labor

Item	Fertilizer (probit)		Seed (OLS)		Hired labor (Tobit)	
	dF/dx	z	Coefficient	t	Coefficient	t
Capital constraints	-2.037	-4.60	14.466	3.03	0.501	1.24
Land (log)	2.569	4.76	-58.894	-9.17	6.880	13.71
Household members (log)	0.839	2.05	26.888	6.06	0.390	1.03
Assets (log)	0.620	4.52	4.810	3.26	0.647	5.24
Female head dummy	-0.338	-0.62	11.244	1.92	2.021	4.06
Experience	-0.004	-0.10	0.370	0.80	-0.058	-1.46
Experience squared	0.000	-0.24	-0.008	-1.38	0.001	0.95
Age of head	-0.105	-1.20	-0.008	-0.01	-0.018	-0.23
Age of head squared	0.001	0.70	-0.006	-0.67	0.000	-0.21
Head's education years	-0.083	-0.55	2.855	1.67	0.602	4.30
Head's education years squared	0.036	3.30	-0.103	-0.74	0.011	1.08
Access to extension	2.288	3.31	2.478	0.32	1.083	1.64
Road distance	-0.028	-4.15	-0.058	-1.29	-0.005	-1.36
Time dummy	-3.203	-6.29	92.811	16.01	-2.611	-5.31
Rural dummy	-1.154	-1.82	13.629	2.04	-3.999	-7.69
Western dummy	-5.953	-10.94	56.745	8.47	-4.747	-8.38
Eastern dummy	-1.812	-3.62	67.607	9.99	-2.485	-4.56
Northern dummy	-4.128	-7.47	58.777	8.14	-5.001	-8.32
Constant			8.446	35.01	-19.096	-9.09
Log likelihood/R ² adjustment	-1,844.491		0.083		-7,686.263	

Note: Numbers in bold indicate that the estimated coefficient is statistically significant at the conventional level.

Source: Authors' calculations based on the 1992 integrated household survey and the 1993/94 first monitoring survey.

Table A5.8. Probit Estimates for the Probability of Enterprise Startups in 1987/88–1992/93

Item	Nonagricultural enterprises				Agricultural enterprises			
	Trade enterprise		Hotel enterprise		Farm enterprise		Livestock enterprise	
	dF/dx	z	dF/dx	z	dF/dx	z	dF/dx	z
Total nonland assets (log)	-0.7214	-3.96	0.5859	5.94	-0.4939	-1.80	1.3077	9.00
Bank in community	5.5962	4.77	2.2709	4.23	-4.0147	-2.61	-3.6549	-5.86
Moneylender in community	0.0894	0.06	-0.5469	-0.91	2.7562	1.34	-1.3260	-1.37
Household members (log)	-0.1771	-1.15	-0.1558	-2.12	-0.0458	-0.22	0.3311	4.36
In-migration during last 5 years	-2.4989	-2.45	0.9387	1.92	2.8544	2.01	-0.3367	-0.61
Female head dummy	1.2599	1.20	0.5406	1.12	-0.5825	-0.41	-1.8864	-3.36
Age of head	0.1738	1.09	0.2109	2.77	-1.4591	-6.66	0.2096	2.35
Age of head squared	-0.0001	-0.07	-0.0021	-2.62	0.0116	5.13	-0.0019	-2.02
Head's education years	1.1136	3.58	-0.1984	-1.40	-0.0956	-0.22	-0.0060	-0.04
Head's education years squared	-0.0549	-2.50	0.0021	0.21	-0.0324	-0.98	0.0165	1.35
Road distance	-1.5513	-4.68	0.3818	2.58	2.5508	5.63	1.2528	6.67
Mean community income (U Sh/month)	13.4616	11.99	1.9381	3.88	-18.2777	-11.84	-1.0467	-1.74
Rural dummy	-11.1854	-8.27	-0.4913	-0.83	20.8621	11.96	2.0507	2.85
Northern dummy	-8.9709	-6.53	0.8875	1.11	0.8978	0.46	1.4919	1.97
Western dummy	2.6348	2.07	9.0618	10.93	-2.5607	-1.42	-4.9195	-7.36
Eastern dummy	-5.1673	-4.47	3.9793	5.56	3.4024	2.04	-0.5099	-0.82
Log-likelihood	-3,711.17		-1,772.56		-4,626.67		-2,200.63	
Pseudo R ²	0.235		0.128		0.234		0.125	

Note: Numbers in bold indicate that the estimated coefficient is statistically significant at the conventional level. Year dummies included but not reported.

Source: Authors' calculations based on the 1992 integrated household survey and the 1993/94 first monitoring survey.

References

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

Appleton, Simon. 1996. "Women-Headed Households and Household Welfare: An Empirical Deconstruction for Uganda." *World Development* 24(12): 1811–27.

Appleton, Simon, and Arsene Balihuta. 1996. "Education and Agricultural Productivity: Evidence from Uganda." *Journal of International Development* 8(3): 415–44.

Baland, Jean-Marie, Gaspart Frédéric, Frank Place, and Jean-Phillippe Platteau. 1999. "Poverty, Tenure Security and Access to Land in Central Uganda: The Role of Market and Non-Market Processes." Research Series no. 216, pp. 1–39. Notre-Dame de la Paix, Faculty of Economics and Social Sciences, Namur, Belgium.

Belshaw, Deryke, Peter Lawrence, and Michael Hubbard. 1999. "Agricultural Tradables and Economic Recovery in Uganda: The Limitations of Structural Adjustment in Practice." *World Development* 27(4): 673–90.

Besley, Timothy. 1995. "Property Rights and Investment Incentives: Theory and Evidence from Ghana." *Journal of Political Economy* 103(5): 903–37.

Bigsten, Arne, and Steve Kayizzi-Mugerwa. 1995. "Rural Sector Responses to Economic Crisis in Uganda." *Journal of International Development* 7(2): 181–209.

Brasselle, Anne-Sophie, Gaspart Frédéric, and Jean-Phillippe Platteau. 1997. "Land Tenure Security and Investment Incentives: Some Further Puzzling Evidence from Burkina Faso." Research Series no. 201, pp. 1–53. Notre-Dame de la Paix, Faculty of Economics and Social Sciences, Namur, Belgium.

Brett, E. A. 1973. *Colonialism and Underdevelopment in East Africa: The Politics of Economic Change, 1919–1939*. London: Heinemann.

Deaton, Angus. 1997. *The Analysis of Household Surveys: A Microeconomic Approach to Development Policy*. Baltimore and London: The Johns Hopkins University Press.

Deininger, Klaus. 2000. "Is Land Tenure in Africa Really Unimportant for Investment?" Development Research Group, World Bank, Washington, D.C. Processed.

Deininger, Klaus, and Hans Binswanger. 1999. "The Evolution of the World Bank's Land Policy." *World Bank Research Observer* 14(2):47–76.

- Deininger, Klaus, and Gershon Feder. 2000. "Land Institutions and Land Markets." In B. Gardner and G. Raussser, eds., *Handbook of Agricultural Economics*. Amsterdam: Elsevier-North Holland.
- Deininger, Klaus, and John Okidi. 2000. "Market Participation, Agricultural Productivity, and Nonagricultural Enterprise Start-Ups." Development Research Group, World Bank, Washington, D.C. Processed.
- Feldman, S., and J. P. Leones. 1998. "Nonfarm Activity and Rural Household Income: Evidence from Philippine Microdata." *Economic Development and Cultural Change* 46(4): 789–806.
- Frisvold, George B. 1994. "Does Supervision Matter? Some Hypotheses Tests Using Indian Farm Level Data." *Journal of Development Economics* 43(2): 460–71.
- Hayami, Yujiro, ed. 1998. *Towards the Rural-Based Development of Commerce and Industry. Selected Experiences from East Asia*. WBI Learning Resource Series. Washington D.C.: World Bank.
- Hazell, Peter B. R., and Behjat Hojjati. 1995. "Farm/Nonfarm Growth Linkages in Zambia." *Journal of African Economies* 4: 406–35.
- Kwagala, Betty. 1999. "Integrating Women's Reproductive Roles with Productive Activities in Commerce: The Case of Businesswomen in Kampala, Uganda." *Urban Studies* 36(9): 1535–50.
- Lanjouw, Peter. 1998. "Rural Nonagricultural Employment and Poverty in Ecuador." *Economic Development and Cultural Change* 48(1): 91–122.
- Lanjouw Peter, and Jean O. Lanjouw. 1997. "Rural Nonfarm Employment. A Survey." Policy Research Working Paper no. 1463. World Bank, Development Research Group, Washington, D.C.
- Mundlak, Yair. 1978. "On the Pooling of Time Series and Cross-Section Data Sources." *Econometrica* 46(1): 69–85.
- Platteau, Jean-Phillippe. 1996. "The Evolutionary Theory of Land Rights as Applied to Sub-Saharan Africa: A Critical Assessment." *Development and Change* 27: 29–86.
- Reardon, Thomas, and Edward J. Taylor. 1996. "Agroclimatic Shock, Income Inequality, and Poverty: Evidence from Burkina Faso." *World Development* 24(5): 901–14.
- World Bank. 1996. *Uganda: The Challenge of Growth and Poverty Reduction*. Washington, D.C.

Crop Markets and Household Participation

Donald Larson and Klaus Deininger

During years of violence, political instability, and economic collapse, Ugandans retreated into self-sufficient agriculture. Even today, farming for home consumption remains a primary activity for most rural households. Crop markets are therefore a key link between subsistence-oriented households and the recovering formal economy. Evidence from other countries indicates that sometimes these markets do not work well, and high transaction costs—often related to poor information and uncertainty about property rights and contract performance—can limit the benefits of participating in formal markets.

This chapter presents evidence from survey data that suggest that crop markets in Uganda effectively convey prices from district to local markets, but that transaction costs differ significantly among crops. The community and household survey data also show that the variance in crop market characteristics and quality measures largely explains differences in prices. Current market conditions encourage households willing to produce export crops rather than food crops, since both transaction costs and uncertainty are lower for export crops (see Martin 1962 for a historical perspective). Given that the survey includes community-level information about several crop markets, a distinction can be made between factors that explain differences in average price levels between communities and those in crop markets.

These results also suggest that transaction costs could be reduced by the development of private market institutions that foster product standardization and help gather and disseminate market information. The scope for direct public interventions, however, is limited. In contrast to export crops, transaction costs are likely to be high in food crops because of a lack of specialization in Ugandan agriculture and labor markets more generally, which gives rise to uncertain demand and thin markets. Some evidence exists, however, of diversification within sectors. A continued change

in the composition of the economy along with growth in incomes can create greater opportunities for households to participate in formal domestic crop markets and export markets.

Market Participation in the Early 1990s

Uganda remained overwhelmingly rural in the early 1990s with only 12 percent of the population living in urban areas. Seventy-seven percent of Ugandans were farmers, and 94 percent of all rural households engaged in farming (table 6.1). Households engaged in other income-generating activities and many received remittances, so that agriculture generated just less than 60 percent of household income. Although sometimes on communal lands, farms were mostly family operated, and households provided most of the labor. Only 17 percent of households hired labor to work on crop farms, and only 13 percent of livestock farmers hired outside labor in 1992. Few households (4 percent) used fertilizers and few (10 percent) purchased seeds (Okidi 1999).

On average, about 20 percent of the 1992/93 survey farm output was marketed. However, farmers who did market their crop tended to farm on a larger scale than those who did not. As a result, the share of the crop marketed was greater than the share a typical farmer marketed. Generally, rural households were largely self-reliant and consumed most of what they produced. According to the survey, one-third were subsistence farmers, while half marketed less than 10 percent of their output. Of the farmers who grew cotton or coffee, the primary cash crops in Uganda, most marketed 25 percent of their output or more (figure 6.1). Farmers who grew cotton were also more likely to market other crops (table 6.2). Still, few of either type marketed more than 25 percent of their crops other than coffee or cotton (figure 6.2). The share of the crop marketed also varied significantly from district to district. Farmers in Luwero and Bundibugyo marketed 30 percent or more of their crop, while farmers in Kotido, Moroto, and Soroti marketed less than 10 percent.

Nevertheless, the volumes sold were sufficient to give rise to local and district markets throughout Uganda. For example, respondents in all but four of the more than 800 communities surveyed noted that district markets were accessible. In only 39 of the communities had accessibility been limited by seasonal rains.

While crop markets were generally available, results from the household surveys suggest that the volumes of particular crops reaching the general market varied greatly. Moreover, household surveys indicate significant differences in the number of farmers engaged in marketing each type of crop. Table 6.3 reports the share of production marketed by crop. The shares range from a low of 6 percent for sweet potatoes to 92 percent for coffee. The table also reports the amount the average household markets. For export crops, household averages for cotton and coffee match marketwide averages, but for several crops—for example, cassava and *sim-sim*—the two averages are significantly different, indicating that a smaller share of the farmers growing

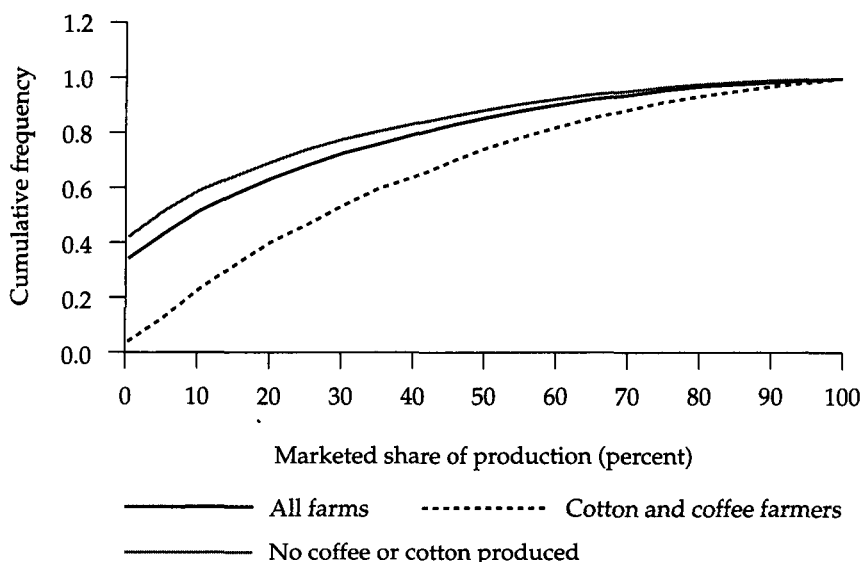
Table 6.1. Percentage of Ugandan Households Engaged in Farming, 1992

<i>Location</i>	<i>Rural</i>			<i>Urban</i>			<i>Urban and rural</i>		
	<i>Agriculture</i>	<i>Crop farm</i>	<i>Livestock farm</i>	<i>Agriculture</i>	<i>Crop farm</i>	<i>Livestock farm</i>	<i>Agriculture</i>	<i>Crop farm</i>	<i>Livestock farm</i>
All Uganda	94.0	93.0	14.8	39.7	37.9	5.7	76.6	75.3	11.9
Central	91.2	88.9	14.4	33.4	29.9	6.7	70.0	67.2	11.6
Eastern	95.4	95.0	16.7	46.9	46.0	4.7	80.3	79.8	13.0
Northern	96.9	96.4	22.9	52.8	51.4	8.9	84.0	83.3	18.8
Western	92.7	92.0	6.1	30.0	28.8	2.8	73.5	72.7	5.1

Source: Okidi (1999).

Figure 6.1. Marketed Share, Cumulative Frequency by Share of Crop Marketed, 1992/93

Marketed share by farm type



Source: 1992/93 integrated household survey.

these crops supplied crop markets. Together, the results suggest that some markets are thin and that these markets are supplied by a concentrated number of households.

Average margins—the difference between district and local market prices expressed as a percentage of local prices—showed a great deal of heterogeneity among crops. Moreover, many are high in absolute terms (figure 6.3). In addition to the low volumes and concentration of suppliers already mentioned, a number of additional reasons exist that may generate differences in margins among crops. These reasons are discussed in the next section.

A Market Model for Community Trade

Generally, crop markets in Uganda, as in most developing countries, are cash based. Performance risk is high and contract enforcement is weak. Information systems are informal for many crops and often network based. Assurances of all types—for quality and performance—tend to be based on reputation and personal trust. Property rights are insecure. This contrasts with most crop markets in industrial countries where transactions are impersonal and formal institutions guarantee performance and deliver information

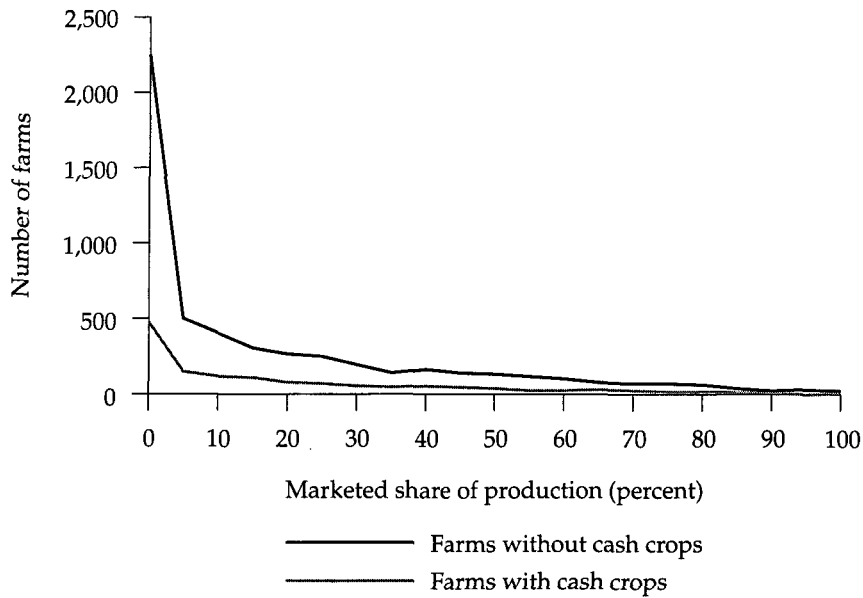
Table 6.2. Number of Farms by Share of Output Marketed

Share marketed (percent)	All farms	All crops		Crops other than coffee or cotton	
		Farms with cashcrops	Other farms	Farms with cashcrops	Other farms
0	2,309	58	2,251	477	2,251
0-5	617	118	499	145	499
5-10	554	148	406	118	406
10-15	436	132	304	113	304
15-20	377	113	264	82	264
20-25	343	96	247	67	247
25-30	294	96	198	54	198
30-35	227	83	144	45	144
35-40	226	65	161	52	161
40-45	219	77	142	47	142
45-50	201	68	133	41	133
50-55	178	59	119	26	119
55-60	149	50	99	26	99
60-65	131	49	82	29	82
65-70	114	44	70	22	70
70-75	108	37	71	18	71
75-80	92	31	61	19	61
80-85	68	26	42	16	42
85-90	51	27	24	5	24
90-95	46	18	28	2	28
95-100	48	24	24	5	24
Total	6,788	1,419	5,369	1,409	5,369

Source: Author's calculations from the 1992/93 integrated household survey.

(Fafchamps and Minten 1999 provide a good description of the differences between formal and informal markets). Differences in how markets are organized are expected to affect outcomes as well. Transaction costs are generally lower in formal, impersonal markets, and the development of the institutions that promote such markets is considered key to long-term economic progress (see, for example, North 1989). All other things being equal, lower transaction costs result in lower marketing margins between communities that generate opportunities for trade, specialization, and productivity gains.

In practice, formal and informal and personal and impersonal markets often coexist (see Kranton 1996, for example). It is likely that common, existing marketing practices, despite limits, best solve the special circumstances associated with each market. Circumstances can differ among crops, such that crop markets work differently in the same country, or even in the same community. In turn, the way the market works affects transaction

Figure 6.2. Marketing of Crops Other Than Cotton and Coffee, 1992

Source: 1992/93 integrated household survey.

costs, marketing margins, and household choices, including the decision even to enter markets at all. For crops largely produced and consumed locally—but not exported cash crops—household decisions will affect the demand characteristics of the crop market, for example, the liquidity and volatility of the local market and the quality of goods demanded. Consequently, household choices and market organization are linked.

One way to measure how well markets work is to see if transfer costs explain differences in a given crop price among different villages. More formally, the spatial arbitrage model stipulates that when trade takes place between two locations, the observed crop price difference can be explained by the full cost of transferring the crop between the two locations. If the difference becomes larger, then traders will move enough of the crop between the two locations to bring prices back in line. Consequently, price changes in one location will be reflected in the other. When transfer costs are significant however, some price differences will be too small to cover the cost of transferring the crop. Trade will stop and prices can drift independently over some limited range. For estimation purposes the spatial arbitrage model can be expressed as:

$$(6.1) \quad E_i[P_i^i + K_i^j(w; c, s)] + \lambda_i^j = E_i(P_i^j),$$

where P^i and P^j are the contemporaneous price of a commodity in markets i and j ; where K^j is the associated transfer cost, which is a function of the variable

Table 6.3. Share of Crop Marketed, by Crop
(percent)

<i>Crop</i>	<i>Average</i>	<i>Typical household</i>
Sweet potatoes	6	6
Millet	12	11
Sorghum	13	13
Cowpeas	16	7
Peas	17	11
<i>Matooke</i>	21	11
Other pulses, nuts, seeds	23	15
Irish potatoes	24	15
Beans	26	15
Maize cob	28	9
Bananas	34	39
Maize grain	35	22
Soybeans	40	24
<i>Sim-sim</i>	42	25
Groundnuts	49	16
Cabbage	62	36
Onions	64	33
Rice	66	49
Cassava	76	44
Cotton	76	74
Tomatoes	78	41
Coffee	92	91

Source: Authors' calculations from the 1992/93 integrated household survey.

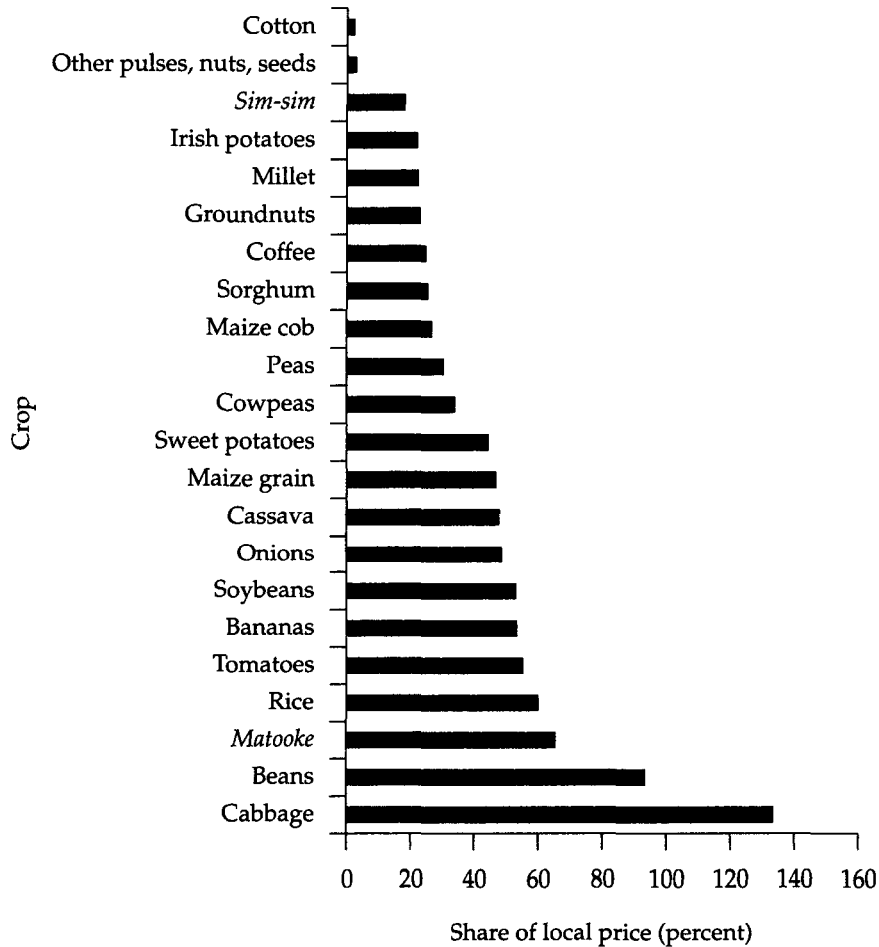
input prices w and fixed capital stock levels c , conditional on a set of state variables s ; and where λ is a slack variable that equals zero when trade takes place between markets i and j (Larson 2000). Variable input costs include labor, fuel, and working capital. Capital stocks reflect past public or private investment.

Examples of capital include roads and communication infrastructure, but may also include difficult to observe human or social capital investments, such as past investments in reputation or in informal information systems. State variables are not subject to choice, but nonetheless affect the way markets are organized; that is, state variables affect choices by market participants about how they will conduct trade. For example, a lack of contract enforcement may encourage exchanges based on personal trust, differences in end-market conditions among crops may give rise to varying levels of risk and uncertainty, differences in security may lead to differences in risk by location, or government policy may encourage smuggling some goods into the country.

The arbitrage model is a short-term measure of markets that asks whether markets convey appropriate price signals and incentives, while taking as given the condition of roads, the availability of information, the nature of demand, and the capacity of institutions. In the longer term investments can be made,

Figure 6.3. Average Gross Margin between District and Local Market Prices, 1992

Average margins



Source: Authors' calculations based on 1992/93 integrated household survey.

demographic and income developments can change local demand, and institutions can evolve. Evidence from the 1992/93 surveys is helpful in addressing the larger issue of market development.

Crop Markets in 1992

The 1992/93 integrated household survey is especially valuable for researchers interested in spatial arbitrage. The questionnaire provides information on price pairs—local and district—for crops in each community. While trans-

fer costs were not directly surveyed, community members were asked about factors likely to influence the cost of transfer, such as the distance to the district market and issues related to transportation and communications infrastructure, including the distance to all-weather roads, public transportation, rail stations, or a public telephone.

Community members were also asked to choose the best description of credit access conditions and common marketing practices from a list. The choices were discrete, for example, the credit access conditions included no access, nearby access, access within 5 kilometers, and access within 10 kilometers. Together, these discrete and continuous variables can be used to examine factors affecting marketing margins and differences in margins among communities and among crops.

As discussed earlier, variations in community and marketing characteristics can be used to proxy the transfer costs given in equation 6.2:

$$(6.2) \quad P_{ic} = b_p p_{ic}^d + \sum_l b_l z_{li} + \sum_m b_m z_{mc} + v_{ic}$$

where the price of crop i in community c is a function of the price of the same crop in the district market d that survey respondents designate as most relevant, a set of cost and state variables $z = [w \ c \ s]$, and a random error v . The matrix z includes continuous and dummy variables associated with l community characteristics and m crop characteristics, where the continuous variables are expressed in natural logs. Table 6.4 reports regression results based on 3,326 price observations from 666 communities, and 31 crops reported in the 1992/93 survey.¹ A summary of the main findings follows.

PRICES. When interspatial arbitrage occurs, local prices are expected to move together with district prices. The regression results suggest that local and district markets are linked. All other attributes being equal, the regression results indicate that a 10 percent increase in the district price for any crop would lead, on average, to a 9.4 percent increase in the local price. In the narrow sense, markets do indeed work in Uganda. Prices in local markets relate to markets in district markets.

INFRASTRUCTURE. The survey measures types of infrastructure likely to affect transportation and transaction costs—distances to all-weather roads, public transportation, rail stations, and a public telephone—in kilometers, and local prices are expected to decline as these distances increase.

1. The model was estimated using the Mixed Model Procedure from SAS (1992). About 140 communities were excluded because of missing values. In addition, not all communities produced all crops. Estimates of community prices predicted from instrumental variables were used in the reported results, although ordinary least square estimates were similar.

Table 6.4. Model Results for 1992/93 Survey

<i>Continuous variables</i>	<i>Estimate</i>	<i>t-statistic</i>
District price	0.936	47.48 ^a
Distance to district market	-0.003	-0.75
Phone	-0.016	-2.52 ^b
All-weather road	0.004	1.51
Public transport	0.000	0.07
<i>Test for fixed effects</i>	χ^2 <i>statistic</i>	
District	305.91 ^a	
Crop	68.36 ^a	
Unit	75.83 ^a	
Credit availability	3.06 ^c	
Inventories available	48.93 ^a	
Marketing scale	0.39	
Low district price	210.18 ^a	

a. Significant at the 99 percent confidence level.

b. Significant at the 95 percent confidence level.

c. Significant at the 90 percent confidence level.

Source: Authors' calculations.

Transportation systems depend not only on the quality of the road that runs near a community, but also on the quality of the roads to which it connects. For example, in Kisoro District most communities are near all-weather roads, while, on average, traders must cover nearly 24 kilometers of seasonal roads to reach communities in Mukono District. A district effect is included in the regression because the efficiency of local infrastructure is affected by transportation and information systems and to compensate for missing information on regional input prices.

Only the district effects and telephone variables were significant among these variables. According to the regression results, decreasing the distance to a telephone by 10 percent would lead to a 1.6 percent increase in local prices. Individually, district effects are not expected to have a specific sign, but taken together, the district effects are statistically important in explaining observed price differences. The effects of the other variables, including distance and road quality, are not significant. As with prices, these results are robust under a number of alternative assumptions, which we discuss later.

CROP EFFECTS. The relationship between transport costs and infrastructure is likely to differ among crops. For example, poorly maintained roads might greatly affect the cost of *matooke* (plantain) transport because of bruising. Such differences are important when infrastructure and distance are used to proxy transfer costs, because they imply differences in parameter values. Moreover, just as farmers choose among different production technologies based

on their own needs and the risks and benefits associated with the various approaches, market participants will decide on strategies based partly on the physical and market characteristics of the crop. For example, quality might be relatively more difficult to gauge for some crops, or the crop might spoil more readily. The demand and information characteristics of crops markets will likely differ as well, especially between export and food crops. Consequently, we include crop dummies in the estimation, which proved significant (table 6.4).

PHYSICAL UNITS OF MEASURE. There is no standard unit of measurement for most commodities traded in rural Uganda. Coffee and cotton are generally measured in kilograms, but many communities trade other crops in local measurement units, for example, cans of various sizes. Altogether, the 1992 community survey data include 22 units of measure with each of the 31 crops measured in more than one unit. Fortunately, respondents quoted local and district prices in similar units.

The Ugandan Bureau of Statistics provides a table of detailed conversion rates for the units so that, potentially, prices could be converted into standard units. Early experimentation with the data showed that the conversion process itself introduced additional, and sometimes large, increases in price variability. In part, these differences may reflect true transformation costs, that is, the cost of sorting, grading, packaging, and so forth. Furthermore, units may indicate quality and information differences that are lost during conversion. For example, a heap (a unit of measure in the survey) is an inexact measure and probably indicates a sack weighing less than 50 kilograms. For estimation purposes, prices were converted to logs, but fixed unit effects were included to account for quality of product and information effects (see Deaton 1997 for a good discussion of quality in the context of consumer demand). These proved highly significant.

CREDIT. Working capital is required to trade crops, and often the volume of a trader's business is limited by lack of credit.² Access to credit is likely to differ according to the crop. The role of credit and its availability may also contribute to differences in transfer costs among crops. For example, credit may be more readily available for export crops than for food crops, because cotton ginneries and coffee hullers and exporters will often finance their purchasing agents, sometimes by passing through offshore financing from buyers. Furthermore, for storable crops, the cost of storage that, in turn, is affected by access to credit, will affect price variability. This is significant, because most communities report that formal bank credit is unavailable (505 out of 666 communities, or 76

2. See Jones' (1972) account of the crop trade in Senegal; or more recently, Barrett's (1997) account of traders in Madagascar; or Baulch, Jaim, and Zohir's (1998) account of grain markets in Bangladesh.

percent). Working capital is required to arbitrage markets, so access to credit is expected to be an important determinant of local prices. The regression results are mixed. Local prices increase by about 4 percent when credit is available; however, the result is statistically significant at a somewhat lower (91 percent) level of significance.

STATE VARIABLE 1: INVENTORIES. When commodities are storable, owners not only decide whether to sell their crop locally or in another town, but they also decide whether to make that decision today or tomorrow. More specifically, when crops can be stored, prices must meet an intertemporal condition as well as the spatial arbitrage condition (Larson 1994). Using a simulation model, Williams and Wright (1991) show that spatial and temporal arbitrage work together to reduce price volatility and decrease the volume of trade needed to bring spatial markets into equilibrium. When stock-outs occur, the intertemporal condition need not hold. For crops that are not continuously produced, a lack of inventories may also signal that the crop is unavailable for trade. By drawing on the household survey, we generated a dummy variable to identify observations in which community members held stocks of a particular commodity. We included the variable in the regression, which proved significant (table 6.4).

STATE VARIABLE 2: FAILURE TO COVER TRANSFER COSTS. When transfer costs are high relative to the price of the commodity, there is a large range of positive district prices over which trade will not occur. If such a condition prevailed in a large number of observations, the regression results could be biased. To address this possibility, we sorted the observations by crop and ranked by district price level. A dummy variable was included in the regression and set to one when an observation contained a district price among the bottom 20 percent of district crop prices. This dummy variable also proved significant.

STATE VARIABLE 3: COMMUNITY MARKETING ORGANIZATIONS. Often farmers will organize formal or informal associations for marketing purposes to reduce transportation costs, to strengthen negotiating positions, or to take advantage of other economies of scale. Survey participants were asked to choose among four options that describe how crops are organized for market: by individual farmers, by small groups, by large groups, or by formal cooperatives. We included these responses in the regression as fixed effects (marketing scale variable). The model results suggest, however, that marketing crops collectively has little influence on the prices observed in local markets.

Explaining Differences among Communities

The questionnaire covers both communities and commodities and a regression of the type reported earlier attempts to explain the variation in prices due

to both, making it possible to decompose the variation into parts (Mundlak 1978). By averaging across commodities in any given community, it is possible to examine the determinants of community differences and explain why, on average, prices are higher in one community than another. Table 6.5 reports these between community regression results. As expected, distance and road quality are highly significant in explaining this portion of the total sample variation. Nevertheless, the effects remain quantitatively small.

Together with the results from the earlier regression, these results suggest that investments in infrastructure are important in explaining why crops generally receive a higher price in communities that have good access to transportation. The results also suggest that much of the price spread among communities is to be found in crop differences and that infrastructure does little to explain this portion of price variation. This point is also brought out by the crop model results discussed next.

Crop Models

Using the 1992/93 survey, the model was estimated by crop.³ Table 6.6 provides selected results from the crop models that are largely consistent with the aggregate models. The price parameters are consistently significant and quantitatively close to one. For the most part, transport and communication variables were not statistically different from zero. Together with the earlier results, this suggests that the differences among crops—both the physical nature of the crop and the associated market characteristics—largely determine differences among crop marketing margins.

Table 6.5. Explaining Differences in Average Community Price Levels

<i>Variable</i>	<i>Estimate</i>	<i>t-score</i>
<i>Price</i>	0.958	350.81 ^a
<i>Distance</i>		
To market	-0.005	-2.93 ^a
To phone	-0.003	-1.45 ^b
To all-weather road	-0.004	-4.17 ^a
To public transport	-0.003	-2.83 ^a

Note: R² equals 0.975.

a. Significant at the 95 percent confidence level.

b. Significant at the 90 percent confidence level.

Source: Author's calculations based on 1992/93 integrated survey

3. In this version of the model unit effects were dropped to save on degrees of freedom.

Table 6.6. Community Prices: Crop Model Estimation Results

Crop	District price		Distance to market		Distance to phone		Distance to all-weather road		Distance to public transport		Distance to rail stop	
	Probability		Probability		Probability		Probability		Probability		Probability	
	Estimate	$> t $	Estimate	$> t $	Estimate	$> t $	Estimate	$> t $	Estimate	$> t $	Estimate	$> t $
Bananas	0.923	0.000	-0.056	0.148	-0.183	0.032	0.011	0.693	-0.158	0.258	0.104	0.479
Beans	0.992	0.000	-0.018	0.104	-0.056	0.014	-0.016	0.064	-0.004	0.744	-0.039	0.033
Cabbage	1.104	0.000	0.006	0.878	-0.208	0.208	0.004	0.896	0.027	0.659	-0.391	0.050
Cassava	0.925	0.000	0.002	0.854	-0.053	0.017	0.026	0.006	0.000	1.000	0.048	0.028
Coffee	0.931	0.000	-0.007	0.410	0.017	0.264	0.008	0.211	0.002	0.779	-0.012	0.361
Cotton	0.969	0.000	-0.015	0.372	0.017	0.577	0.000	0.978	0.004	0.670	-0.016	0.394
Cowpeas	1.064	0.000	-0.163	0.057	0.260	0.231	0.062	0.048	-0.011	0.797	-0.263	0.251
Groundnuts	0.995	0.000	-0.017	0.222	-0.024	0.318	-0.007	0.439	-0.015	0.159	0.070	0.010
Irish potatoes	0.934	0.000	-0.069	0.051	0.019	0.711	0.019	0.425	0.010	0.789	0.002	0.961
Maize cob	0.978	0.000	0.025	0.319	0.153	0.007	0.039	0.029	-0.005	0.784	-0.098	0.180
Maize grain	0.944	0.000	-0.003	0.851	0.028	0.293	0.008	0.429	-0.013	0.265	0.012	0.657
Matooke	0.875	0.000	0.004	0.749	0.007	0.673	0.004	0.649	0.004	0.797	0.005	0.717
Millet	0.967	0.000	0.003	0.841	0.033	0.196	-0.013	0.100	0.011	0.248	-0.001	0.939
Onions	1.110	0.000	0.005	0.943	-0.080	0.595	0.011	0.771	-0.011	0.878	0.287	0.076
Other pulses, nuts, seeds	0.875	0.000	-0.211	0.343	0.222	0.016	-0.017	0.276	0.079	0.002	0.007	0.934
Peas	1.168	0.000	-0.078	0.311	-0.055	0.830	-0.091	0.153	0.147	0.074	-0.051	0.431
Rice	0.881	0.000	-0.008	0.752	-0.038	0.215	0.019	0.230	0.002	0.919	0.018	0.628
Sim-sim	0.950	0.000	-0.014	0.442	-0.036	0.487	-0.014	0.190	-0.013	0.266	0.021	0.510
Sorghum	0.949	0.000	-0.002	0.944	0.042	0.358	-0.019	0.089	-0.002	0.887	0.018	0.481
Soybeans	0.974	0.000	0.008	0.740	-0.033	0.428	0.031	0.126	0.028	0.215	-0.007	0.849
Sweet potatoes	0.865	0.000	-0.011	0.461	-0.003	0.892	-0.003	0.783	0.001	0.932	-0.015	0.429
Tomatoes	1.169	0.000	-0.013	0.697	-0.044	0.682	0.038	0.116	-0.039	0.414	0.017	0.712

Source: Reported estimation results based on the 1992/93 integrated household survey.

The Determinants of Market Participation

Transfer costs in commodity markets set bounds on potential gains from trade for poor rural households. Most analysts recognize that rural households in many poor countries and regions face imperfect markets.⁴ Apparent from the analysis above, differences prevail among commodity markets. Moreover, since transfer costs are also partly determined by distance to market, credit markets, and other community characteristics, the set of relative prices and the characteristics of the markets faced by households will differ by location. In turn, the capacity of households to produce, take on risk, and participate in commodity markets will differ from household to household. Consequently, some households may choose to participate in commodity output markets while others do not. Moreover, participation in some commodity markets may be more attractive to households than participation in other markets. As already discussed, survey data show that, in general, few rural households participate significantly in crop markets. This section examines the determinants of the decision to participate.

Formally, we assumed that conditional on the state variables, households formulate a decision price, $t_{h,i}$, which when compared with market prices, triggers their participation in markets; that is, $y_{h,i} \geq 0$, for $p_{h,i} \geq t_{h,i}(H, I, E, V)$, where y is the share of crop i production marketed by household h ; and where H , I , E , and V are state variables representing household, commodity, enterprise, and community characteristics (de Janvry, Fafchamps, and Sadoulet 1991). Because the decision price is unobserved, the following relationship is estimated:

$$(6.3) \quad y_{h,i} = s(p_{h,i}; (H_h, I_i, E_h, V_h)).$$

Table 6.7 provides estimates of household participation in Ugandan crop markets based on nearly 11,700 observations from the 1992/93 survey. The subsequent sections discuss the implications of the key results.

Prices

Relative prices are important when farmers decide how much of their crop to market. On average, across all crops, a 10 percent increase in price will result in a 2 percent increase in the amount of the crop sold. The source of the price increase can be a general rise in district-level prices or a decrease in transfer costs. The latter point is significant, given the relatively large margins associated with many of the food crops. Furthermore, the 0.2 participation elasticity is in addition to household supply elasticities, that is, households can produce

4. For example, Ellis (1993, p. 13) provides the following definition: "Peasants are households which derive their livelihoods mainly from agriculture, utilise mainly family labour in farm production, and are characterised by partial engagement in input and output markets which are often imperfect or incomplete."

Table 6.7. Market Participation: Household Tobit Results

<i>Variable</i>	<i>Estimate</i>	<i>χ^2 statistic</i>	<i>Probability > χ^2</i>
Price	0.20	23.27	0.00
<i>Market characteristics</i>			
Crop effects (joint significance)	n.a.	2,255.82	0.00
Region effects (joint significance)	n.a.	195.49	0.00
<i>Household characteristics</i>			
Size of household	-0.01	0.14	0.71
Male head of household	0.05	4.37	0.04
Education of household head (joint significance)	n.a.	8.20	0.04
None	-1.13	2.52	0.11
Primary	-1.08	2.31	0.13
Secondary	-1.11	2.43	0.12
<i>Sources of capital</i>			
From savings/family	-0.18	1.66	0.20
From government/NGO	0.08	0.12	0.73
Money lender	0.03	0.06	0.81
Formal credit	-0.46	3.11	0.08
<i>Enterprise characteristics</i>			
Number of paid workers	0.01	4.98	0.03
Number of unpaid workers	-0.10	37.22	0.00
Investment capital	0.04	26.13	0.00
<i>Community characteristics</i>			
Distance to market	0.00	2.48	0.12
Distance to phone	-0.03	15.91	0.00
Distance to all-weather road	0.00	2.25	0.13
<i>Common method of sale</i>			
Sold by cooperative	-0.23	0.46	0.50
Sold by individual farmer	0.06	0.15	0.70
Sold by large group	0.09	0.28	0.60

n.a. Not applicable.

Note: Continuous variables not already expressed as shares were converted to natural logs prior to estimation.

Source: Estimates based on 1992/93 integrated household surveys.

for either home consumption or for market. Consequently, all other things being equal, a permanent reduction in transfer costs would result in both an increase in output and an increase in the share of output marketed.

Market Characteristics

Crop markets have different information and storage characteristics that influence household marketing decisions in the same way they influence markets

between communities. In the regression, crop effects and regional effects were significant when taken as a group. Table 6.8 reports the estimated crop effects individually. Among the crops, farmers were more likely to export a greater share of traditional export crops.

Household Characteristics

Among the household characteristics included in the regression, the gender of the household head proved significant: male heads of households were more likely to participate in crop markets. The size of the family and differences in

Table 6.8. Estimated Fixed Commodity Effects

<i>Commodity</i>	<i>Estimated effect</i>	χ^2	<i>Probability > χ^2</i>
Coffee	1.33	6.13	0.01
Other fruit	1.22	4.70	0.03
Cotton	1.21	5.09	0.02
Tomatoes	0.97	3.14	0.08
Tobacco	0.95	2.94	0.09
Sugar cane	0.90	2.19	0.14
Rice	0.87	2.61	0.11
Onions	0.85	2.41	0.12
Other cash crop	0.84	1.22	0.27
Other grains	0.81	1.92	0.17
Cabbage	0.72	1.66	0.20
Oranges	0.67	1.11	0.29
Pineapples	0.65	1.08	0.30
Soybeans	0.50	0.88	0.35
Maize grain	0.38	0.50	0.48
Bananas	0.37	0.46	0.50
<i>Sim-sim</i>	0.37	0.47	0.49
Peas	0.24	0.19	0.66
Maize cob	0.14	0.07	0.79
Groundnuts	0.14	0.07	0.80
Beans	0.06	0.01	0.91
Sorghum	0.03	0.00	0.95
Millet	0.02	0.00	0.98
<i>Matooke</i>	0.00	0.00	1.00
Irish potatoes	-0.01	0.00	0.99
Other vegetables	-0.02	0.00	0.97
Other pulses, nuts, seeds	-0.10	0.03	0.86
Cassava	-0.17	0.10	0.75
Cowpeas	-0.24	0.19	0.66
Sweet potatoes	-0.31	0.32	0.57

Note: Fixed effect for yams excluded.

Source: Authors' fixed-effect parameter estimates.

educational attainment were not important in explaining market participation, nor were differences in the sources of credit important. The coefficient on formal credit sources was significant, although not of the expected sign. This may well be coincidental, because less than 2 percent of the sample included households with credit obtained from formal sources.

Enterprise Characteristics

Past investment reflected in current investment capital levels was significant in explaining differences in market participation rates. The number of paid employees was associated with greater market participation, that is, enterprises with commercial outputs also participated in formal labor markets. The opposite was also true, and farms that relied on unpaid—usually family—labor were also less likely to market their output.

Community Characteristics

The effects of community characteristics, which are important to trade among communities, are likely to be reflected in farm-gate prices. They may also play a role in the type of information households receive and the range of opportunities available to households. Among the community characteristics included in the regression, only access to telephones proved both quantitatively and statistically significant.

The Effects of Price Changes on Household Welfare

Crop models provide a way to quantify the effects of exogenous changes in district prices on community prices. However, the quantitative significance of such changes on welfare is not clear, because the relationship between local prices, district prices, and community market characteristics differ among crops; market characteristics differ among communities; and the composition of production differs among farms. Fortunately, the 1992/93 household survey contains information on the composition of household production and also provides a way of linking households with communities. Linking the crop pricing models with the household composition data provides a way of measuring the welfare effects of changes in policy and public investment. Annex 6.1 explains how the welfare measure was calculated.

The model results discussed earlier suggest that changes in district prices are reflected in local prices (table 6.4). In turn, tradable crop prices are linked to international prices. However, in 1992/93 Uganda households were only partially linked to formal crop markets, because most households marketed only a small share of their output. Cash crops were the exception. Table 6.9 shows the effects of a simulated 10 percent increase in cash crop prices. The change is significant, but mostly for a concentrated group of households. This is because

Table 6.9. Welfare Effect of a 10-Percent Increase in Cash Crop Prices
(percent)

<i>Range</i>	<i>Share of households</i>	<i>Average change</i>
0-1	84.8	0.0
1-2	4.6	1.5
2-3	3.1	2.4
3-4	2.4	3.5
4-5	1.3	4.4
5-6	1.2	5.5
6-7	0.8	6.5
7-8	0.7	7.5
8-9	0.4	8.5
9-10	0.3	9.4
10-11	0.2	10.5
11-12	0.2	11.6
12-13	0.2	12.4
Total	100.0	0.6

Source: Authors' simulation.

Ugandan households choose production diversification as a survival and risk management strategy. As might be expected, a price increase also has regional effects. Coffee appears to dominate the results, with coffee-growing districts like Kasese showing greater changes under the simulation.⁵

Because of the composition of production, gains from temporary price movements are also small and unlikely to contribute in a significant way to the accumulation of household assets. In contrast, reductions in transfer costs will improve the household terms of trade in a permanent way. Results from the previous section suggest that, all other things being equal, farmers would consequently increase their market participation. Moreover, changes in transfer costs may lead to reduced risk levels as well. As a result, the true development impact of improvements in crop markets are likely to come from changes in household production and market participation made in response to new opportunities.

Are Crop Markets Developing?

This section considers subsequent evidence that suggests that crop markets are developing in Uganda. In 1992 crop markets worked in the sense that

5. Note that an export tax—sometimes proposed to stabilize exchange rates during a boom—would have exactly the opposite results.

relevant price signals were relayed among markets. Transfer costs, however, were high and differed significantly among crops. Most households engaged in farming and consumed most of what they produced. Rural households did not specialize in other sector activities nor did they specialize in producing particular crops that would give rise to growing food crop markets. Clearly there was scope for transaction costs to fall, and for crop markets, especially food crop markets, to deepen.

Increased Participation in the 1990s

Subsequent household surveys show small but steady changes in income levels and sources of income, which together suggest some growth in the domestic demand for food crops (see book appendix A for surveys). Changes in the survey instruments make some comparisons difficult; nevertheless, it appears that between 1992 and 1995 real income levels grew as did income from wages (table 6.10). At the same time, the share of household income from farming grew between 1992/93 and 1994/95. Moreover, the percentage of heads of households reporting agriculture as their primary occupation grew between 1992/93 and 1995/96 (table 6.11). Using the same household data, Okidi (1999) reports some changes in the composition of household production, including a greater role for coffee, but it is difficult to tell if this result is due to changing prices only. A change in the way the survey was conducted further obfuscates any changes in the composition of household production. Nevertheless, there is some evidence from the early surveys to suggest that households became significantly more integrated into crop markets during this period.

In 1999/2000, a revised household survey included questions about market participation, not only for the period coinciding with the survey, but for previous years as well. Partial and preliminary data from the 1999/2000 survey provides strong evidence that farmer participation is increasing.

Table 6.12 reports results from a probit regression that predicts participation in crop markets based on the household characteristics of the respondents. The regression suggests that the availability of storage facilities and of market information are important determinants of market participation. The use of high-yielding seed varieties (proxy for the technical sophistication of the farmer) was not significant, but having at least one visit by an extension officer was significant. In addition, separately included time effects suggest that market participation increased significantly between the early surveys of 1992/93 and 1994/95 and the subsequent surveys in 1995/96 and 1999/2000.

This general result—that farmers report increasing participation in formal markets over time—remains at odds with participation as measured by the share of income from formal markets. Nonetheless, the results suggest at least a perception of increased use of formal markets. Moreover, the positive effect of extension on participation reinforces the earlier finding that information is an important component of market development.

Table 6.10. Household Income by Source, 1992–96

<i>Location</i>	<i>Total household income (U Sh 1,000)</i>			<i>Share of income from agriculture (percent)</i>		<i>Share of income from all wages (percent)</i>		
	1992/93	1994/95	1995/96	1992/93	1994/95	1992/93	1994/95	1995/96
All Uganda	54.2	69.5	74.6	49.4	51.7	12.0	13.5	15.7
Central	68.9	104.2	103.7	42.7	40.4	18.7	19.8	20.5
Eastern	49.9	51.5	64.2	49.4	54.7	9.7	10.8	15.4
Northern	42.8	46.7	50.1	52.1	61.8	5.6	7.7	9.3
Western	50.3	56.2	67.4	55.4	57.3	11.4	11.4	14.6

Source: Okidi (1999).

Table 6.11. Main Occupation of Household Head, 1992 and 1995
(percent)

<i>Location</i>	<i>Self-employed</i>				<i>Employed</i>			
	<i>Agriculture</i>		<i>Nonagriculture</i>		<i>Agriculture</i>		<i>Nonagriculture</i>	
	1992	1995	1992	1995	1992	1995	1992	1995
All Uganda	57.3	63.2	20.1	16.0	3.2	3.1	19.5	17.8
Central	50.8	57.4	17.6	18.7	5.0	5.0	26.6	18.9
Eastern	60.9	63.9	15.2	16.3	1.6	2.1	22.3	17.8
Northern	59.9	69.1	33.7	11.6	1.1	1.2	5.3	18.1
Western	58.7	64.3	16.3	15.9	4.4	3.4	20.7	16.4

Source: Okidi (1999).

Table 6.12. Explaining Positive Responses to “Did You Sell Your Output?”

<i>Variable</i>	<i>Estimate</i>	<i>z</i>	<i>Probability > z </i>
Storage facility	0.47	3.75	0.00
HYV, 1–20%	–0.31	–1.15	0.25
HYV > 20%	–0.15	–0.81	0.42
<i>Number of extension visits</i>			
One	0.62	2.88	0.00
Two to three	0.54	2.50	0.01
More than three	0.51	2.21	0.03
<i>Received market information</i>			
Somewhat useful	0.64	5.13	0.00
Useful	0.37	2.28	0.02
<i>Year effect</i>			
1994	0.10	0.79	0.43
1996	0.25	2.05	0.04
1999	0.26	2.17	0.03

HYV High-yielding varieties.

Source: Estimates based on preliminary data from 1999/2000 national household survey.

Crop Market Results from Subsequent Surveys

The community surveys of 1992/93, 1993/94, and 1995/96 asked different questions about crop prices. Only the 1992/93 survey asked about district prices. The 1993/94 survey inquired about local prices and prices in the most common market, and the 1995/96 questionnaire asked about farm-gate prices and most common market prices. Moreover, information on infrastructure, credit access, and marketing practices was more limited in the 1993/94 and 1995/96 surveys. Consequently, putting together a panel as detailed as the model applied to the 1992/93 data is not possible.

It is feasible to use the 1993/94 and 1995/96 data together and separately in a limited way. Using the 1993/94 survey, observed nearest market prices were regressed on most common market, distance to market, infrastructure measures, and fixed effects for crop, unit, and region. Distance to market was assumed to equal the distance to the most important produce market minus the distance to the local market. When the distance was zero, the observation was dropped on the assumption that the local market was also the most important one. Because of the way the question was asked, one cannot unambiguously associate the distance variable with a market pair. Similarly, the 1995/96 survey can be used by regressing farm-gate prices on producer prices in the most common market, transport infrastructure, and fixed effects. The distance between farm and community must, unfortunately, be ignored.

Despite ambiguities about distance, the regression results are quite similar to the results from the better-designed 1992/93 survey (table 6.13) and broadly support earlier findings. Prices in related markets largely explain that local prices and quality effects are important. Crop and regional effects turn up significant for the 1995/96 survey, but not for the 1993/94 survey. Transportation infrastructure effects are neither large nor significant. Unfortunately, communication or other types of information measures were not available.

Evidence on Transfer Costs

As discussed earlier, even when markets are integrated and arbitrage conditions hold, high transfer margins encourage self-sufficiency and limit the benefits of trade. Nevertheless, markets are an amorphous blend of information, business practices, institutions, credit, and transport costs. Thus an additional question of interest then is how marketing margins have changed over time given the many changes to the Ugandan economy.

One cannot make direct comparisons of margins over time because of changes to the surveys. A related question, however, can be addressed: Have average spreads between observed market prices and district averages declined over time? This is done by regressing local most common crop prices, available in both the 1993/94 and 1995/96 surveys, against transportation variables and crop, unit, and regional dummies together with a year dummy.

Table 6.13. Results from the 1993 and 1995 Surveys

<i>Variable</i>	<i>1993/94 survey</i>		<i>1995/96 survey</i>	
	<i>Estimate</i>	<i>t-score</i>	<i>Estimate</i>	<i>t-score</i>
Price	0.952	37.840	0.921	59.610
Distance to market	0.000	-0.170	-0.004	-1.060
Distance to tarred road	0.004	0.690	0.003	1.020
Distance to public transport	-0.007	-1.510	0.002	0.490
Distance to rail stop	-0.032	-1.010	-0.004	-0.870
<i>Tests for fixed effects</i>				
	χ^2 statistic	Probability > χ^2	χ^2 statistic	Probability > χ^2
Crop	23.300	0.669	99.860	0.0001
Unit of measure	36.060	0.003	41.800	0.0001
Region	22.220	0.507	88.190	0.0001

Source: Based on 1992/93 and 1995/96 household surveys.

Together, the crop, unit, and regional dummies take on the value of the regional average price for a particular crop in a particular unit of measure. The year dummy takes on a value of one for 1993/94 observations and is otherwise zero.

The results are given in table 6.14 and answer yes to this question, that is, average spreads have fallen with all other things being equal. In fact, the regression results imply that the spread between the two surveys fell by approximately 32 percent, suggesting that opportunity for trade increased for most communities.

Evidence on Changing Domestic Demand

In rural communities where most households are largely self-sufficient in food, there is scant and inconsistent demand for local food crops. When transportation costs are high and the information supply is low, households cannot depend on markets for food crops to generate income. In contrast, an export market always exists for coffee, although the price may be uncertain. As already noted, improving communications and access to information can lower uncertainty and transaction costs. Changes in the composition of the economy that lead to a consistent demand for local food crops can do the same. Evidence from national accounts suggests this has been happening to some extent in recent years. Nevertheless, the number of households engaged in agriculture has not fallen, and rural incomes remain highly dependent on agriculture. As discussed in chapter 2, a significant portion of growth has come from the formal nonagricultural sectors of the economy. To the extent

Table 6.14. Modeling District Spreads

<i>Variable</i>	<i>Estimate</i>	<i>Probability > t </i>
Distance to market	0.00005	0.993
Distance to tarred road	-0.01178	0.024
Distance to public transport	0.00739	0.107
Distance to rail stop	-0.00603	0.511
<i>Tests for fixed effects</i>	<i>χ^2 statistic</i>	<i>Probability > χ^2</i>
Crop	952.81	0.0001
Unit of measure	6,166.28	0.0001
Region	167.15	0.0001
Year	88.49	0.0001
<i>Test that year effects are the same</i>	<i>Estimate</i>	<i>Probability > t </i>
1995 effect + 1993 effect	-0.38688	0.0001

Source: Authors' calculations.

that the changing composition of the economy continues to reflect changing specialization by households, consistent demand for local food crops will create incentives for greater participation by farming households in formal markets for food crops.

Conclusions and Policy Implications

Information from community and household surveys conducted in 1992/93, 1993/94, and 1995/96 and partial survey results from 1999/2000, together with modeling work, suggest that household participation in crop markets is limited. The consequences are less severe for export crops that eventually make their way into international markets. For food crops, however, the lack of domestic participation most likely results in illiquid markets. Gross margins between local and district markets for most food crops are large, both absolutely and relative to cash crops. This fact alone would encourage self-sufficiency in food crops and trade in cash crops. Large margins and high transfer costs also imply a large range of positive prices that fail to cover transfer costs, increasing the risks of going to market when prices are uncertain. Units of measure, which probably indicate quality differences, are important determinants of local prices relative to district prices, suggesting that demand markets are further fragmented by uncertainty about quality. Together these factors indicate that marketing food crops is riskier than marketing export crops, encouraging households to remain both self-sufficient and diversified in their production. The mechanism is self-enforcing, because a lack of specialization also limits the demand for local food crops and the depth of local markets.

Despite high margins, there are no indications of widespread market failure. Results from a spatial arbitrage model suggest that district and local markets are integrated to the extent that local prices largely reflect district prices once transfer costs and commodity quality characteristics are taken into account. This sign of market integration is significant and fundamental, because the most basic economic measures of income, poverty, and welfare are premised on the notion that prices are comparable across time and space.

Although differences among the surveys make comparisons difficult, evidence indicates that crop markets are improving and that transfer margins fell between 1992 and 1995. Nevertheless, in 1995 most rural households were still engaged in self-reliant farming, and their participation in crop markets remained limited. Working markets were not sufficient to coax many poor households out of self-sufficiency. In addition, while investments in infrastructure that are statistically significant can explain average crop price differences among communities, the quantitative impact of public investment in infrastructure—in the short run—appears to be small. Access to telecommunications and credit seems to be significant for crop markets, but again, the estimated short-run benefits are small.

Nonetheless, the benefits of public investments in infrastructure and access to credit probably extend beyond crop markets, and policies toward investments in infrastructure must include a balanced consideration of the effects of public investments in infrastructure.

Taken together, the survey and modeling results suggest that the problems in crop markets up to 1995 were symptomatic of limited specialization in the Ugandan economy and labor markets. More recent sectoral income data suggest that this is changing and the economy is becoming more diverse. Consequently, policies that enable households to accumulate savings and human and physical capital and, thereby, take on the additional risks of specialization, are likely to result in improved crop market performance. In tandem, government support for the public and private institutions that strengthen crop markets by reducing price, quality, and transaction uncertainty can speed the development of crop markets.

Annex 6.1. Calculating Household Welfare

From the 1992/93 integrated household survey, crop production shares were calculated for each of the nearly 6,000 households in the sample and crop weights were calculated, so that:

$$(A6.1) \ w_c^h = v_c^h / \sum_c v_c^h,$$

where h denotes households, c denotes crops, and v represents a value of production calculated from the household survey. Price changes, dp_c , were simulated under different scenarios. The two series were then combined to provide a Laspayres measure of welfare change:

$$(A6.2) \ \Delta L^h = \sum_c dp_c w_c^h.$$

Because households would reevaluate their optimization strategy in light of a relative price change, the Laspayres measure gives a lower-bound estimate.

References

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

Barrett, C. B. 1997. "Food Marketing Liberalization and Trader Entry: Evidence from Madagascar." *World Development* 25(5): 763–77.

Baulch, Bob, W. M. H. Jaim, and Sajjad Zohir. 1998. "The Spatial Integration and Pricing Efficiency of the Private Sector Grain Trade in Bangladesh." Briefing paper. Institute of Development Studies, Brighton, United Kingdom.

- Deaton, Angus. 1997. *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*. Baltimore, Maryland: The Johns Hopkins University Press.
- de Janvry, Marcel Fafchamps, and Elisabeth Sadoulet. 1991. "Peasant Household Behaviour with Missing Markets: Some Paradoxes Explained." *Economic Journal* 101(409):1400–17.
- Ellis, Frank. 1993. *Peasant Economics: Farm Households and Agrarian Development*. Cambridge, U.K.: Cambridge University Press.
- Fafchamps, Marcel, and Bart Minten. 1999. "Property Rights in a Flea Market Economy." Working Paper no. WPS/99.25. University of Oxford, Centre for the Study of African Economies, United Kingdom.
- Jones, William. 1972. *Marketing Staple Food Crops in Tropical Africa*. Ithaca, New York: Cornell University Press.
- Kranton, Rachel. 1996. "Reciprocal Exchange: A Self-sustaining System." *American Economic Review* 86(4): 830–51.
- Larson, Donald F. 1994. "Copper and the Negative Price of Storage." Policy Research Working Paper no. 1282. World Bank, Development Research Group, Washington, D.C.
- . 2000. "Measuring Market Development: Crop Markets in Uganda." World Bank, Development Research Group, Washington, D.C. Processed.
- Martin, Anne. 1962. *The Marketing of Minor Crops in Uganda: A Factual Study*. London: Her Majesty's Stationery Office.
- Mundlak, Yair. 1978. "On the Pooling of Time Series and Cross-section Data." *Econometrica* 46(1): 69–85.
- North, Douglas. 1989. "Institutions and Economic Growth: An Historical Introduction." *World Development* 17(9): 1319–32.
- Okidi, John A. 1999. "Regional Growth Disparities and Household Economic Performance in Uganda." Research Series no. 17. Economic Policy Research Centre, Kampala. Processed.
- SAS Institute, Inc. 1992. "SAS Technical Report P-229, SAS/STAT Software: Changes and Enhancement, Release 6.07." Cary, North Carolina.
- Williams, Jeffrey C., and Brian Wright. 1991. *Storage and Commodity Markets*. Cambridge, U.K.: Cambridge University Press.

Part III

Firm Responses and Constraints

Confronting Competition: Investment, Profit, and Risk

Ritva Reinikka and Jakob Svensson

This chapter examines the investment performance of the private firm sector. The ensuing analysis is based mostly on the Uganda enterprise survey carried out in 1998 (for survey details, see appendix B at the end of the book). Household enterprises, the focus of chapters 5 and 6, are also part of the private sector, but they are typically very small (micro) enterprises. This chapter focuses on larger firms, that is, firms with five or more employees. As Collier and Reinikka argued in chapter 2, given the capital flight and the depletion of capital stock during the 1970s and 1980s, sustained growth and reduction in poverty beyond recovery require a strong private investment response. Collier and Reinikka's macroeconomic data show that investment as a share of gross domestic product increased in the 1990s, but is still well below, say, that of East Asian countries. This chapter analyzes the microeconomic or firm-level evidence of private investment.

How important is investment generally for economic growth? Investment or physical capital accumulation has long played a central role in the

The findings reported in this chapter are based on data from the 1998 Uganda enterprise survey, which was carried out by the Uganda Manufacturers Association Consultancy and Information Service on behalf of the Ugandan Private Sector Foundation and the World Bank, and was managed by William Kalema and Frances Nzonsi. The survey design benefited from the Regional Program on Enterprise Development and contributions from Andrew Stone. Alex Bilson-Darku, and Mimi Klutstein-Meyer assisted in data analysis. Useful comments were received from participants at the annual seminar on the Ugandan economy, organized by the Economic Policy Research Centre (Kampala) in May 1999, as well as from Catherine Pattillo and Francis Teal.

literature on economic growth and development. Few economic ideas are as intuitive as the notion that increasing investment is a good way to raise output and income. Recent empirical research also supports this view—the rate of investment is robustly and positively correlated with the rate of economic growth in cross-country, long-run growth regressions.

Early research on growth and investment took a rather mechanical approach: growth was constrained by a lack of investment that, in turn, was constrained by a lack of finance (see Easterly 1997). Consequently, if financing was made available, it was argued, physical capital investment and, ultimately, growth would follow.¹

This chapter contends that both investment and growth, as well as innovation and technical change, are driven by the prevailing policies and economic, social, and legal institutions. While some of these policies, particularly macroeconomic policies, can be measured directly, the effect and efficiency of other policy areas are much more difficult to assess. By studying the determinants of private investment, it is possible to study a larger set of institutional and policy issues that affect firms.

The basic idea in the initial wave of the so-called endogenous growth theory is that growth differences could be sustained indefinitely because the return to capital would not diminish as economies develop (Lucas 1988; Rebelo 1991; Romer 1986). Unlike the growth theory of the 1960s, recent research reflects closer attention to the relationship between theory and data. Indeed, a large empirical literature developed in the 1990s in which virtually every possible variable has been used to explain this divergence in growth over time within the cross-country framework (Barro 1991; see Barro and Sala-i-Martin 1995 for a review). Most of this work explains cross-country differences in growth, but a few studies also attempt to explain Africa's poor performance (Easterly and Levine 1997; Sachs and Warner 1995, 1996; see Collier and Gunning 1999 for a review). While the explanatory power of many of the proposed variables has been shown to depend on specification, sample, or measurement, some variables appear to be robustly correlated with growth (see Levine and Renelt 1992 for a critical review). These variables include investment rate (DeLong and Summers 1991; Mankiw, Romer, and Weil 1992), level of initial income, human capital stock, openness to trade, financial depth, and fiscal stance. The African growth "tragedy" has been explained by additional factors, including high volatility (high incidence of shocks originating from external terms of trade, climate, or policy), deficient public infrastructure, and ethnic fragmentation.

1. Recent research based on data for a cross-section of countries during 1970–97 shows that public investment has not been correlated with growth in Africa (Devarajan, Easterly, and Pack 1999). Similarly, private investment has not been correlated with growth, unless Botswana is included in the sample. This result is not surprising given the poor policy and institutional environment in most of these countries during most of the sample period.

This chapter has two objectives. First, using new microeconomic data from Uganda, it examines the extent to which liberalization and the profound macroeconomic and structural reforms implemented in the late 1980s and the 1990s translate into higher private investment. Second, while at present households are important economic agents in agriculture and other sectors, sustainability of economic growth depends on the growth of firms, because households seldom achieve significant economies of scale necessary for sustained growth. Using quantitative and qualitative survey data, the chapter analyzes factors that constrain investment and the growth of Ugandan firms.

Investment Response

Firm surveys have proven a useful tool to explore private sector responses to macroeconomic reforms and to increase our understanding of microeconomic constraints to investment. Such surveys can also help policymakers prioritize policies and interventions to improve the business environment. In Africa, the Regional Program on Enterprise Development, initiated by the World Bank, has over time produced valuable quantitative data on manufacturing firms for Burundi, Cameroon, Côte d'Ivoire, Ghana, Kenya, Tanzania, Zambia, and Zimbabwe (Biggs and Srivastava 1996). The 1998 Uganda enterprise survey benefited from the Regional Program on Enterprise Development model and, hence, is comparable to the other African surveys. However, the Uganda survey is somewhat more limited in its scope (it excludes detailed labor and finance questions), but covers a wider range of sectors—in addition to manufacturing it includes firms in commercial agriculture, construction, and tourism (for details, see appendix B at the end of the book). In addition, it includes a wider range of questions on infrastructure, taxation, and corruption.

Investment Data

Before analyzing the regression results, it is useful to examine the Ugandan investment data and compare them with similar data for four other African countries: Cameroon, Ghana, Kenya, and Zimbabwe. The survey provides quantitative data on employment, capital stock, investment, sales, and value added for 192 Ugandan firms during 1995–97. Because changes are used in some of the variables, one year of observations (1995) is lost. Thus, data permitting, each firm has two observations, making the total number of observations 367. Initial inspection of the data resulted in discarding 14 of these observations as outliers, leaving a sample size of 353.²

2. Observations with reported value added to capital above 1,000 percent or below –100 percent are dropped. A closer inspection of the data revealed that misreported or erroneous recording of capital stock data was the source of these extreme values.

As shown in table A7.1, about half of the Ugandan firms made an investment in machinery and equipment in both 1996 and 1997. This is similar to the African country average. For individual countries where comparable information exists, the percentage of Ugandan firms that invested is somewhat higher than in Cameroon, Ghana, and Kenya, but lower than in Zimbabwe (Bigsten and others 1999). While large firms are more likely to invest (77 percent of large and 45 percent of small firms in Uganda), they invest less relative to their capital stock than smaller firms. For the Ugandan firms that invested, the value of investment relative to the capital stock (investment rate) was, on average, 11 percent for large firms and 30 percent for small firms. For all Ugandan firms, both those that did and did not invest, the investment rate was 13 percent in 1996 and 11 percent for 1997. Again, this pattern is quite similar to the African comparator country average. With respect to individual comparator countries, the investment rate for the firms that invested in Uganda is lower than that in Cameroon and Ghana, about the same as in Kenya, and higher than in Zimbabwe.

Averages, however, can be misleading when the underlying distribution is skewed. At the median firm, the Ugandan investment rate is very low: less than 1 percent for all firms and 4.7 percent for those firms that invest. The picture is similar in the four comparator countries, that is, median investment rates for all firms range from zero in Cameroon and Kenya, to less than 1 percent in Ghana, to 3 percent in Zimbabwe.³

As shown in table 7.1, there are obvious differences between firms that invest and those that do not invest. Investing firms, on average, have higher profits, tend to experience positive changes in demand and value added, are larger in terms of value added and employment, and are somewhat more recently established. Uganda and Ghana are the only countries that experience a positive change in value added (and gross sales for Uganda) at the median, reflecting a growing economy and relatively good economic policies. For Ugandan firms that invest, the sales-to-capital stock ratio increased by 42 percent, on average (9 percent at the median), while for firms that did not invest, the change in sales was negative (0 at the median).

Another notable characteristic of African firms is the very high mean and median profit rates, that is, profit as a share of the installed capital stock is high. These gross profits are calculated as the firm's value added less wages and interest payments. Compared with the rest of the world, the high profit-to-capital ratios are likely to be driven by the low level of installed machinery and equipment. For the four comparator countries, Bigsten and

3. The firm survey data seem to be generally consistent with the trend depicted by Uganda's macroeconomic data. As shown in chapter 2, private investment was relatively stable during the survey period of 1995–97, while the overall share of investment in machinery and equipment in gross domestic product fell somewhat after the 1994–95 coffee boom.

Table 7.1. Summary Statistics for Ugandan Firms, Pooled Data, 1996–97

<i>Variable</i>	<i>Firms that invest</i>	<i>Firms that do not invest</i>	<i>All firms</i>
Profit rate	0.914 [0.306]	0.565 [0.177]	0.747 [0.256]
Change in sales	0.418 [0.090]	–0.023 [0.001]	0.207 [0.028]
Change in value added	0.214 [0.027]	0.012 [–0.001]	0.117 [0.007]
Value added	1.39 [0.501]	0.890 [0.330]	1.149 [0.414]
Size (employment)	150 [50]	51 [19]	103 [28]
Age (years)	12 [9]	14 [11]	13 [10]
Investment rate	0.234 [0.047]	n.a. n.a.	0.122 [0.002]

n.a. Not applicable.

Note: Mean values, with median values in brackets. There were 184 observations with positive investment and 169 with zero investment. Variables are expressed as a ratio of lagged capital stock, except for size and age.

Source: Authors' calculations based on the 1998 enterprise survey.

others (1999) report an average profit rate of 198 percent and a median of 40 percent for all firms. While the Ugandan investment rates do not differ much from the African average, average profit rates are clearly lower. They are also lower than in any individual comparator country. Indeed, profit rates in Uganda, both at the median and the mean, are only about half of those reported for the pooled African sample: for those Ugandan firms that invested, the mean profit rate was 91 percent (31 percent at the median), while for all firms the mean was 75 percent (26 percent at the median).

Flexible Accelerator Model of Investment

To what extent is investment across Ugandan firms driven by changes in demand as suggested by the flexible accelerator model of investment? Are firms in general constrained by liquidity? Do age and size matter? Are there any clear geographical or sectoral differences in investment behavior? To answer these questions a simple flexible accelerator model is estimated (see annex 7.2). In this model, fluctuations in demand are assumed to motivate investment. Given the weaknesses of the financial sector in African economies, a model is adopted in which firms do not have access to credit and simply allocate current profits to investment (for details see Tybout 1983). A similar approach has

been applied to four other African countries, namely, Cameroon, Ghana, Kenya, and Zimbabwe (Bigsten and others 1999). By replicating their specification, this section explores whether Uganda, with its better macroeconomic record, differs from the other countries in terms of firms' investment response. As in the case of the comparator countries, data on investment in machinery and equipment are used.

The flexible accelerator model of investment for a profit maximizing firm i , which is liquidity constrained, can be written as follows (see annex 7.2 for details):

$$(7.1) \quad I_i(t) = \alpha_{oi} + \alpha_Q \Delta Q_i(t) + \alpha_\pi \pi_i(t) + \alpha_I I_i(t-1) + \alpha_x X_i + d_t + \varepsilon_i$$

where $I_i(t)$ is the level of investment for firm i at time t , α_{oi} is the constant for firm i , ΔQ_i denotes the change in sales, π_i is the level of profits, X_i denotes firm-specific characteristics (age, size), d_t is a time dummy, and ε_i is the error term. To avoid the heteroskedasticity problem with respect to size in the estimation, the variables are expressed in rates, that is, scaled by the inverse of capital stock at the end of the previous period, $K(t-1)$.

The empirical model set out in equation (7.1) treats investment as a continuous variable. However, capital investment is typically lumpy, which constrains the firm's investment behavior. In a given year the firm may not be able to invest the desired amount and, therefore, chooses not to invest at all. In other words, the observable data on firms' investment rates are incidentally truncated and, thus, equation (7.1) is estimated in two stages.⁴ The two-stage procedure involves, first, the estimation of a probit model of the decision to invest and, second, an estimation of the investment rate equation for the firms that invested, accounting for the selection of firms with only positive investment.

Regression Results

This section explores how well the flexible accelerator model, as expressed in equation (7.1), can explain Ugandan firms' decisions to invest and the amount. Table 7.2 reports the basic results, including the two-stage estimation and the Tobit regression. Apart from the variables defined above, each regression includes industrial category and location-specific dummies. Column 1 shows the result of the first-stage probit model concerning the decision to invest. At the 90 percent confidence level, both the accelerator (change in sales) and the liquidity constraint (profit) are found to be important in the decision to invest. Thus, according to the prediction of the accelerator model, Ugandan firms indeed invest to meet increases in demand, provided that they have sufficient

4. Heckman's (1979) two-step procedure. If the factors that determine the decision to invest and the amount of investment are the same, the correct specification is the Tobit model.

Table 7.2. Investment Regressions for All Ugandan Firms, 1995–97

Variable	(2) Ordinary		
	(1) Probit regression	least squares regression	(3) Tobit regression
Constant	–1.15 ^a (0.470)	0.992 (0.525)	–0.430 ^b (0.232)
Change in sales-to-capital stock	0.164 ^b (0.073)	–0.055 (0.042)	0.032 (0.028)
Profit rate	0.090 ^c (0.054)	0.076 ^b (0.035)	0.100 ^a (0.024)
Age (log)	–0.250 ^a (0.092)	–0.028 (0.054)	–0.147 ^a (0.045)
Size (log)	0.372 ^a (0.064)	–0.120 (0.075)	0.087 ^a (0.030)
Time dummy	0.060 (0.144)	–0.082 (0.084)	–0.005 (0.072)
District dummies significant	No	No	No
Industrial category dummies significant	Yes	No	Yes
Agroprocessing	0.844 ^a (0.288)	n.a. n.a.	0.258 ^c (0.137)
Tourism	0.644 ^b (0.320)	n.a. n.a.	0.281 ^c (0.158)
Predictability	0.70	n.a.	n.a.
R ²	n.a.	0.15	n.a.
Observations	353	184	353

n.a. Not applicable.

Note: The dependent variable in regression (1) takes the value one if the firm invested and zero otherwise. Standard errors (in parenthesis) adjusted for heteroskedasticity (White 1980). Regressions (2) and (3) were adjusted for selectivity. (The inverse Mills ratio is not reported.)

a. Significant at the 1 percent level.

b. Significant at the 5 percent level.

c. Significant at the 10 percent level.

Source: Authors' calculations based on the 1998 enterprise survey.

funds—that is, adequate profits—to do so. If they do not have adequate profits, they cannot invest, even if the demand for their product is increasing.⁵

Age and size also enter significantly into the decision to invest. Bigsten and others (1999) argue that size may proxy the likelihood that indivisibilities in investment constrain capital accumulation (the constraint is less likely to bind for large firms), and that older firms are likely to have better access to bank finance. The Ugandan data support the first of these assumptions (size is positively correlated with the probability to invest), but rejects the second

5. The results are very similar when using the lagged profit-to-capital ratio instead of the profit-to-lagged-capital ratio.

(age enters significantly, but with a negative sign). A possible explanation for the latter result is that older firms in the sample were first established in an environment with a very different incentive system. While many establishments in the 1996 census update began operating during the first half of the 1990s (37 percent), many of the older firms were endowed with a capital stock that, because of drastic changes in the policy environment, is no longer viable (for example, equipment to produce an import-substituting good). These firms are therefore less willing to invest. Two industrial category dummies are also significant. Holding changes in demand and profit constant, firms in agroprocessing and tourism are more likely to invest.

Column 2 in table 7.2 reports the second-stage regression, which examines the amount of investment for those firms that invested in machinery and equipment.⁶ Now only profit enters significantly. Thus, while demand changes play a role in determining whether or not to invest, profit is the only binding constraint for the level of investment. The results suggest that most (but not all) firms can generate funds for some investment if demand is increasing, but they cannot realize their desired investment level if current profits are not sufficient. Interestingly, neither age nor size nor any of the sector and location dummies enter significantly. Indivisibilities and sector-specific factors are important for the decision to invest, but they do not influence the actual investment level. This interpretation is supported by the Tobit regression reported in column 3. The profit rate is highly significant, but the accelerator is insignificant at the conventionally accepted significance levels.^{7,8}

6. The flexible accelerator model was also applied to investment data on buildings and land, for which valuation is much more difficult. In the probit model, only size and some district and industrial category dummies are significant (at the 10 percent level) for the decision to invest, while none of the variables are significant in the second-stage regression.

7. When using a dynamic specification of the model, that is, including a lagged dependent variable, all qualitative results continue to hold. The main difference is that the size of the coefficient on the profit term is reduced from 0.100 to 0.059 in the Tobit model. Lagged investment is insignificant in all three specifications: decision to invest, investment level regression, and Tobit model. Given the lack of significance, and because around a dozen observations are lost by including the lagged dependent variable, the restricted model (reported in table 7.2) appears preferable.

8. Another potential objection to the reported results could be that they may be driven by unobservable firm-specific factors. To test this, a second-stage regression with fixed effects is run, using deviations from means. The results imply a lower, but highly significant, coefficient on the profit term (0.034 with a *t*-value of 4.80). However, a test of the hypothesis that the fixed effects were all equal across firms indicated that the fixed effect specification was not efficient. In other words, the fixed effects are picking up important cross-firm differences in profits and demand, reducing the explanatory power of these variables in the regression.

In table A7.2 the sample is partitioned into small firms (100 employees or less) and large firms (more than 100 employees). The results reveal some interesting trends. First, for the decision to invest (columns 1 and 3), for small firms only the profit term is significantly positive, while for large firms the important explanatory variable is changes in demand. Second, the second-stage regressions (columns 2 and 4) show a similar pattern for small firms, while neither profit nor the accelerator is significant for large firms. Third, as before, only the age of the firm appears significant and negative, for the large firms.^{9,10} The results suggest that firms, particularly small ones, are liquidity constrained in the sense that they cannot invest (or can invest only small amounts) when demand is increasing if they do not have sufficient funds available. However, given the reported high profit-to-capital ratio in Uganda (and in the four comparator countries), it is hard to argue that the liquidity constraint is binding in most cases.

Comparing the results from the Ugandan firm survey with the evidence from other African countries is interesting.¹¹ Regarding the decision to invest and using the same model specification, the Ugandan coefficient for profit is found to be somewhat larger. In the level of investment, the estimated coefficient for profit in Uganda is also larger (0.076 versus 0.03 elsewhere). This holds for all firms and when the firms are divided into two groups according to size. While Bigsten and others (1999) find no robust correlation between the accelerator and investment in the other African countries, this study finds some evidence that demand plays a role in investment for large Ugandan firms. Age and size of the firm behave similarly in Uganda as elsewhere. Compared with the rest of the world, the estimated coefficient on profit (and accelerator) is small in Uganda, even though it is larger than in the African comparator countries (see, for example, Athey and Laumas 1994; Bigsten and others 1999; Bond and others 1997; Tybout 1983).

9. The lack of clear results for large firms in the second-stage regression may be driven by the small sample size. By estimating a Tobit regression, degrees of freedom can be saved.

10. While in both the 1994 and 1998 firm surveys interest rates were ranked as one of the leading constraints by firms of all sizes, firms' perceptions varied considerably regarding access to finance. As in the quantitative analysis, the perceptions of larger enterprises seem to be different from those of smaller ones. For large enterprises that had not borrowed money recently, the leading reason after "high interest rates" was "no need to borrow." Nor did collateral requirements prevent large firms from borrowing; the smaller the firm, the more collateral proved a problem. Liquidity constraints may be binding for start-ups, however. Firms reported that about 70 percent of their private investment was financed by profits and personal savings.

11. As Bigsten and others (1999) do not report marginal effects, the results are compared at each stage.

Constraints to Investment

So far this chapter has examined the determinants of private investment by different types of firms in the single country context. In general, the Ugandan results are strikingly similar to those obtained from several other African countries. This section takes the viewpoint of a typical, or average, Ugandan firm and examines differences across countries. In particular, it attempts to explain the observation that firms' profit rates are lower in Uganda, while investment rates are similar.

Profit Rates

Table 7.3 reports a series of regressions of profit rates on size and foreign ownership, using data from both the Ugandan firm survey and the four other surveys described in Bigsten and others (1999). Column 1 illustrates

Table 7.3. Profit Rate Regressions, Pooled Data for Cameroon, Ghana, Kenya, Zimbabwe, and Uganda

<i>Variable</i>	<i>(1) Profit rate</i>	<i>(2) Profit rate</i>	<i>(3) Profit rate</i>	<i>(4) Profit rate</i>	<i>(5) Profit rate</i>
Constant	3.46 ^a (0.444)	3.99 ^a (0.510)	3.41 ^a (0.631)	2.02 ^a (0.172)	1.81 ^a (0.221)
Foreign	0.933 ^c (0.493)	0.801 ^c (0.480)	0.856 ^c (0.481)	-0.014 (0.105)	-0.007 (0.105)
Size (log)	-0.631 ^a (0.128)	-0.623 ^a (0.109)	-0.523 ^a (0.104)	-0.267 ^a (0.035)	-0.238 ^a (0.037)
Uganda	n.a. n.a.	-1.23 ^a (0.194)	-1.03 ^a (0.373)	-0.559 ^a (0.090)	-0.447 ^a (0.152)
Cameroon	n.a. n.a.	n.a. n.a.	-0.557 (0.476)	n.a. n.a.	-0.005 (0.211)
Zimbabwe	n.a. n.a.	n.a. n.a.	-0.345 (0.363)	n.a. n.a.	-0.018 (0.151)
Ghana	n.a. n.a.	n.a. n.a.	1.51 ^a (0.691)	n.a. n.a.	0.452 ^b (0.212)
R ²	0.05	0.07	0.09	0.09	0.10
Observations	1,287	1,287	1,287	1,058	1,058

n.a. Not applicable.

Note: The dependent variable is the profit rate (profit-to-capital ratio); foreign is a binary variable taking the value one if the firm is foreign owned, zero otherwise. Standard errors (in parenthesis) adjusted for heteroskedasticity (White 1980). Regressions (4) and (5) exclude outliers.

a. Significant at the 1 percent level.

b. Significant at the 5 percent level.

c. Significant at the 10 percent level.

Source: Authors' calculations based on the 1998 enterprise survey; Bigsten and others (1999).

the result when pooling all variables (altogether, 1,287 observations). As evident from the table, the size of the firm (logarithm of total employment) is significantly negatively correlated with the profit rate (profit-to-capital ratio). Foreign ownership is positively related to profit (although the dummy variable enters only marginally significant at the 10 percent level). In column 2 a dummy for Ugandan firms is added. The dummy enters with a large, negative coefficient and is highly significant. Thus, controlling for size and ownership, Ugandan firms, on average, have significantly lower profits than firms in the four comparator countries.

Significant differences are apparent across the four comparator countries. When adding (individually) country controls for the four comparators (column 1), the country dummies for Cameroon, Kenya, and Zimbabwe differ insignificantly from zero, while the Ghana dummy is significantly positive. As reported in column 3, the result is similar if all country controls are included (one has to be dropped to estimate the regression). The Uganda dummy is significantly negative, while the Cameroon and Zimbabwe (and Kenya if we replace Zimbabwe with Kenya) controls are insignificant, and Ghana is significantly positive.

There are at least two possible objections to the pooled results in columns 1–3. First, while the Uganda sample includes both manufacturing firms and firms in commercial agriculture, tourism, and construction, the sample of firms in the comparator countries only includes manufacturing firms, including agroprocessing firms. To control for this possibility, all Ugandan firms in commercial agriculture, tourism, and construction are excluded. Second, in the Uganda sample a few firms with extreme value added were excluded, while the sample of firms of the comparator countries include a few firms with extreme profit rates (and value added) of more than 1,000 (up to almost 8,000) percent. While these observations may not necessarily be misreported, it would be of concern if the results were driven by them. To examine this possibility, all observations with profit rates larger than 1,000 percent and lower than –100 percent were dropped. The new results are depicted in columns 4 and 5.

As evident, the results are very similar qualitatively to those reported earlier. The Uganda dummy remains negative and highly significant, but with a smaller coefficient (in absolute terms). On average, controlling for size and ownership, the Ugandan firms' profit rate is 56 percentage points lower than in other African countries. Again, some differences exist across the four comparators. Repeating the procedure described, the country dummies for Cameroon, Kenya, and Zimbabwe again differ insignificantly from zero, while the Ghana dummy is significantly positive. As shown in column 5, including all country controls simultaneously yields a similar result. The Uganda dummy is significantly negative, while the Cameroon and Kenya (and Zimbabwe if we replace Kenya with Zimbabwe) controls are insignificant and Ghana is significantly positive. Finally, the coefficient on size is now only

one-third of that reported in column 1, suggesting that a few extreme observations significantly affect the absolute value of the coefficient.¹²

Conceptual Framework

How can Ugandan investment rates be similar to those in other African countries when Uganda's profit rates are lower? This section constructs a simple conceptual framework suggesting one possible answer.

Consider a two-period model of a representative firm. A risk-neutral manager decides on the firm's level of investment in period one to maximize the present value of its cash flow $c_1 + \beta c_2$, where $\beta = 1/(1 + \theta)$ is the discount factor. One can think of θ as capturing expectations about the future. The assumption is that the firm can borrow in period one. The interest on the borrowed amount b is r . To avoid extreme solutions, we assume that $r \geq \theta$, implying that the firm will only borrow to finance investment. The budget constraint in period one is then:

$$(7.2) \quad c_1 + i \leq \pi_1 + b,$$

where π_1 is the initial profit available to the firm and i is the level of investment. The return to investment (or gross profit) is captured by the concave and strictly positive revenue function $\pi_2(i;x)$, where x is a vector of variables that affect the profit but which the firm cannot control (degree of competition, quality of infrastructure, and so on). The budget constraint in period two can be expressed as follows:

$$(7.3) \quad c_2 = \pi_2(i;x) - (1 + r)b.$$

The model is easily solved by maximizing the firm's cash flow subject to the budget constraints. Provided that the firm has sufficient internal funds, it will not borrow. Then the first-order condition that defines the optimal level of investment i^* can be written as follows:¹³

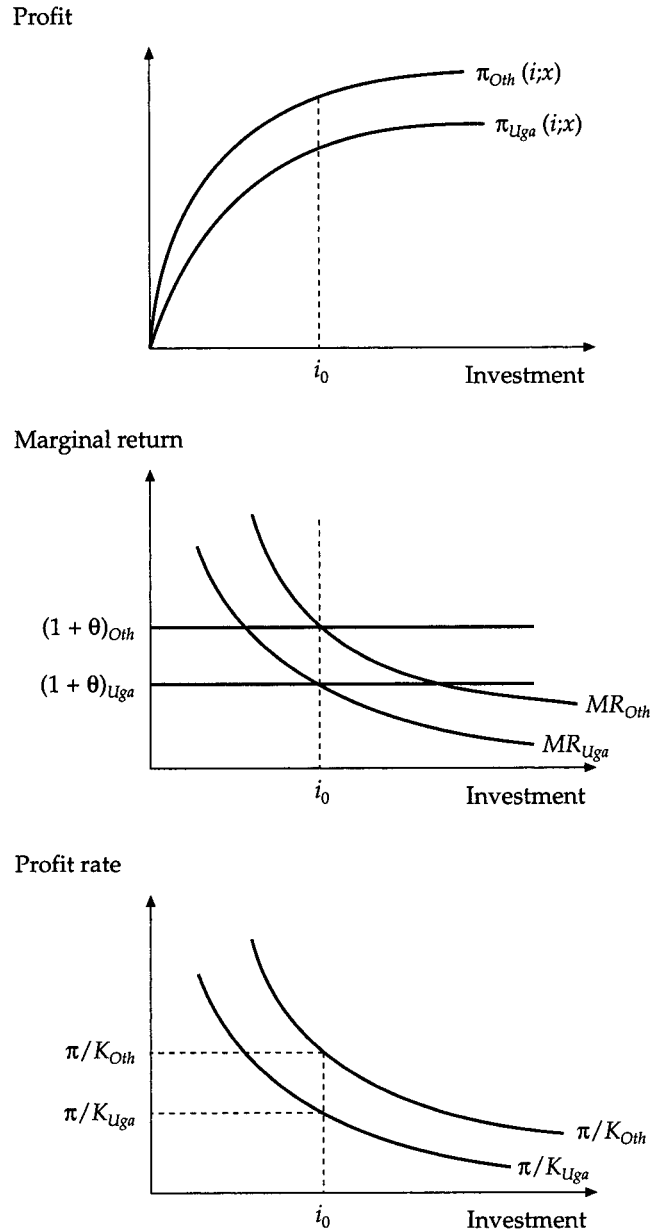
$$(7.4) \quad \pi'_2(i^*) - (1 + \theta) = 0.$$

The first term in equation (7.4) is the marginal return (MR) curve. The second term is the discounted opportunity cost. The equilibrium is illustrated in the middle graph in figure 7.1.

This simple model has a number of interesting implications. First, a policy change that, other things being equal, reduces profits (for example, increased competition from abroad resulting from trade liberalization) shifts the MR curve

12. Indeed, when dropping all firms with profit rates larger than 300 percent, no significant statistical relationship exists between size and profit. The relationship between profit rates and size for Ugandan manufacturing firms is also significantly negative (coefficient = 0.17).

13. If the firm does not have sufficient internal funds, that is, $\beta\pi'_2(\pi_1) - 1 > 0$, it will borrow. The first order condition then becomes $\pi'_2(\pi_1 + b) - (1 + r) = 0$.

Figure 7.1. Investment and Profit in Uganda and Other African Countries

MR Marginal return.

 θ Discount rate. i Level of investment.

Source: Authors.

inward, leading to a lower level of investment for a given r and θ for the existing firms.¹⁴ Second, a lower discount rate θ (for example, better economic policies are expected in the future) would shift the horizontal curve down, leading to a higher investment level as future income becomes more valuable.

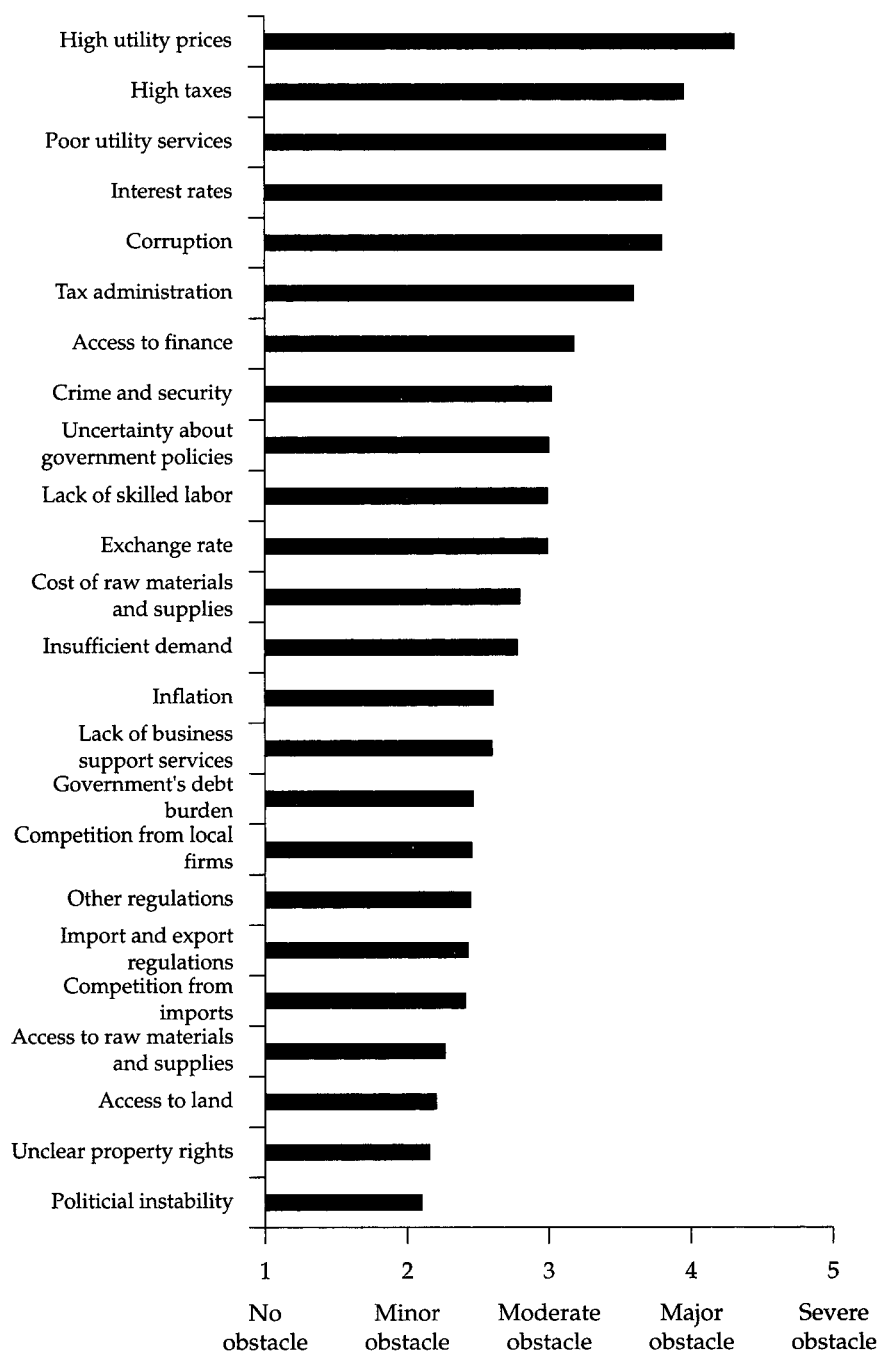
Comparing Uganda with other African countries, the model offers one potential explanation as to how investment rates can be similar while profit rates are lower. Increased competition has reduced profits and would, everything else being equal, have reduced investment rates as well. However, less uncertainty about future policies, resulting in a lower θ , counterbalances the negative effect of tougher competition on the level of capital accumulation. In equilibrium (figure 7.1), investment remains the same while profits and profit rates are lower.

While it would be interesting to test this simple model statistically using the Ugandan survey data, endogeneity problems and a lack of suitable instruments effectively prevent this. Instead, the conceptual framework can be used for a diagnostic discussion of the factors that are likely to affect the MR curve and the discount rate (θ) of an average Ugandan firm. The analysis poses two hypothetical questions: Why is the Ugandan MR curve likely to be to the left of that of other African countries? Why is the discount rate of Ugandan firms likely to be smaller than elsewhere in Africa? The diagnostics are based on both quantitative and qualitative survey data from Uganda and focus on firms' perceptions of constraints to investment, competitive environment, costs beyond firms' control (infrastructure, corruption), risk, and policy credibility. Note, however, that similar data are not available for the comparator countries. Hence, the diagnostics presented in the rest of the chapter are tentative at best.

Firms' Perceptions of Constraints

This section examines qualitative data on constraints to investment. Rankings of constraints reported by firms give us a general idea of likely factors affecting both the marginal return to investment and the discount rate. In the 1998 survey Ugandan enterprises identified price and quality of utility services (electricity, telephones, water, and so on), high taxes, and interest rates as "major" (four on a scale of one to five) constraints to investment (figure 7.2). Corruption, access to finance, tax administration, and the cost of raw materials formed a second tier of leading constraints. Finally, the group of "moderate" (three on a scale of one to five) constraints included the problems of local competition, lack of demand, lack of business support services, crime and security, lack of skilled labor, and uncertainty about government policies. The largest variance in responses between firms occurred in access to finance and raw materials.

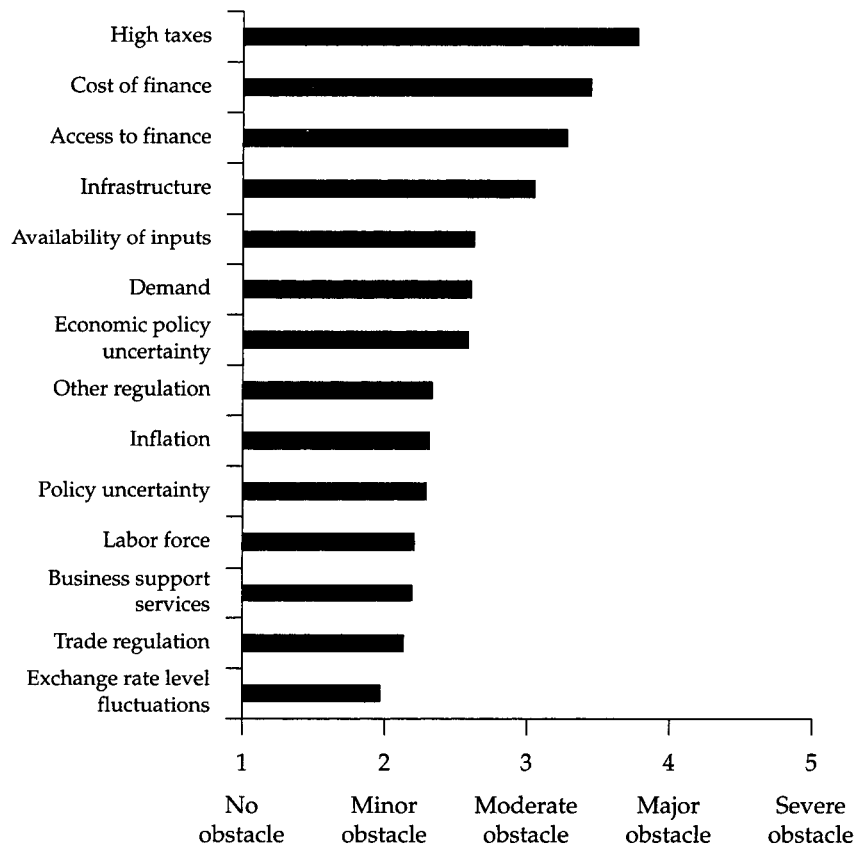
14. In this context we disregard the fact that increased competition may have other effects, such as raising productivity, which would shift the MR curve outward.

Figure 7.2. Ranking of Constraints to Investment, 1998

Source: Authors' calculations based on the 1998 enterprise survey.

A similar survey carried out in 1994 provides an interesting dynamic comparison (figure 7.3).¹⁵ In the earlier survey, only high taxes were ranked a “major” constraint, while together with availability of inputs, lack of demand, and economic policy uncertainty, cost and access to finance and infrastructure formed a second tier of “moderate” constraints. In that survey infrastructure included both the quality and the price of utility services. In addition to a general elevation of constraints in their perceived severity, the major differences between 1994 and 1998 are the top rating of utility prices when offered in the 1998 survey as a separate constraint choice; the identification

Figure 7.3. Ranking of Constraints to Future Operations and Growth in 1994



Source: World Bank (1994).

15. The 1994 survey differed slightly in its formulation of constraints, offered fewer choices of constraints to rank, and included firms from more subsectors of the economy.

of corruption as a leading constraint when offered in the 1998 survey, the recognition of labor force skills as a moderate constraint, and the new evaluation of the lack of business services as a moderate constraint.

A closer look at the constraints by firm category shows little difference between the relative rankings in 1998 by small and large firms. For large firms, however, constraints were generally more binding, as reflected in higher perception scores. For foreign firms (and construction industry firms), corruption was the second constraint in severity (see figure A10.1 in chapter 10). For Kampala-based firms, access to utility services was less binding than for other locations, while commercial farms and construction companies were less concerned about high taxes than the other firms.

Competitive Environment

When asked whether competition for their principal product had changed during the past three years, 88 percent of firms said it had increased, 10 percent reported unchanged competition, and only 2 percent said it had decreased. Similarly, the number of new firms exceeded those that had exited. The firm-level evidence of increased competition accords with the liberalization of the economy and the continued start-up of new firms. Fairness constitutes another feature of competition. In 1994 a perception of unfairness existed in tax and regulatory administration. In 1998 this perception remained, with tax evasion as a leading constraint in relation to unfair competition. Firms in commercial agriculture reported the lowest incidence of unfair competition. However, the numerical constraint scores for competitors evading taxes, undercutting fair prices, or smuggling have all declined. Hence, while the overall level of competition has increased, firms' perception is that it has become slightly fairer since 1994.

Lower profits are thus consistent with the observation of increased competition and the pressure it places on firms to reduce costs. Many of the reported cost constraints, such as utility prices, cost of imported inputs, and interest rates, are outside firms' direct control. One can therefore infer from the perception data that increased competition may not have been matched by corresponding improvements in physical and other support systems, particularly those in the public domain. This makes it difficult for firms to respond to the challenge of increased competition brought about by external liberalization by cutting costs.

Costs beyond Firms' Control

As noted earlier, the Ugandan firm survey of 1998 points to at least three categories of costs that are beyond the firm's control, but that nonetheless tend to lower their profits. First, transport and other import-related costs add about 50 percent, on average, to the cost of imported capital goods and inputs compared with their cost in the country of origin. Second, infrastructure services are highly deficient and costly, which also affects profits and

tends to shift the MR curve to the left. The 1998 survey confirmed that the cost of utilities is the most binding constraint to all types of Ugandan firms. Reliability and adequacy of electric power supply remain the leading infrastructure constraints to Ugandan enterprises, the only “major” constraints in the evaluation of respondents. Responses suggest that the electric power supply has worsened in the last few years as demand has increased. Given the poor quality of infrastructure services, investment in productive capacity often requires an additional investment in complementary capital by the firm, such as electric power generators (see Reinikka and Svensson 1999). Third, corruption is another factor that adversely affects returns to investment and, hence, shifts the MR curve inwards. As Svensson notes in chapter 10, the Ugandan survey data show that the larger, more profitable, more export-oriented the firm, the higher the incidence and the amount of bribe payments.

Risk

The relatively high profit rates in African firms point to a high cost of capital and high risk. The latter affects the discount rate θ and tends to shift the horizontal line in figure 7.1 upward. The Ugandan firm survey reveals at least three types of risks that can adversely affect firms' expectations of future returns. First, erratic transport and other infrastructure services create a high risk in terms of unexpected delays (and related extra costs) in production, imports, and exports. For example, in 1998 it took an average of 30 days for imported inputs to arrive from their original destination in the port (typically, Mombasa), another 30 days from the port to Ugandan customs, and an extra 9 days to the firm. While these figures are ex post averages, there is considerable variance among firms. In electric power supply, firms report that 87 operating days are lost annually due to power cuts. Although variance between firms is smaller with respect to power shortages than other infrastructure services, blackouts and brown-outs create uncertainty about the returns to investment projects, including uncertainty about future improvement in these services (Reinikka and Svensson 1999).

Second, while the past decade has shown improvement, the tax administration is still plagued by arbitrary tax assessments and audits. When firms do not know their tax liability in advance, returns to investment become uncertain.

Crime poses a third major risk for Ugandan firms. The survey shows that 54 percent of the firms experienced merchandise robbery or theft of goods and equipment in 1995–97. Thirty-seven percent of the firms had also been victims of fraud. The loss from all these incidents was equivalent to US\$7,500 at the median firm during the three years. Compared with corruption, for example, the incidence of crime seems to be relatively random. There is no evidence that the incidence of robbery or fraud, or the size of the loss from them, are correlated with profit, sales, or other cost- and revenue-related data from the firms. No evidence supports that certain sectors, foreign-owned firms, or those engaged in trade more often experience crime. The only characteristic of firms

that seems to matter is size (proxied by employment) and location. Larger firms are more often exposed to crime, and Kampala firms encounter an approximate 20 percent increase in the probability of robbery or theft, independent of the size of the firm. In the sample, the probability that the average [median] firm in Kampala with 120 [35] employees had suffered from robbery and/or theft during the past three years is around 70 [63] percent. Not surprisingly, larger firms and firms located in Kampala spend significantly more on security. The annual cost of security for the median firm is equivalent to US\$1,800, which equals the median firms' reported corruption payment per year. The data reveal that a 1 percent increase in employment (that is, firm size) corresponds with a 1.5 percent increase in security spending.

Finally, noncommercial risk (captured by "political instability" in the overall ranking of constraints) does not seem to concern many firms already in operation. According to a foreign investor survey, however, these risks were more of a concern for potential investors (World Bank 1999).

Policy Credibility

At the time of the firm survey in 1998, the private sector in Uganda seemed fairly confident that good macroeconomic management would continue both in the short and medium term, that is, one and three years from the time of the interview. This optimism was spread across all five sectors. On average, firms expected the exchange rate to remain about the same for the short term as at the time when the survey was carried out. Foreign-owned firms anticipated a slightly higher depreciation, however. In the medium term a slight depreciation was expected (less than 10 percent). These results indicate that firms did not expect any major exchange rate volatility either in the short or medium term. Subsequent depreciation has been more substantial than the firms' expectations in 1998. Inflation forecasts were also relatively favorable. More than half of the firms expected that the country's single-digit average annual inflation—which had been maintained consistently since 1992/93—would continue both in the short and medium term.

Two-thirds of the enterprises expected the trade regime to be further liberalized, and almost all firms expected the privatization program to continue. Indeed, at the time of the survey privatization appeared to be the most credible of all the government's economic reforms. As discussed in chapter 2, while a large number of productive enterprises have been privatized in recent years, privatization of a few high-profile enterprises subsequently failed and corruption investigations were initiated. As a result, the privatization program was partially halted in 1998/99.

Firms were less optimistic about the financial sector reform and its impact on future interest rates. About half the respondents expected interest rates to be lower in three years' time. However, close to 40 percent of firms did not believe that the banking sector could be reformed in the medium term and expected even higher interest rates. Concerning access to bank financing, four

out of every five respondents expected the situation to remain the same or to improve. In 1999 the Ugandan financial sector saw a number of bank closures, so firms might have appeared even more pessimistic about the financial sector had the survey been conducted in 1999. While this may be a temporary setback and even a sign of more effective banking supervision, it is likely to have a negative effect on investor confidence, at least in the short term.

Firms seemed to believe in continued growth in 1998: more than two-thirds of firms anticipated that their production would increase during the next three years. However, regarding expected future tax rates, they showed some pessimism: more than half anticipated that tax rates would be increased, and only 25 percent believed that rates would decrease.¹⁶

Conclusions and Policy Recommendations

This chapter shows that investment rates in Uganda are relatively similar to those in other African countries. On average, the investment rate is slightly more than 10 percent, while at the median firm it is only about 1 percent. Such low investment rates in response to economic reform pose a serious policy problem. Unlike other African comparators, most firms in Uganda (and Ghana) experienced a positive change in their value added and gross sales. Investment by small firms seemed to be partly constrained by liquidity, while large firms, on average, could have chosen to invest more from retained earnings. As shown elsewhere, poor electricity supply substantially hinders private investment (Reinikka and Svensson 1999). Furthermore, Ugandan profits are considerably lower than profit rates elsewhere in Africa.

These results are consistent with the view that during the latter half of the 1990s, Ugandan firms displayed more confidence in the economy than their counterparts in many other African countries. Thus, for a given profit rate Ugandan firms invest more. At the same time increased competition, due to far-reaching economic liberalization, has pressured firms to cut costs. Many of the costs, such as utility prices, transport costs, and interest rates, are not in the firms' control, however. As there has been no matching improvement in infrastructure services or the financial sector, firms have failed to fully meet the challenge of increased competition. Thus, profits have been squeezed.

16. When asked an open-ended question about the best investment opportunity in the Ugandan economy in the medium term, firms listed a large variety of economic activities. Agriculture (horticulture, fruit, flowers, fishing, cattle, and so on) and agroprocessing were the most popular choices. Tourism and manufacturing (the latter mainly for the local market) were also frequently mentioned as good opportunities. A few firms considered trading (rather than production) as the most profitable activity, but the share of these firms was relatively small in the total survey.

The survey identified a number of cost factors to explain the observed low level of investment in Africa in general and the lower profits in Uganda in particular. First, capital goods are more expensive, largely due to higher transport costs and inefficiencies in transit transport and ports. Second, apart from investing in productive assets, firms often need to purchase complementary capital, such as power generators, to stay in operation. Third, corruption is a problem for most firms, particularly for those that invest more and employ more workers, are active in the formal sector, and are trade oriented. Risk factors likely to increase the discount factor firms apply to the future cash flow from investment and make longer-term investment less attractive include erratic infrastructure services, arbitrary tax administration, and crime. At the same time, macroeconomic policy credibility and investor confidence improved considerably in Uganda in the 1990s, and the risk of economic policy reversal is perceived to be relatively small. This in turn reduces the discount factor of firms.

The survey findings suggest four key policy priorities. First, the electric power sector urgently needs an effective reform program, combined with privatization and new investment in large-scale hydropower capacity. This is key to growth of the firm sector. Without a major improvement in the power supply, the sustainability of current growth rates is uncertain. Other utilities also need to improve their services. Second, while the government has committed in its most recent budgets not to raise tax rates, tax administration needs improvement. One way could be to initiate a trust-building effort through establishment of a systematic mechanism of consultation between the tax collector and taxpayers, as well as proper appeals procedures. Third, a concerted effort to reduce corruption and improve contract enforcement is required. Such efforts are likely to take time, and it is initially important to choose measures that have a strong signaling effect. A recent household survey found that the judiciary and police are one of the most corrupt institutions (Republic of Uganda 1998). Tackling corruption in these institutions, as well as in tax administration, should lead to less crime and reduced security costs, both of which are now a serious problem for firms. Finally, a more efficient transport route to the coast is needed, both in terms of improving the infrastructure and reducing red tape. The international donor community in Uganda could play a role in this effort, as Uganda alone will likely find it difficult to effect major changes in transit transport when part of the problem lies with the neighboring countries.

Annex 7.1. Data and Estimation Results

Table A7.1. Investment in Machinery and Equipment by African Firms
(mean)

<i>Country and category</i>	<i>Proportion of firms investing</i>	<i>Investment-capital stock for all firms</i>	<i>Investment-capital stock if firms invest</i>
<i>Cameroon</i>			
1993–94	0.125	0.059	0.479
1994–95	0.347	0.132	0.382
<i>Ghana</i>			
1992	0.363	0.090	0.428
1993	0.536	0.136	0.254
<i>Kenya</i>			
1993	0.357	0.072	0.202
1994	0.459	0.127	0.277
<i>Uganda</i>			
1996	0.506	0.134	0.263
1997	0.529	0.111	0.208
Large firms	0.765	0.083	0.109
Small firms	0.445	0.133	0.300
<i>Zimbabwe</i>			
1993	0.621	0.069	0.111
1994	0.738	0.142	0.193
<i>Comparator average</i>			
All firms	0.535	0.128	0.239
Large firms	0.738	0.113	0.152
Small firms	0.458	0.134	0.291

Note: Large firms have more than 100 employees, while small firms have 100 or less employees.

Source: Bigsten and others (1999); authors' calculations based on the 1998 enterprise survey.

Table A7.2. Investment Regressions for Small and Large Ugandan Firms

Variable	(1) Probit (small firms)	(2) Ordinary least squares (small firms)	(3) Probit (large firms)	(4) Ordinary least squares (large firms)	(5) Tobit (small firms)	(6) Tobit (large firms)
Constant	1.14 ^b (0.582)	-0.005 (0.216)	4.95 ^b (2.33)	0.468 ^c (0.227)	-0.727 (0.365)	0.169 (0.219)
Change in sales-to-capital stock	0.102 (0.076)	0.040 (0.038)	0.94 ^a (0.342)	0.006 (0.026)	0.010 (0.036)	0.048 ^c (0.028)
Profit rate	0.143 ^b (0.065)	0.109 ^a (0.051)	-0.12 (0.139)	0.036 (0.026)	0.145 ^a (0.034)	0.011 (0.017)
Age (log)	-0.306 ^a (0.104)	n.a.	-0.062 (0.333)	-0.065 ^a (0.031)	-0.193 ^a (0.064)	-0.064 ^b (0.028)
Size (log)	0.395 ^a (0.105)	n.a.	-0.828 ^b (0.399)	n.a.	0.154 ^b (0.064)	0.014 (0.036)
Time dummy	0.019 (0.160)	-0.098 (0.111)	0.524 (0.411)	0.026 (0.049)	-0.042 (0.099)	0.066 (0.046)
District dummies significant	No	Yes	No	No	No	Yes
Mbale	n.a.	n.a.	n.a.	n.a.	n.a.	-0.305 ^b (0.141)
Kampala	n.a.	0.218 ^c (0.114)	n.a.	n.a.	n.a.	n.a.
Mukono	n.a.	0.389 ^c (0.232)	n.a.	n.a.	n.a.	n.a.
Industrial category dummies significant	Yes	No	Yes	No	No	No
Agroprocessing	0.708 ^b (0.350)	n.a.	2.06 ^b (0.814)	n.a.	n.a.	n.a.

(table continues on following page)

Table A7.2 continued

<i>Variable</i>	<i>(1) Probit (small firms)</i>	<i>(2) Ordinary least squares (small firms)</i>	<i>(3) Probit (large firms)</i>	<i>(4) Ordinary least squares (large firms)</i>	<i>(5) Tobit (small firms)</i>	<i>(6) Tobit (large firms)</i>
Predictability	0.67	n.a.	0.80	n.a.	n.a.	n.a.
R ²	n.a.	0.16	n.a.	0.27	n.a.	n.a.
Observations	278	126	75	58	278	75

n.a. Not applicable.

Note: The dependent variable in regression (1) takes the value one if the firm invested and zero otherwise. Standard errors (in parenthesis) are adjusted for heteroskedasticity (White 1980). Regressions (2), (4), (5), and (6) are adjusted for selectivity. The inverse Mills ratio is not reported. The tourism dummy had to be dropped from regression 3 because all large firms in this sector invested.

a. Significant at the 1 percent level.

b. Significant at the 5 percent level.

c. Significant at the 10 percent level.

Source: Authors' calculations based on the 1998 enterprise survey.

Annex 7.2. Derivation of the Investment Equation

Let the cost of instantaneous net investment be given by $C(I)$, where I is net investment and C is a cost function with $C(0) = 0$, and $C', C'' > 0$ for all $I > 0$. Let profit be a concave function of the capital stock $\pi = \pi(t, K)$, and assume that the firm takes product and factor prices as given. As shown by Tybout (1983), with constant relative prices, investment can be expressed as

$$(A2.1) \quad I(t) = \beta[K^* - K(t)],$$

where K^* is the desired capital stock implicitly determined by $\pi'(K^*) = rC'(0)$, and β is a composite variable (constant) of the discount rate, r , and π'' and C'' evaluated at K^* and 0, respectively. Hence, in the flexible accelerator model, investment is driven by the gap between the desired and actual capital stock, where the relative sluggishness of adjustment depends on the user cost of capital. Assume that managers expect that the future demand for their output will be Q^* , and let $K^*(t) = \gamma Q^*(t)$, where γ is determined by relative prices. In discrete time, equation (A2.1) can be written as

$$(A2.2) \quad I(t) = \beta[\gamma Q^*(t) - K(t-1)].$$

Demand expectations are assumed to be linear functions of current output. Thus,

$$(A2.3) \quad I(t) = \beta[\gamma\phi Q(t) - K(t-1)].$$

By first-differencing equation (A2.3) and noting that $I(t-1) = K(t-1) - K(t-2)$, equation (A2.3) can be written as

$$(A2.4) \quad I(t) = \alpha_Q \Delta Q(t) + (1 - \beta)I(t-1),$$

where $\alpha_Q \equiv \beta\gamma\phi$ and $\Delta Q(t) = Q(t) - Q(t-1)$. This is the traditional flexible accelerator model in which fluctuations in sales motivate changes in capital spending, that is, investment is driven by demand.

As shown in Tybout (1983), if firms must finance all investment out of profits and retained earnings, the firms will behave according to (A2.4) when they have funds to do so. However, with currently binding shortages, they will simply allocate current profits to investment. Hence,

$$(A2.5) \quad I(t) = C^{-1}[\pi(t)].$$

A general empirical model can now be formed by nesting (A2.4) and (A2.5),

$$(A2.6) \quad I_i(t) = \alpha_{i0} + \alpha_Q \Delta Q_i(t) + \alpha_\pi \pi_i(t) + \alpha_I I_i(t-1) + \alpha_X' X_i + d_t + \varepsilon_i,$$

where α_{i0} is a constant for firm i , α_X is a $n \times 1$ vector of coefficients, X_i is a $n \times 1$ vector of firm specific controls (firm age and size), d_t is a time dummy, and ε_i is an iid error term. To avoid heteroskedasticity problem with respect to size, $I(t)$, $\Delta Q_i(t)$ and $\pi_i(t)$ are scaled by the inverse of the end of the previous period capital stock, $K(t-1)$. Thus, we are regressing investment rate, $I_i(t)/K_i(t-1)$, on change in output (value added) rate, $\Delta Q_i(t)/K_i(t-1)$ and profit rate, $\pi_i(t)/K_i(t-1)$.

A number of variations of (A2.6) are estimated: with fixed effects (α_{i0}), with a common constant (α_0), and with and without the lagged investment variable. Given the short panel, there are clear costs of estimating the more complex regressions. With fixed effects all firms that do not have observations for all three years are lost.¹⁷ Similarly, including a lagged dependent variable implies that we lose observations for firms that started up after 1995, and fixed effects in a dynamic model with a short time dimension result in biased estimates (Nickell 1981) that cannot be overcome by instrument variables techniques (due to the short panel) as suggested by Arellano and Bond (1991).

References

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

- Arellano, Manuel, and Stephen Bond. 1991. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *Review of Economic Studies* 58(April): 277–97.
- Athey, M. J., and P. S. Laumas. 1994. "Internal Funds and Corporate Investment in India." *Journal of Development Economics* 45(2): 287–303.
- Barro, Robert. 1991. "Economic Growth in a Cross-Section of Countries." *Quarterly Journal of Economics* 106(2): 407–43.
- Barro, Robert, and X. Sala-i-Martin. 1995. *Economic Growth*. New York: McGraw-Hill.
- Biggs, Tyler, and Pradeep Srivastava. 1996. "Structural Aspects of Manufacturing in Sub-Saharan Africa: Findings from a Seven Country Enterprise Survey." World Bank Discussion Paper no. 346, Africa Technical Department Series. World Bank, Washington, D.C.
- Bigsten, Arne, Paul Collier, Stefan Dercon, Bernard Gauthier, Jan Willem Gunning, Anders Isaksson, Abena Oduro, Remco Oostendorp, Cathy Pattilo, Mans Soderbom, Michel Sylvain, Francis Teal, and Albert Zeufack. 1999. "Investment in Africa's Manufacturing Sector: A Four-Country Panel Data Analysis." *Oxford Bulletin of Economics and Statistics* 61(4): 489–512.
- Bond, Stephen, Julie Ann Elston, Jacques Mairesse, and Benoit Mulkay. 1997. "Financial Factors and Investment in Belgium, France, Germany, and the UK: A Comparison Using Company Panel Data." Working Paper no. 5900. National Bureau of Economic Research, Cambridge, Massachusetts.

17. Note that to create a panel with, at the most, two observations for each firm, we must use data for three years since $\Delta Q(t) = Q(t) - Q(t - 1)$.

- Collier, Paul, and Jan Willem Gunning. 1999. "Explaining African Economic Performance." *Journal of Economic Literature* 37(March): 64–111.
- DeLong, J. B., and L. H. Summers. 1991. "Equipment Investment and Economic Growth." *Quarterly Journal of Economics* 106(2): 445–502.
- Devarajan, Shantayanan, William Easterly, and Howard Pack. 1999. "Is Investment in Africa Too Low or Too High?" World Bank, Development Research Group, Washington, D.C. Processed.
- Easterly, William. 1997. "The Ghost of Financing Gap—How the Harrod-Domar Growth Model Still Haunts Development Economics." Policy Research Working Paper no. 1807. World Bank, Development Research Group, Washington, D.C.
- Easterly, William, and Ross Levine. 1997. "Africa's Growth Tragedy: Policies and Ethnic Division." *Quarterly Journal of Economics* 112 (4): 1203–50.
- Heckman, James. 1979. "Sample Selection Bias as a Specification Error." *Econometrica* 47(1): 153–61.
- Levine, Ross, and David Renelt. 1992. "A Sensitivity Analysis of Cross-Country Growth Regressions." *American Economic Review* 82(4): 942–63.
- Lucas, R. E. 1988. "On the Mechanism of Economic Development." *Journal of Monetary Economics* 22(1): 3–42.
- Mankiw, N. G., D. Romer, and D. N. Weil. 1992. "A Contribution to the Empirics of Economic Growth." *Quarterly Journal of Economics* 107(2): 407–38.
- Nickell, Steven J. 1981. "Biases in Dynamic Models with Fixed Effects." *Econometrica* 52(6): 203–7.
- Rebelo, Sergio 1991. "Long-Run Policy Analysis and Long-Run Growth." *Journal of Political Economy* 99(3): 500–21.
- Reinikka, Ritva, and Jakob Svensson. 1999. "How Inadequate Provision of Public Infrastructure and Services Affects Private Investment." Policy Research Working Paper no. 2262. World Bank, Development Research Group, Washington, D.C.
- Republic of Uganda. 1998. *National Integrity Survey*. Kampala: Inspector General of Government.
- Romer, P. M. 1986. "Increasing Returns and Long-Run Growth." *Journal of Political Economy* 94(5): 1002–37.
- Sachs, J. D., and A. M. Warner. 1995. "Natural Resource Abundance and Economic Growth." Working Paper no. 5298. National Bureau of Economic Research, Cambridge, Massachusetts.

- _____. 1996. "Sources of Slow Growth in African Economies." HIID Development Discussion Paper no. 545. Harvard Institute for International Development, Cambridge, Massachusetts.
- Tybout, J. R. 1983. "Credit Rationing and Investment Behavior in a Developing Country." *Review of Economics and Statistics* 65(4): 598–607.
- White, Halbert. 1980. "A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity." *Econometrica* 48(4): 817–38.
- World Bank. 1994. "The Private Sector in Uganda: Results of the World Bank Enterprise Survey." World Bank, Eastern Africa Department, Washington, D.C. Processed.
- _____. 1999. "Survey of Foreign Investors." A Report by the Consorzio Italiano Consulenti, Bologna, Italy. Processed.

Productivity and Exports

Bernard Gauthier

Uganda has liberalized its trade and exchange rate regimes to scale back trade barriers and price distortions (see chapters 2 and 3 in this volume). Have the reforms generated a significant response from firms and substantial productivity gains? Have they encouraged the development of an outward-oriented industrial sector? While external competition is perceived as favoring efficiency through increased productivity and a shift of resources from inefficient to efficient sectors, the transition from a restrictive to an open trade regime can impose short-term adjustment costs in sectors newly exposed to external competition. The answers to these questions are important, therefore, in understanding what can be done to speed and smooth the transition toward an efficient, outward-oriented industrial base.

To address these issues we examine the impact of trade and exchange rate reforms on private enterprises. Firm-level productivity and technical efficiency measures, as well as other performance indicators, are constructed using detailed information collected in a 1998 survey of firms by the World Bank and the Ugandan Private Sector Foundation (see appendix B at the end of the book). Performance measures show whether firms have shifted resources by increasing or decreasing output following the change in incentives; whether they have become more productive in terms of labor productivity, total unit cost, total factor productivity (TFP), and technical efficiency (using stochastic production frontier models); whether market shares have

The author thanks Ritva Reinikka for insightful discussions. Excellent research assistance was provided by Jean Habarurema, Michel Sylvain, and Alex Darku at different stages of the project.

shifted toward high-productivity firms; and whether an association exists between productivity gains and the ability to export.

This chapter discusses the relationship between trade reform, exports, and productivity. It examines the response of enterprises to the new environment of liberalized trade and exchange in terms of output and productivity growth, and documents in more detail the export response to trade reforms. The conclusion suggests three types of policies to enhance the export orientation of Ugandan enterprises.

Trade Liberalization, Exports, and Productivity

In addition to improvements in the policy environment and macroeconomic stability, the core element of the economic reform programs implemented and supported by external donors in many Sub-Saharan African countries since the late 1980s has been the implementation of trade liberalization and the development of an outward-looking development strategy. Given the small size of the domestic market in Africa and the dependency on imported intermediate goods and capital, the development of an export-oriented sector has been perceived as essential for investment and development (Husain and Faruquee 1994; UNCTAD 1998; World Bank 1994). Trade liberalization and export orientation is seen to have a positive effect on productivity and investment. The perception is that exposure to international markets favors technology acquisition and market discipline, allowing firms to achieve economies of scale. By introducing competition among previously protected domestic firms, trade reforms induce changes in firms' behavior and performance.

The benefits of more open trade and an export orientation are transmitted through several channels. Exposure to external competition encourages domestic firms to adopt newer and more efficient technology or to use the same technology with less waste or less x-inefficiency to reduce costs and compete against international firms (Nishimizu and Robinson 1984). Furthermore, the removal of less efficient firms, previously able to operate inefficiently because of protection, results in a lower average cost and higher productivity. The firms that remain in the industry must adjust by expanding the scale of their production, exploiting economies of scale, and reducing technical inefficiency. Because domestically produced goods cannot replace imported intermediate and capital goods in developing countries, imported inputs tend to increase knowledge and improve technical efficiency. At the same time, increased imports and exports augment the spillover of international technical knowledge (Grossman and Helpman 1991).

Despite these expected positive effects, more open trade and an outward-oriented strategy may have adverse effects on domestic producers competing with imports. Rodrik (1988) and Tybout (1992) emphasize that a negative transition cost could result for domestic producers in industries where economies of scale existed and that contract or exit due to greater import penetration in the domestic market.

More generally, the potential benefits of trade liberalization and export orientation have not been fully exploited in Africa, and some analysts contend that this explains the development of the small industrial sector:

[M]anufacturing industries in Africa have not been exposed to market discipline through exports, and in addition they have failed to benefit from the scale advantages needed to compete internationally. These factors have, in turn, further restricted the development of such industries to small and sluggish domestic markets, perpetuating high costs and giving rise to inefficiencies and low levels of productivity (UNCTAD 1998, p. 196).

Empirical evidence of the effects of trade liberalization and export orientation has been mixed. Pack (1988, p. 353) reviewed numerous empirical studies on the effects of export orientation on the industrial sector, observing that "there is no clear confirmation of the hypothesis that countries with an external orientation benefit from greater growth in technical efficiency in the components sectors of manufacturing." In the particular case of Sub-Saharan Africa, some analysts doubt that more open trading conditions will produce an industrial response. Several factors could compromise this response, including inconsistent macroeconomic policies and weaknesses in institutions, infrastructure, and available human resources. Indeed, even if economic reforms were credible and producers did respond to the new incentives, the resulting productivity gains could be offset by declines in factor accumulation (Elbadawi 1992; Matin 1992).

Several analysts have found evidence of output growth and productivity gains following liberalization and export orientation in the African context. Harrison (1994) analyzed the changes in firm behavior in Côte d'Ivoire and found that liberalization had significantly affected productivity. In Morocco, Haddad (1993) found a positive relationship between productivity and exports at the firm level. She suggested that firms closest to the maximum efficiency level tended to have high export shares.

Roberts and Tybout (1997) in their examination of four countries found that differences in productivity within an industry are typically greater in industries protected from international competition, suggesting that protection nurtures inefficiency. However, in another study of four countries, including Morocco, Clerides, Lach, and Tybout (1998) found little evidence of an export efficiency effect. By contrast, Bigsten and others (forthcoming), using a four-country panel of African manufacturing firms in four sectors, found a significant efficiency gain from exporting, the gains being even larger for new entrants into the exporting market.

Using firm-level data from five sectors in Uganda, this chapter examines the evidence of association between productivity and exports within the framework of trade liberalization. The next section examines the response of enterprises to the new environment of trade liberalization and economic reforms.

Enterprise Responses to Changing Incentives

This section examines firms' responses to changes in incentives following trade and economic reforms. It first looks at whether the firms shifted resources toward tradable products by examining output responses between 1995 and 1997. It then examines whether firms improved their productivity by constructing indexes of productivity performance and analyzing the determinants of productivity growth to determine whether any differences can be explained by the firms' export orientation, the import intensity of intermediates, or other firm-level characteristics.

Nature of the Sample and Variables

The data used in this study comprise a balanced panel data set of 139 firms.¹ Data were collected in a recent firm-level survey conducted in Uganda by the World Bank and the Ugandan Private Sector Foundation during 1995–97. Table A8.1 presents basic characteristics of the sample of firms drawn from five sectors, representing a wide spectrum of private sector activities. Firms are classified into three size categories based on the number of employees: small (5–20 employees), medium (21–100 employees), and large (more than 100 employees). The distribution is also broken down according to whether the firm was an exporter in 1997 and its reliance on imported inputs. A firm is classified as an exporter if it exports any percentage of the value of its output. A firm is classified as imported-input intensive when it imports more than 50 percent of the value of its inputs. Firms are additionally classified by source of capital (domestic, foreign, and joint ownership firms).

As illustrated in table A8.1, the agroprocessing and manufacturing sectors are heavily represented, with 21 and 49 percent, respectively. While the manufacturing sector is also the most important in terms of total output value (52 percent), the agroprocessing sector is the most important in terms of total employment (43 percent). Seventy-four percent of the firms in the sample are domestically owned, but represent a much smaller proportion of total output and employment.

Foreign firms are the most important for total employment (37 percent), while the 11 percent of jointly owned firms account for more than 71 percent of total output. With respect to market orientation, exporting firms account

1. The original data set comprised 243 firms in five sectors. Restricting the sample to firms with complete time series in all variables of interest reduced the size of the data set by about one-third. Of the remaining firms, those that reported data inconsistent with the following criteria corresponding to twice the standard deviation were rejected as data errors or outliers: replacement value of machinery and equipment over gross output value greater than 50, growth in unit cost over the period greater than 1.5, growth in gross output greater than 500 percent, and growth in employment greater than 500 percent.

for almost half of total employment and nearly 40 percent of total output, despite their representation of only a quarter of the sample in terms of number of firms. With respect to size distribution, large firms represent less than 20 percent of the sample, but employ 77 percent of the total work force and account for 86 percent of total output value.

Table A8.2 presents the variables used in the empirical analysis of the study, defined as follows. Output corresponds to sales revenue from all output produced by the firm during the year. Capital is defined as the replacement value of machinery and equipment. Intermediate inputs include the cost of raw materials, utilities (telephone, electricity, water), and fuel. Wage is the total wage bill, including allowances, benefits, bonuses, and statutory payments. Labor is defined as total number of employees. Where applicable, data are expressed in constant 1995 prices.

Output and Productivity Growth

A fundamental objective of trade liberalization and the economic reform program in Uganda was to encourage the production of tradable goods. Firms were expected to increase outputs if changes in relative prices increased profitability. Furthermore, if markets were made more competitive by the removal of trade barriers, domestic producers were expected to increase production and reduce inefficiency in production. Were these goals achieved? To investigate differences in the output and productivity responses of categories of firms, several indicators of performance are constructed, including output growth and productivity indexes.

Table A8.3 summarizes growth rates in real output for the categories of firms during 1995–97. It presents unweighted and weighted averages, as well as medians and interquartile ranges.² All firm-level growth rates are cumulative for the period 1995–97. As shown in table A8.3, output response was relatively strong during the period, as the average firm shows an increase in real output of more than 35 percent (unweighted) between 1995 and 1997 (29 percent weighted). There is, however, a wide variation across firms, as the median output increased by 12 percent, but more than a quarter of the sample exhibited negative output growth.

Breaking down the sample by sector reveals that output growth is concentrated in the manufacturing sector as well as the agroprocessing and commercial agriculture sectors. Output-weighted figures in particular show an increase of close to 50 percent in the real output value in manufacturing. Export-oriented firms fared much better than nonexporting firms, with the weighted average figures exhibiting an increase of 40 percent, compared with only 15 percent for nonexporters. Unweighted average figures reveal a similar picture, although the gap is smaller.

2. Firm gross output is used as the weight, which is used to account for firms' relative size within the sample in their contribution to the sample mean.

Regarding categories of input use, for firms relying intensely on domestic inputs, the median firm recorded an increase of 13 percent in output, compared with only 6 percent for firms relying principally on imported inputs. However, average real output growth is greater for imported-input-intensive firms than for domestic input firms because of a greater variation in performance among the latter category of firms and, presumably, because many of them produce tradable goods.

Regarding categories of ownership, foreign-owned firms did better than domestically-owned firms. Joint ownership firms also performed better than entirely domestic firms, with more than three-quarters of them recording positive output growth. Larger units fared better than other size categories during the period, especially medium-size firms, as shown in the unweighted average of 35 percent compared with 20 percent, and the weighted average increase of 36 percent compared with a drop of -3 percent for medium-size firms.

Although significant growth in real output was registered mainly by larger producers in the categories of tradable goods producers, it is unclear whether this increase paralleled an increase in productivity due to a shift of resources from inefficient to efficient activities or through a more efficient use of resources. To assess the effects of trade liberalization on firm-level productivity, four commonly used indexes of productivity are constructed: labor productivity, total unit cost, TFP, and technical efficiency.

Labor productivity is measured as the logarithm of the output per employee in constant 1995 prices. Total unit cost is measured as the long-term average cost of production in constant 1995 prices, and is calculated as the logarithm of the cost of capital, wages, and intermediate inputs divided by the value of gross output. The TFP represents the level of output not explained by the level of inputs. It is constructed as the residual of a constant returns Cobb-Douglas production function using capital, labor, and material as inputs (see annex 8.1 for details). Finally, technical efficiency is a continuous index ranging from zero to one representing the degree to which firms fail to reach a best practice frontier. This index is measured using the stochastic frontier production function methodology (see Bauer 1990 or Schmidt and Sickles 1984 for a survey). In this model, the best practice production frontier is estimated that defines the maximum output achievable for a given set of inputs. All firm output is then compared to this frontier. Deviations from the frontier mean that the firm produces less than its technical capacity, implying some degree of inefficiency (see annex 8.1 for details).

Productivity Level

Table 8.1 presents the unweighted average levels for 1995–97 of each of the four productivity indexes by firm category. All figures are presented in constant 1995 prices. Examining the differences in productivity levels among categories of firms confirms that all measures of productivity considerably favor exporting firms. On average, exporters enjoy more than 60 percent more output per employee than nonexporters, while for the average

Table 8.1. Productivity Levels by Firm Characteristics
(unweighted averages, 1995–97)

<i>Characteristic</i>	<i>Number of firms</i>	<i>Labor productivity</i>	<i>Unit cost</i>	<i>Total factor productivity</i>	<i>Efficiency</i>
<i>By sector</i>					
Commercial					
agriculture	16	8.54	1.94	2.75	0.27
Agroprocessing	29	20.19	4.86	1.95	0.18
Manufacturing	68	19.33	3.08	2.00	0.17
Construction	11	7.36	4.19	2.02	0.19
Tourism	15	5.44	1.37	3.25	0.23
<i>By exporters</i>					
Exporter	32	22.22	1.96	2.41	0.23
Nonexporter	107	13.91	3.60	2.15	0.18
<i>By importer</i>					
Domestic input intensive	97	8.39	3.01	2.40	0.19
Imported input intensive	42	32.99	3.73	1.77	0.19
<i>By ownership</i>					
Local	103	9.46	5.53	2.24	0.18
Foreign	21	26.25	2.27	2.10	0.17
Joint	15	44.89	2.49	2.15	0.32
<i>By size</i>					
Small	63	9.53	3.59	2.12	0.18
Medium	50	17.93	3.35	2.48	0.20
Large	26	27.02	2.10	1.91	0.22
Total	139	15.82	3.22	2.21	0.19

Note: Categories in 1995. Labor productivity, unit cost, and total factor productivity in logs. Efficiency is a 0–1 index, where 1 indicates full efficiency.

Source: Author's calculations based on the 1998 enterprise survey.

exporting firm the TFP index is more than 12 percent greater than for nonexporters. Total cost per unit of revenue is 46 percent less for exporters, and the index of technical efficiency is an average of 28 percent greater for exporting firms, indicating more homogeneity in the distribution of exporters. These patterns are robust when measured by weighted averages, medians, or unweighted means.

Among categories of ownership, foreign-owned firms and those with joint foreign and local ownership generally enjoy higher levels of productivity. The labor productivity of local firms is almost five times less than that of joint ownership firms; the total unit cost is twice as high and the efficiency index is 44 percent lower. These patterns are similar for median and weighted average figures (table A8.4).

Differences in productivity levels are also marked among sectors, because the agroprocessing and manufacturing sectors exhibit close to 2.5 times more labor productivity than the agriculture and construction sectors. Productivity levels by size categories are also as expected, because smaller firms exhibit 65 percent less labor productivity than large firms, 70 percent higher total costs per unit of revenue, and 19 percent less technical efficiency. With respect to the TFP index, medium-size firms show a higher unweighted average and large firms show a higher weighted average (31 percent more than small firms, see table A8.4), indicating that the larger segment of the large-size category exhibits greater productivity levels.

Table 8.2 compares technical efficiency levels in Uganda with manufacturing firms in four other African countries. All technical efficiency figures were computed using a random-effect model and estimated with a generalized least squares approach. Table 8.2 reveals that among all five African countries technical efficiency among exporting firms is consistently greater, on average, than that of domestic-oriented firms. However, efficiency among the sample of firms in Uganda is low among both exporters and nonexporters relative to the other African countries. Low technical efficiency in Uganda indicates more potential waste and x-inefficiency in production. It may also indicate untapped opportunities for productivity improvement through learning, possibly reflecting less homogeneity in technology within the distribution of firms.

Productivity Growth

An increase in output generally leads to an increase in productivity because of a reduction in idle capacity and better use of economies of scale. Furthermore, if market competition were increased through trade liberalization, Ugandan firms may have responded to the new environment by further improving their productivity. Some preliminary evidence reveals better output response and higher productivity levels, particularly from exporters.

Table 8.3 shows productivity growth among categories of firms and presents cumulative productivity growth rates for the four indexes by category.

Table 8.2. Efficiency Levels of Exporters in Five African Countries
(unweighted averages)

<i>Category</i>	<i>Uganda</i>	<i>Cameroon</i>	<i>Ghana</i>	<i>Kenya</i>	<i>Zimbabwe</i>
Exporters	0.23	0.52	0.49	0.32	0.40
Nonexporters	0.18	0.31	0.25	0.18	0.34
All	0.19	0.38	0.27	0.22	0.37
Number of firms	139	50	93	70	94
Period	1995–97	1993–95	1991–93	1992–94	1992–94

Source: Author's calculations based on the 1998 enterprise survey; Bigsten and others (2000, table 3).

Table 8.3. Real Productivity Growth
(cumulative percentages unweighted, 1995–97)

<i>Characteristic</i>	<i>Number of firms</i>	<i>Labor productivity</i>	<i>Total unit cost</i>	<i>Total factor productivity</i>	<i>Efficiency</i>
<i>By sector</i>					
Commercial					
agriculture	16	-1.2	-4.6	14.5	-1.8
Agroprocessing	29	14.2	2.3	2.6	-0.2
Manufacturing	68	6.5	5.9	10.2	-4.9
Construction	11	-15.9	15.6	-11.5	0.8
Tourism	15	25.9	14.0	-0.8	1.9
<i>By exporters</i>					
Exporter	32	25.8	1.1	10.4	7.3
Nonexporter	107	2.1	6.9	4.9	-5.3
<i>By importer</i>					
Domestic input					
intensive	97	2.0	7.1	4.3	-1.7
Imported input					
intensive	42	20.5	2.0	10.5	-4.0
<i>By ownership</i>					
Local	103	5.1	8.5	3.7	-3.6
Foreign	21	18.5	-4.5	21.2	6.5
Joint	15	9.0	-0.5	2.1	-6.7
<i>By size</i>					
Small	63	6.3	8.5	8.8	-4.0
Medium	50	6.0	4.7	2.7	-3.2
Large	26	13.5	0.2	6.5	3.0
Total	139	7.5	5.6	6.2	-2.4

Note: Categories in 1995.

Source: Author's calculations based on the 1998 enterprise survey.

All figures are unweighted averages for 1995–97 in constant 1995 prices. An examination of the four indexes of productivity reveals a mixed overall response. While some indexes exhibit a positive trend, others have regressed. Both unweighted and weighted average figures (see table A8.5) show improvements in labor productivity and TFP for the average firm in the sample, with the related indexes rising by 8 and 6 percent, respectively (unweighted). By contrast, total unit cost and technical efficiency exhibited a negative overall trend, with an increase in unit cost of 6 percent and a drop in efficiency of 2 percent. Significant differences in productivity performance among categories of firms explain these trends.

The export sector, however, performed noticeably better than domestic market-oriented producers for all productivity indexes. During the period, labor productivity grew more than 10 times faster, and total unit cost grew 6

times slower. Moreover, exporters recorded an (unweighted) average increase in their TFP of 10 percent—compared with 5 percent for nonexporters—and an increase of 7 percent in efficiency index, compared with a decline of 5 percent for nonexporters. Interestingly, in terms of labor productivity, total unit cost, and TFP, firms relying intensely on imported inputs achieved higher productivity growth than firms relying on domestic inputs. With respect to size categories, large firms performed better than smaller units, especially in terms of labor productivity, efficiency, and lower unit cost growth. With respect to ownership, foreign-owned firms fared better than their domestic counterparts for all four productivity measures (both weighted and unweighted).

Table 8.4 compares technical efficiency growth in Uganda during the liberalization period with observed efficiency growth in four other African countries also going through a process of trade liberalization. Efficiency growth in the export sector in Uganda is consistent with similar growth observed in the other four African countries, with export-oriented firms outperforming domestic market-oriented producers during the liberalization period.

Explaining Productivity Growth

A series of regressions is estimated to more rigorously examine how economic reforms produced increases in productivity. Firm-level productivity is modeled as a function of various explanatory variables, including exports, market participation, and other firm characteristics. More specifically, the following equation is used:

$$(8.1) \quad \Delta A_{it} = \alpha_1 DE_{it-1} + \alpha_2 X_{it-1} + e_{it}$$

where ΔA_{it} is a measure of productivity growth calculated above for firm i at time t , DE_{it-1} is a dummy of initial exports, and X_{it-1} is a vector of exogenous variables of firm characteristics, particularly size and sector.

In a small country like Uganda, exporting firms are expected to adjust relatively easily to changes in relative prices and other external changes due to the absence of demand constraints. Indeed, export-oriented firms

Table 8.4. Efficiency Growth of Exporters in Five African Countries
(cumulative percentages, unweighted)

<i>Category</i>	<i>Uganda</i>	<i>Cameroon</i>	<i>Ghana</i>	<i>Kenya</i>	<i>Zimbabwe</i>
Exporters	7.3	12.8	15.2	8.4	8.6
Nonexporters	-5.3	-9.8	-3.0	2.0	1.9
All	-2.4	-2.6	-1.7	4.0	5.8
Number of observations	139	50	93	70	94
Period	1995–97	1993–95	1991–93	1992–94	1992–94

Source: Author's calculations based on the 1998 enterprise survey; Bigsten and others (2000, table 4).

exposed to a more competitive environment are expected to have a greater incentive to increase productivity. To assess this incentive adequately, and to identify the effect of exporting, a dummy variable takes the value of one when a firm was an exporter initially and zero when it did not export at the beginning of the period.

Equation (8.1) is estimated using Huber-White correction for heteroskedasticity. Table A8.6 presents the results, which tend to confirm the evidence presented in table 8.3. Export orientation is a significant determinant of productivity growth according to several productivity measures. As table A8.6 shows, the coefficients of the dummy variable of initial exporters is positive and significant in both the TFP and technical efficiency regressions, indicating that initial exporters tend to show higher growth of TFP and efficiency compared with nonexporters during the period. As for labor productivity growth, the export dummy, while not significant, has the expected positive sign, and the export dummy for total unit cost has the expected negative sign, as initial exporters exhibit a lower total cost per unit of revenue over the period.

These results accord with the resource shift documented earlier toward export-oriented activities and are consistent with those of Roberts and Tybout (1997) and Kraay (1999), who observed that exporting firms are more productive than their domestically-oriented counterparts. Indeed, Kraay (1999), studying a panel of Chinese firms, also observed that past exports were positively associated with higher growth in productivity measures. The results are also consistent with those of Bigsten and others (2000) in a study of a comparable group of Sub-Saharan countries. Using firm-level panel data from four Sub-Saharan African countries (Cameroon, Ghana, Kenya, and Zimbabwe), Bigsten and others (2000) examined the effects of exporting on technical efficiency over a three-year period. They showed that the effects were quite substantial, with initial exporters exhibiting 11 percent higher efficiency growth than nonexporters over the period. In Uganda the effect of exporting on technical efficiency is also positive and significant, indicating an important learning effect associated with exporting activities among the sample firms during the period.

Caution is necessary when analyzing these results because of endogeneity problems between exporting and efficiency. On the basis of the present analysis, it is impossible to answer the question of whether exporting leads to efficiency gains or if the relationship runs from efficiency to exporting. Indeed, according to several productivity measures, the correlation between export status and ex post productivity levels suggests that high productivity precedes entry into the export market. One likely explanation investigated in the recent literature (but not yet pursued with the Ugandan survey data) is that high-productivity producers can afford the cost of entering the export market (Roberts and Tybout 1997). Work on U.S. firms and middle-income countries has documented that high productivity levels correlate with subsequent entry (Bernard and Jensen 1999). Further research would be required to disentangle the

direction of causality (see Bigsten and others 2000; Clerides, Lach, and Tybout 1998).³ In conclusion, export orientation is associated with significantly greater output growth during the period of liberalization in Uganda, and with higher productivity levels and growth in terms of several measures of productivity.

Export Response

As shown previously, trade liberalization in Uganda was accompanied by output growth among export-oriented activities as well as greater levels and growth in productivity among these firms. This section documents in more detail the export response to trade liberalization. It examines the source of export response by breaking down export growth by firm category (incumbent, new entrants, and quitters), as well as the determinants of the decision to export.

The sample in this section comprises a balanced panel data set of 177 firms that reported data on the decision to export, percentage of exports in each year, and destination of exports.⁴ As can be seen from table A8.7, which presents summary statistics on the exporters, the average percentage of exports to gross output value in the sample increased from 9 to 10 percent during the period. Exporting firms exported an average of 37 percent of their output in 1995, a figure that remained stable in 1997 (38 percent). When weighted by the value of output to account for relative firm size, the weighted export average increased to 15 percent of total sales value in 1997, up from 12 percent in 1995.

An interesting element concerns the destination of Ugandan exports and the changes during the liberalization period. As reported in table 8.5, the most important destination was Europe, which received 60 percent of total export value in 1997, followed by East Africa and other non-European, non-African countries, both with 18 percent.

Between 1995 and 1997, export values for the sample increased by 90 percent. As documented in table 8.5, the largest increase over the period (327

3. Clerides, Lach, and Tybout (1998) have performed a type of Granger causality test by using a full information maximum likelihood (FIML) estimator on a dynamic model of productivity and exports with serially correlated errors, as well as a generalized method of moments estimator on an average variable cost function. Examining three middle-income countries, they have not found evidence that exporting experience reduces costs, except in the apparel and leather products industries in Morocco. Bigsten and others (2000), using a comparable nonparametric FIML dynamic model with correlated random effects, found a significant and positive effect of export history on technical efficiency among manufacturing firms in four Sub-Saharan countries.

4. Note that the sample in this section is larger by 38 firms than in the section on enterprise responses. This is due to the smaller requirement in the number of variables in each year in this section. Firm number 75 was deleted because of data-entry error.

Table 8.5. Nominal Exports Value and Shares by Destination, 1995–97

<i>Destination</i>	1995		1996		1997	
	<i>U Sh billions (current)</i>	<i>Percent</i>	<i>U Sh billions (current)</i>	<i>Percent</i>	<i>U Sh billions (current)</i>	<i>Percent</i>
East Africa	10.76	27.4	15.92	23.5	13.56	18.2
Rest of Africa	1.21	3.1	1.71	2.5	2.74	3.7
Europe	24.05	61.4	38.50	56.8	44.66	60.0
Other countries	3.16	8.1	11.71	17.2	13.48	18.1
Total exports	39.18	100.0	67.84	100.0	74.44	100.0

Note: Number of firms is 177.

Source: Author's calculations based on the 1998 enterprise survey.

percent) was registered in the “other countries” category (non-European and non-African countries). This destination now represents 18 percent of total export value in the sample, compared with just 8 percent in 1995. Exports to the rest of Africa increased by 126 percent, but still represent a small fraction of total exports (3 percent). European destinations increased by 86 percent and represent the most important export destination with 60 percent of total export value. With a below average increase in exports of 26 percent during the period, regional exports to East African countries decreased in relative terms from 28 to 18 percent of total export value between 1995 and 1997.

Did new firms enter the export market during the period of trade liberalization? If so, decisions to enter the export market would signal the credibility of the trade reforms and suggest that entrepreneurs believed the future benefits of foreign sales outweighed the start-up cost of exporting. To understand this question in more depth, table A8.8 documents the transition pattern for the 177 firms providing complete export data in the full sample between 1995 and 1997.

Of the 177 firms, 41 (23 percent) exported in 1995, compared with 47 in 1997 (27 percent). This increase is due to nine firms entering the foreign market, while only three ceased exporting during the period, leaving a net entry of six firms. All nine of the new entrants export to Africa, three to the East African market exclusively, three to other African markets, and three to Africa and elsewhere. All three of the firms that ceased exporting during the period were active in the European market. Still, earlier export growth figures show the African market entrants and European market quitters left the overall market share of European destinations unchanged at 60 percent of total value, while the relative importance of African markets decreased from 31 to 22 percent.

The situation in Uganda is relatively similar to that in Cameroon following trade liberalization and devaluation. In Cameroon, between 1993 and

1995 few firms entered the export market: the net entry rate was only 5 percent (11 entrant and 1 quitter among a sample of 187 firms). Essentially, most of the entry and exit was in the African market among relatively small firms. None of the exporters specializing in the African market entered the European market and few selling outside Africa began selling in African markets (see Tybout and others 1997). The pattern in Cameroon suggested that the two export markets were segmented, which appears to be the case in Uganda.

Similarly, in Chad and Gabon, where trade and exchange rate reforms affected the relative profitability of different markets between 1993 and 1996, essentially no shift occurred between markets during the period. Entry and exit from the export market occurred only for exporters to Africa and among small firms. The net entry rate was negative in Gabon (3 firms exited and 1 firm entered among a sample of 80 firms), while in Chad 2 new firms started exporting within the regional free-trade area (among a sample of 54 firms) during the period. Thus, sunk costs for export market entry appeared relatively high (see Barba Navaretti, Faini, and Gauthier 1998).

The source of the growth in exports and differences in behavior among categories of firms in Uganda can be understood more clearly through a decomposition analysis. Following Barba Navaretti, Faini, and Gauthier (1998); Sullivan, Tybout, and Roberts (1995); and Tybout and others (1997), nominal export growth is broken down by three categories of firms, incumbent exporters (continuous), new exporters (entrants), and quitters.⁵

The incumbent effect in table A8.9 is the contribution of continuous exporters to samplewide export growth. This is a weighted average of the growth in exports among firms that continue to sell abroad, the weights being their share in total exports. The net entry effect measures the effect of net changes in the number of exporters on growth, that is, the difference between the number of firms that enter the export market between periods

5. The following equation is used for decomposition:

$$\begin{aligned} \frac{Q_t^f - Q_{t-1}^f}{Q_{t-1}^f} &= \sum_{i \in c} \left(\frac{Q_{it}^f}{Q_{t-1}^f} \right) \left(\frac{Q_{it}^f - Q_{it-1}^f}{Q_{it-1}^f} \right) + \sum_{i \in e} \left(\frac{Q_{it}^f}{Q_{t-1}^f} \right) - \sum_{i \in q} \left(\frac{Q_{it-1}^f}{Q_{t-1}^f} \right) \\ &= \sum_{i \in c} S_{it-1}^f \left(\frac{Q_{it}^f - Q_{it-1}^f}{Q_{it-1}^f} \right) + \left(\frac{n_{et}^f - n_{qt-1}^f}{n_{t-1}^f} \right) \left(\frac{\bar{Q}_{et}^f - \bar{Q}_{qt-1}^f}{2\bar{Q}_{t-1}^f} \right) + \left(\frac{\bar{Q}_{et}^f - \bar{Q}_{qt-1}^f}{\bar{Q}_{t-1}^f} \right) \left(\frac{n_{et}^f - n_{qt-1}^f}{2n_{t-1}^f} \right) \end{aligned}$$

where S_{it-1}^f denotes the share of total exports of the i^{th} firm in year $t-1$, n^f refers to the number of exporting firms, Q_t^f is output value sold in foreign markets during year t , and overbars denote period averages. The index i stands for the i^{th} firm, e subscripts refer to firms entering the export market, q subscripts refer to firms that will quit the export market during the next period, and c subscripts to continuous exporters. Aggregates without these subscripts refer to the entire set of exporting firms (see Sullivan, Tybout, and Roberts 1995 for further details).

$t - 1$ and t , and the number of firms that cease exporting over the same interval. The turnover effect describes the effect on export growth of replacing firms ceasing to export with firms entering the export market. Note that if quitters and entrants export the same value per firm, the turnover effect is zero. However, if large exporters leave foreign markets and small exporters enter them, turnover can lead to a decrease in total export value. Table A8.9 presents the results of the breakdown; it also shows the result of a similar decomposition performed on data from Cameroon and Gabon.

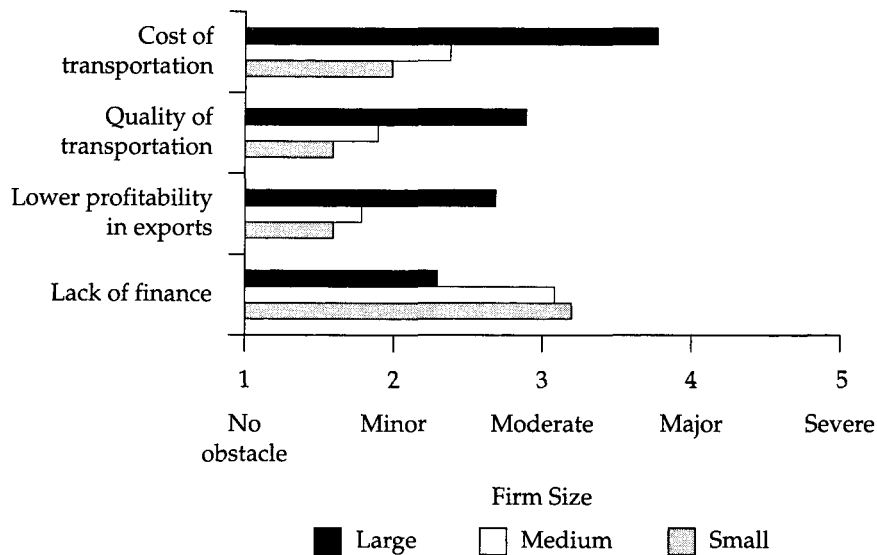
Note that the incumbent effect, the net entry effect, and the turnover effect in the table sum to nominal export growth. In addition, both the net entry effect and the turnover effect break down into their multiplicative components. For example, the net entry rate times the relative size of entrants equals the net entry effect.

As observed from table A8.9, the net entry rate in Uganda was 12 percent between 1995 and 1997. However, new exporting firms exported, on average, only 35 percent as much per firm as incumbent exporters (see relative size), so the net entry effect amounted to only 4 percent of total growth in export value. Furthermore, the export value of entrants represented only 51 percent as much per firm as that of quitters over the sample period, so the replacement of exiting firms with entering firms tended to reduce total export value. Indeed, according to the observed pattern, some large-scale exporters dropped out of foreign markets, and the firms that replaced them exported less.

Combining these entry and exit effects, virtually all the export growth in the sample in Uganda between 1995 and 1997 can be attributed to incumbent firms (95 percent). The Ugandan pattern is reminiscent of that observed in Cameroon and Gabon following trade liberalization in which no export boom was observed (table A8.9). Indeed, export growth in these countries occurred among incumbent firms and did not result from a surge of new entrants into the export market. This contrasts with export booms in Mexico, Morocco, and Columbia driven by a net entry of more than 50 percent of total growth of exports over a five-year period (Roberts and Tybout 1995).

Tables 8.5 and A8.8 show that the growth in export value by existing producers in Uganda takes place in the European and other non-African countries. As noted earlier, the few new producers in the export market represent regional exporters to Africa and tend to be smaller. This pattern may indicate the existence of significant start-up costs for the export market, especially to non-African countries.

It thus appears that despite regional initiatives and the various trade reforms implemented in Uganda since the late 1980s, a number of constraints on export development still exist. As reported in the Uganda survey, trade regulation is still perceived as a constraint by exporters and private businesses considering the export market. Figure 8.1 shows that constraints on export increases principally relate to the cost of transportation, the lack of finance, and the quality of transportation due to poor infrastructure. For the

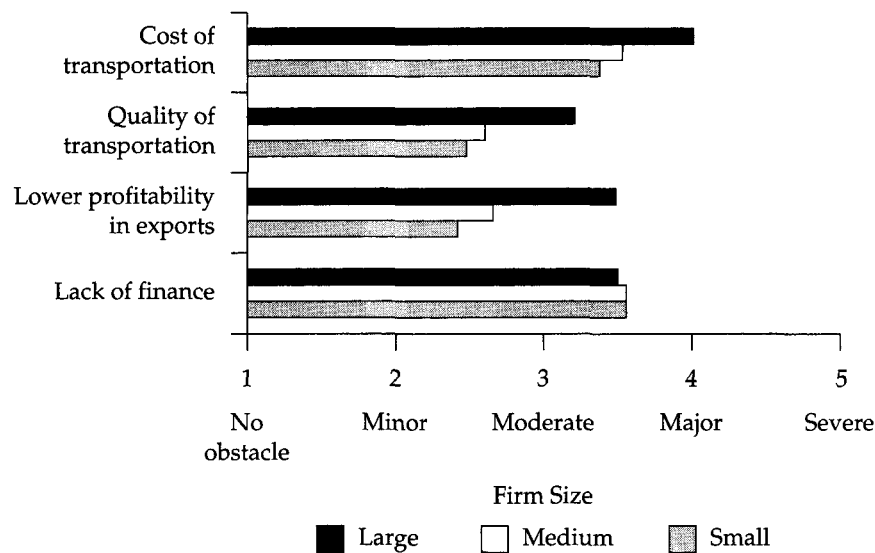
Figure 8.1. Main Constraints to Increased Exports

Source: Author's calculations based on the 1998 enterprise survey.

larger exporters, transportation costs are the main issue; for the smaller exporters it is lack of finance. As figure 8.2 shows, the elements that prevent firms from starting to export are associated mainly with the cost of transportation, lack of finance, and lack of information about export markets. Again, the larger firms tend to cite transportation costs as the main constraint, while smaller ones cite lack of finance.

To further pursue the conjecture of significant start-up costs for the export market, the export behavior of firms in the sample is explained using a simple model of the decision to export. This choice relates to evolution and level of total unit cost, controlling for previous export history and sector-based characteristics. Table A8.10 presents the results of two simple regressions performed on the Ugandan survey data and contrasts them with similar regressions performed on Cameroonian firms. The dependent variable is a dummy that takes the value of one if the firm exported at the end of the period and zero otherwise.

As shown in the first regression, (a), expressing the probability of exporting in the last period as a function of cost and industry dummies, firms in Uganda with lower total unit costs are more likely to be exporters. Similar results were observed in Cameroon among a sample of 114 firms between 1992/93 and 1994/95 (Tybout and others 1997). These results imply that measures to reduce unit costs (through an increase in output price relative to intermediate price) should induce firms to enter the export market.

Figure 8.2. Main Constraints to New Exporters

Source: Author's calculations based on the 1998 enterprise survey.

The second regression, (b), accounts for export history and controls for initial cost and changes in average cost. Table A8.10 shows that in Uganda, as in Cameroon, unit cost at the beginning of the period and change in cost have the expected negative sign but are not statistically significant. The initial exporter dummy is positive, however, as well as significant, indicating that firms that have already adapted their products and processes and established distribution channels and mechanisms to deal with custom authorities will be more likely to export at the end of the period. Still, there are also other firm characteristics that may remain important over time, such as location, foreign ownership status, managerial skills, and so forth, that relate to the firm's capacity to be an exporter.

In short, substantial export growth occurred in Uganda during the period of trade liberalization. However, for the most part this growth can be explained by increased exports by firms already active in the export market. New entry is limited in terms of number of firms and relative importance. This may suggest that, as observed in previous studies in Cameroon, Chad and Gabon, the barriers to export market entry remain high in Uganda. Indeed, only a small number of firms shifted toward the export market. The small number of entries likely reflects the existence of start-up costs. If such costs are high, firms are reluctant to redirect their operations toward foreign markets and incur costs for retooling, establishing distribution channels, and researching foreign market conditions. As suggested in the small

net entry effect, the reforms associated with trade liberalization may not have been enough to convince firms that incurring these costs is a wise business decision (see Barba Navaretti, Faini, and Gauthier 1998; Tybout and others 1997).

Conclusions

Using the detailed information collected in the 1998 survey of firms by the World Bank and the Ugandan Private Sector Foundation, this chapter shows that trade liberalization has been accompanied by significant growth in output and productivity in Uganda's private sector firms. Reallocation of resources toward the efficient export sector is apparent as export-oriented firms show almost 50 percent more growth, on average, in real output (unweighted) compared with nonexporters during the period. Furthermore, using several measures of productivity, a significant productivity gap appears between exporters and firms producing exclusively for the domestic market. Exporters enjoy, on average, more than 60 percent more output per employee than nonexporters, while for the average firm the TFP index is more than 12 percent greater than for nonexporters. Total cost per unit of revenue is 46 percent less for exporters, and the index of technical efficiency is also 28 percent greater, on average, for exporting firms. In addition, exporters achieved significantly more productivity growth during the period compared with nonexporters, particularly in terms of TFP and efficiency growth. Whereas the export sector is growing in nominal value terms and relative to total industry sales, few new firms appear to be entering the market. Those who do so tend to be smaller than existing exporters and focus on the African market. The Ugandan pattern of export growth in the absence of an export boom is similar to that observed in Cameroon, Chad, and Gabon, where export growth following liberalization and foreign exchange modification was due to incumbent firms rather than to a surge of new entrants into the export market.

The absence of an export boom points toward the substantial role played by start-up costs in reducing firms' response to relative price changes and policy reforms. The findings suggest that trade liberalization and export orientation in Uganda can be enhanced by three types of policies, namely:

- Policies that emphasize both increased specialization of incumbent producers in the export market and reduced barriers faced by new exporters.
- Policies that identify and correct factors that prevent firms from investing in new equipment, upgrading product quality, and researching foreign markets to the extent necessary for export market entry.
- Policies that target deficiencies in public infrastructure and regulatory constraints, particularly those that add to production and transport.

Annex 8.1. Productivity Measures

The four indexes of productivity used in this chapter are constructed as follows. It is assumed that production relationships at the firm level can be characterized by a general function of the form $Q = f(K, L, M, A)$, where Q is gross output, K is our measure of capital, L is labor, M is material, and A is a productivity index. Assuming a neoclassical Cobb-Douglas production function, a measure of total factor productivity is given by

$$(A8.1) \ln A_{ijt} = \ln Q_{ijt} - s_{Kjt} \ln K_{ijt} - s_{Ljt} \ln L_{ijt} - s_{Mjt} \ln M_{ijt}$$

where i is the index of the i^{th} firm ($i = 1, \dots, N$) at time t in sector j , while s_{vjt} is the share of the v^{th} input in total costs. Assuming that firms behave optimally and that factors are remunerated at the value of their marginal product, output elasticities could be associated with input shares. These output elasticities are calculated for labor and material inputs in each sector j at each period as the current price ratios of total wages and materials to gross output value, in that sector and that year. Furthermore, assuming a constant return to scale, the capital output elasticity is measured as one minus the two other elasticities. (Table A8.11 presents these output elasticities by sector and by year used in the computation of the TFP index.)

Growth rate in the productivity measure, which gives the variation in output not explained by input changes, is obtained through a second-order Tornqvist approximation given by

$$(A8.2) \Delta \ln A_{ijt} = \Delta \ln Q_{ijt} - \bar{s}_{Kj} \Delta \ln K_{ijt} - \bar{s}_{Lj} \Delta \ln L_{ijt} - \bar{s}_{Mj} \Delta \ln M_{ijt}$$

where \bar{s}_j is the share of the v^{th} input in total costs in sector j , averaged over the two periods.

The technical efficiency index is measured using the stochastic frontier production function methodology. In this model a production frontier is estimated that defines the maximum output achievable for a given set of inputs. The degree to which firms fail to reach the frontier is attributed to inefficiency of production. Note that the stochastic element of the model allows some observations to lie above the frontier, which makes the model less vulnerable to the influence of outliers than deterministic models. Assuming again a Cobb-Douglas production function, the frontier technology can be represented in the following form:

$$(A8.3) \ln Y_{it} = \alpha_{it} + \alpha_1 \ln K_{it} + \alpha_2 \ln L_{it} + \alpha_3 \ln M_{it} + v_{it} + u_{it}$$

where Y_{it} is the observed value of gross output of the i^{th} firm ($i = 1, \dots, N$) at time t , K represents the replacement value of equipment, L the total number of employees, and M the value of intermediate inputs, in firm i in period t , and α_i is a vector of technology parameters to be estimated.

The compound disturbance is composed of two terms. The first, v_{it} , is a random disturbance assumed to be distributed identically and independently

across plants as $N(0, \sigma^2)$. It represents factors such as luck, weather conditions, and unpredicted variation in inputs. The second, u_{it} , is a firm-specific effect that reflects firm efficiency and management skills. Its distribution is one-sided, reflecting the fact that output must lie on or below the frontier. u_{it} is assumed to be independently and identically distributed across plants as the nonpositive part of a $N(\mu, \sigma^2)$ distribution truncated above at zero. Both v and u are assumed to be distributed independently of the exogenous variables in the model.

Following Aigner and Schmidt (1977), Jondrow and others (1982), and Battese and Coelli (1992), an estimate of the efficiency measure of the i^{th} firm at the t time period is given by

$$(A8.4) \text{ } eff_{it} = \exp(\hat{u}_{it}).$$

Table A8.12 presents the estimated coefficients of the production function using a random-effect estimator (generalized least square). Furthermore, labor productivity is measured as the logarithm of the ratio of output per employee, while total unit cost is measured as the long-term average cost of production

$$(A8.5) \text{ } UC_{it} = \ln(LRC_{it}) - \ln(Q_{it}),$$

where LRC_{it} is the long-run cost of firm i at time t , as measured by the logarithm of the cost of capital, wages, and intermediate inputs, and Q_{it} is value of gross output of firm i at time t .

Table A8.1. Distribution of Sample by Categories, 1997

Category	Number		Employment		Gross output value ^a	
	of firms	Percentage of total	Mean	Percentage of total	Mean	Percentage of total
<i>By sector</i>						
Commercial agriculture	16	11.5	58.6	6.2	451.4	1.7
Agroprocessing	29	20.9	225.4	43.1	5,972.7	40.9
Manufacturing	68	48.9	60.9	27.3	3,209.3	51.5
Construction	11	7.9	265.9	19.3	1,944.4	5.0
Tourism	15	10.8	42.8	4.2	233.2	0.8
<i>By ownership</i>						
Local	103	74.1	50.8	34.5	712.6	17.3
Foreign	21	15.1	263.6	36.5	2,432.3	12.1
Joint	15	10.8	294.1	29.1	19,937.9	70.6
<i>By exporters</i>						
Exporter	37	26.6	195.2	47.6	6,950.7	39.3
Nonexporter	102	73.4	78.0	52.4	1,631.1	60.7
<i>By importer</i>						
Domestic input intensive	94	67.6	111.0	68.7	1,883.1	41.8
Imported input intensive	45	32.4	105.5	31.3	5,479.6	58.2
<i>By size</i>						
Small	63	45.3	13.1	5.4	156.4	2.3
Medium	50	36.0	52.9	17.4	1,032.5	12.2
Large	26	18.7	450.4	77.1	13,927.6	85.5
Total	139	100.0	109.2	100.0	3,047.1	100.0

a. Gross output value in million Ugandan shillings.

Source: Author's calculations based on the 1998 enterprise survey.

Table A8.2. Summary Statistics of Variables
(average, 1995–97)

<i>Variable</i>	<i>Sample mean</i>	<i>Sample standard deviation</i>	<i>Minimum</i>	<i>Maximum</i>
Output	2,491.6	9,312.2	1.0	73,933.3
Capital	2,875.9	13,082.9	0.1	99,933.3
Employment	101.1	254.6	3.0	1,866.7
Wage cost	177.3	651.3	0.2	6,154.5
Intermediate inputs	1,074.8	4,969.9	0.3	56,239.9
Foreign (%)	15.0	35.9	0.0	100.0
Share exported (%)	9.0	23.4	0.0	100.0

Note: Output, capital, wage cost, and intermediate inputs are in millions of constant 1995 Ugandan shillings. The number of firms is 139.

Source: Author's calculations based on the 1998 enterprise survey.

Table A8.3. Real Output Growth by Firm Characteristics
(cumulative percentage, 1995–97)

<i>Category</i>	<i>Number of firms</i>	<i>Unweighted average</i>	<i>Weighted average^a</i>	<i>Median</i>	<i>Interquartile range</i>
<i>By sector</i>					
Commercial					
agriculture	16	31.2	13.2	14.0	–3.8 to 41.5
Agroprocessing	29	26.2	11.6	11.7	–21.8 to 39.7
Manufacturing	68	27.9	49.1	9.6	–18.5 to 40.0
Construction	11	7.1	28.6	15.5	–27.8 to 32.2
Tourism	15	18.7	4.9	9.6	–24.8 to 47.5
<i>By ownership</i>					
Local	103	18.8	10.1	10.8	–23.1 to 38.3
Foreign	21	59.7	21.5	13.2	–7.7 to 88.7
Joint	15	21.4	36.4	15.4	0.4 to 43.6
<i>By exporters</i>					
Exporter	32	33.8	39.9	18.2	–7.8 to 47.6
Nonexporter	107	22.7	15.2	9.6	–21.8 to 37.9
<i>By importer</i>					
Domestic input intensive	97	21.6	20.6	13.3	–20.9 to 40.4
Imported input intensive	42	33.8	34.9	6.0	–19.2 to 38.3
<i>By size</i>					
Small	63	25.8	10.3	6.4	–23.2 to 39.1
Medium	50	19.5	–26.0	15.3	–13.2 to 41.2
Large	26	35.1	36.1	14.4	–7.6 to 47.5
Total	139	25.3	29.2	11.7	–19.2 to 40.4

a. Weighted by firms' gross output.

Note: Categories in 1995.

Source: Author's calculations based on the 1998 enterprise survey.

Table A8.4. Productivity Levels by Firm Characteristics

(weighted averages, 1995–97)

<i>Characteristic</i>	<i>Number of firms</i>	<i>Labor productivity</i>	<i>Unit cost</i>	<i>Total factor productivity</i>	<i>Efficiency</i>
<i>By sector</i>					
Commercial					
agriculture	16	8.50	0.99	2.89	0.72
Agroprocessing	29	23.87	1.51	4.12	0.52
Manufacturing	68	42.35	2.04	1.40	0.28
Construction	11	7.00	1.02	3.29	0.19
Tourism	15	4.83	1.44	3.59	0.20
<i>By exporters</i>					
Exporter	32	29.45	1.88	3.37	0.46
Nonexporter	107	19.52	1.50	2.14	0.32
<i>By importer</i>					
Domestic input					
intensive	97	14.27	0.89	4.67	0.53
Imported input					
intensive	42	44.98	2.27	1.61	0.31
<i>By ownership</i>					
Local	103	37.16	1.76	1.87	0.16
Foreign	21	55.73	1.37	2.44	0.19
Joint	15	79.07	1.77	3.20	0.51
<i>By size</i>					
Small	63	10.28	2.27	2.26	0.21
Medium	50	20.93	1.16	2.35	0.25
Large	26	27.18	1.81	2.95	0.44
Total	139	24.23	1.71	2.83	0.40

Note: Observations are weighted by the firm gross output value. Labor productivity, unit cost, and total factor productivity in logs. Technical efficiency is a zero to one index, where one indicates full efficiency.

Source: Author's calculations based on the 1998 enterprise survey.

Table A8.5. Real Productivity Growth
(cumulative percentages weighted, 1995–97)

<i>Characteristic</i>	<i>Number of firms</i>	<i>Labor productivity</i>	<i>Total unit cost</i>	<i>Total factor productivity</i>	<i>Efficiency</i>
<i>By sector</i>					
Commercial					
agriculture	16	3.4	-7.4	6.1	1.0
Agroprocessing	29	63.1	17.5	-19.9	-12.4
Manufacturing	68	23.3	-15.7	25.1	3.9
Construction	11	3.5	0.0	9.7	-1.9
Tourism	15	30.7	14.0	-8.2	-2.9
<i>By exporters</i>					
Exporter	32	71.4	-1.9	2.5	-1.7
Nonexporter	107	5.3	5.4	2.1	-7.5
<i>By importer</i>					
Domestic input intensive	97	42.0	7.8	-9.8	-1.0
Imported input intensive	42	25.6	-3.1	10.4	-6.4
<i>By ownership</i>					
Local	103	-8.2	11.7	2.1	-6.1
Foreign	21	6.2	-4.1	11.8	2.5
Joint	15	12.7	-0.9	0.6	-4.9
<i>By size</i>					
Small	63	2.6	9.3	3.1	-4.6
Medium	50	8.5	4.8	0.4	-11.2
Large	26	45.6	0.3	2.7	-2.8
Total	139	36.7	1.3	2.3	-4.2

Note: Observations are weighted by the firm's gross output value.

Source: Author's calculations based on the 1998 enterprise survey.

Table A8.6. Regression of Productivity Growth
(dependent variable: $\Delta \ln A$)

<i>Independent variable</i>	<i>Labor productivity</i>	<i>Total unit cost</i>	<i>Total factor productivity</i>	<i>Efficiency</i>
Constant	-0.002 (0.788)	0.234 ^b (2.223)	-0.014 ^b (2.376)	-0.109 (0.838)
Initial export	0.009 (0.959)	-0.093 (-1.291)	0.006 ^a (1.663)	0.154 ^a (1.687)
Agricultural	-0.010 (0.724)	-0.244 ^a (-1.828)	0.014 ^b (2.077)	0.071 (0.555)
Agroprocessing	-0.002 (0.135)	-0.161 (-1.308)	0.003 (0.446)	0.071 (0.462)
Manufacturing	-0.003 (0.219)	-0.149 (-1.305)	0.011 ^a (1.765)	0.070 (0.394)
Construction	-0.016 (-1.102)	-0.045 (-0.225)	0.007 (0.971)	0.129 (0.934)
Medium	0.004 (0.721)	-0.025 (-0.297)	-0.001 (0.197)	-0.018 (0.332)
Large	-0.002 (0.187)	-0.052 (-0.566)	0.002 (0.497)	-0.006 (-0.967)
Sample size	278	278	278	278
R ²	0.036	0.032	0.056	0.034

Note: Robust *t*-statistics in parentheses. Initial export is a dummy that takes the value of one if the firm exported at the beginning of the period and zero otherwise. Sector and size dummies take the value of one if the firm is in the category and zero otherwise. The service sector and the small-size dummies are omitted.

a. Significant at the 10 percent level.

b. Significant at the 5 percent level.

Source: Author's calculations based on the 1998 enterprise survey.

Table A8.7. Summary Statistics of Exporters, 1995–97

<i>Category</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>
Exporters in the sample (percent)	23.2	26.6	26.6
Number of firms	41	47	47
Export (percent)	39.2	36.9	37.9
Export/gross output value (unweighted)	9.1	9.8	10.1
<i>Mean output</i>			
Nonexporter	1.159	1.38	1.61
Exporter	4.479	5.49	6.05
<i>Employment</i>			
Nonexporter	60.4	62.7	74.1
Exporter	178.5	189.9	190.1

Note: Mean output in billions of Ugandan shillings. Number of firms is 177.

Source: Author's calculations based on the 1998 enterprise survey.

Table A8.8. Exporting Status, 1995 versus 1997

<i>1995 status</i>	<i>1997 status</i>						<i>Nonexporter</i>	<i>Total</i>
	<i>East Africa only</i>	<i>Rest of Africa only</i>	<i>Europe only</i>	<i>Other countries only</i>	<i>Joint Africa</i>	<i>Joint Africa and elsewhere</i>		
East Africa only	6	0	0	0	0	0	1	7
Rest of Africa only	0	5	0	0	0	0	0	5
Europe only	0	0	1	2	0	0	2	5
Other countries only	0	0	0	3	0	2	0	5
Joint Africa	0	0	0	0	2	0	0	2
Joint Africa and elsewhere	0	0	0	0	0	17	0	17
Nonexporter	4	3	0	0	0	2	127	136
Total	10	8	1	5	2	21	130	177

Source: Author's calculations based on the 1998 enterprise survey.

Table A8.9. Nominal Export Growth Decomposition, Selected African Countries
(percentage)

<i>Category</i>	<i>Uganda</i>	<i>Cameroon</i>	<i>Gabon</i>
Nominal export growth	92.9	82.5	115.2
Incumbent effect	94.9	85.4	115.4
Net entry effect	4.1	8.6	-23.7
Net entry rate	12.0	20.8	-10.0
Relative size	0.345	0.413	0.237
Turnover effect	-6.14	-11.5	-1.53
Turnover rate	12.0	43.8	25.0
Size difference	-0.512	-0.26	-0.06
Period	1995-97	1993-95	1993-96

Source: Author's calculations based on the 1998 enterprise survey for Uganda; Tybout and others (1997) for Cameroon; Barba Navaretti, Faini, and Gauthier (1998) for Gabon.

Table A8.10. Probit Models of the Decision to Export, Uganda and Cameroon, 1997

<i>Independent variable</i>	<i>Uganda</i>		<i>Cameroon^a</i>	
	<i>(a)</i>	<i>(b)</i>	<i>(a)</i>	<i>(b)</i>
Constant	1.512 ^c (0.513)	0.058 (0.888)	-0.433 (-0.198)	-0.944 (-0.29)
Ln (UC) initial	n.a. n.a.	-0.185 (0.224)	n.a. n.a.	-0.325 (0.336)
Ln (UC) final	-0.193 (0.153)	n.a. n.a.	-0.343 ^c (0.115)	n.a. n.a.
Δ Ln (UC)	n.a. n.a.	-0.349 (0.527)	n.a. n.a.	-0.125 (0.176)
Exporter (initial)	n.a. n.a.	3.277 ^c (0.644)	n.a. n.a.	1.513 ^c (0.312)
Agricultural	-2.307 ^c (0.632)	-2.075 ^b (1.153)	n.a. n.a.	n.a. n.a.
Agroprocessing	-2.045 ^c (0.588)	-1.780 ^b (-1.018)	n.a. n.a.	n.a. n.a.
Manufacturing	-2.314 ^c (0.546)	-1.263 (0.926)	n.a. n.a.	n.a. n.a.
Construction	-8.289 (21,124.9)	-6.867 (21,044.2)	n.a. n.a.	n.a. n.a.
Wood product	n.a. n.a.	n.a. n.a.	0.036 (0.307)	-0.011 (0.403)
Textiles/apparel	n.a. n.a.	n.a. n.a.	-0.009 (0.301)	-0.049 (-0.407)
Metal products	n.a. n.a.	n.a. n.a.	-0.159 (0.267)	-0.19 (0.372)
Sample size	126	126	114	114
Log-likelihood function	-52.250	-25.36	—	—

— Not available.

n.a. Not applicable.

Note: Standard error in parentheses. Ln (UC) is the log of unit cost, and Δ Ln (UC) is the variation in the log of unit cost during the period. Exporter (initial) is a dummy variable that takes the value of one if the firm is an exporter in the first period and zero otherwise. Sector dummies take the value of one if the firm is part of the category and zero otherwise. The service sector dummy is omitted in Uganda, and the food sector dummy is omitted in Cameroon. Initial periods: Uganda 1995, Cameroon 1993. Final periods: Uganda 1997, Cameroon 1995.

a. Cameroon: Export dummy in 1995.

b. Significant at the 10 percent level.

c. Significant at the 5 percent level.

Source: Author's calculations based on 1998 enterprise survey for Uganda; Tybout and others (1997) for Cameroon.

Table A8.11. Output Elasticities Used in Computing the TFP, 1995–97

<i>Sector</i>	<i>Factor</i>	1995	1996	1997
Commercial agriculture	Labor	0.212	0.206	0.198
	Materials	0.244	0.228	0.221
	Capital	0.543	0.566	0.581
Agroprocessing	Labor	0.155	0.121	0.109
	Materials	0.592	0.542	0.535
	Capital	0.254	0.337	0.356
Manufacturing	Labor	0.125	0.124	0.132
	Materials	0.463	0.431	0.436
	Capital	0.412	0.445	0.432
Construction	Labor	0.193	0.165	0.163
	Materials	0.388	0.379	0.326
	Capital	0.419	0.456	0.511
Tourism	Labor	0.179	0.153	0.173
	Materials	0.240	0.197	0.218
	Capital	0.581	0.650	0.610
Total	Labor	0.153	0.139	0.141
	Materials	0.435	0.401	0.400
	Capital	0.413	0.460	0.459

Note: Output elasticities for labor and materials are calculated as the share expenditures on materials (including intermediate inputs, utilities, and fuel) and wages (including allowances, bonuses, and statutory payments), respectively. The capital elasticity is calculated as one minus the other two elasticities (see text for details).

Source: Author's calculations based on the 1998 enterprise survey.

Table A8.12. Estimated Parameters of the Frontier Production Function

<i>Independent variable</i>	<i>Random effect</i>
Constant	3.586 ^a (8.755)
Labor	0.151 ^a (4.361)
Capital	0.132 ^a (5.036)
Intermediate inputs	0.692 ^a (30.728)
Sample size	139
R ²	0.857

Note: Standard error on parentheses.

a. Significant at the 5 percent level.

Source: Author's calculations based on the 1998 enterprise survey.

References

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

- Aigner, Denis, and Peter Schmidt. 1977. "Formulation and Estimation of Stochastic Frontier Production Function Models." *Journal of Econometrics* 6(1): 21–37.
- Barba Navaretti, Giorgio, Ricardo Faini, and Bernard Gauthier. 1998. "Enterprise Response to the Devaluation and Fiscal Reforms in Chad and Gabon." Union douanière et économique de l'Afrique centrale (UDEAC) and World Bank, Africa Region, Washington, D.C. Processed.
- Battese George E., and Tim J. Coelli. 1992. "Frontier Production Functions, Technical Efficiency and Panel Data: With Application to Paddy Farmers in India." *The Journal of Productivity Analysis* 3(1–2): 149–65.
- Bauer, Paul W. 1990. "Recent Developments in the Econometric Estimation of Frontiers." *Journal of Econometrics* 46(October–November): 39–56.
- Bernard, Andrew B., and J. Bradford Jensen. 1999. "Exporting and Productivity." Yale School of Management, New Haven, Connecticut. Processed.
- Bigsten, Arne, Paul Collier, Stefan Dercon, Marcel Fafchamps, Bernard Gauthier, Jan Gunning, Jean Haraburema, Abena Oduro, Remco Oostendorp, Catherine Pattillo, Mans Soderbom, Francis Teal, and Albert Zeufack. 2000. "Exports and Firm-Level Efficiency in African Manufacturing." Working Paper Series 2000.16. Oxford University, Centre for the Study of African Economies, U.K.
- . Forthcoming. "Are There Efficiency Gains from Exporting in African Manufacturing." In Augustin Kwasi Fosu, Saleh Nsouli, and Aristomene Varoudakis, eds., *Policies to Foster Manufacturing Competitiveness in Sub-Saharan Africa*. Paris: Organisation for Economic Co-operation and Development, Development Centre.
- Clerides, Sofronis, Saul Lach, and James Tybout. 1998. "Is Learning by Exporting Important? Micro-Dynamic Evidence from Colombia, Mexico, and Morocco." *Quarterly Journal of Economics* 113(3): 903–47.
- Elbadawi, Ibrahim A. 1992. "World Bank Adjustment Lending and Economic Performance in Sub-Saharan Africa in the 1980s: A Comparison of Early Adjusters, Late Adjusters, and Nonadjusters." Policy Research Working Paper no. 1001. World Bank, Development Research Group, Washington, D.C.
- Grossman, Gene M., and Elhanan Helpman. 1991. *Innovation and Growth in the Global Economy*. Cambridge, Massachusetts: MIT Press.

- Haddad, Mona. 1993. "How Trade Liberalization Affected Productivity in Morocco." Policy Research Working Paper no. 1096. World Bank, Development Research Group, Washington, D.C.
- Harrison, Ann E. 1994. "Productivity, Imperfect Competition, and Trade Reform: Theory and Evidence." *Journal of International Economics* 36(1-2): 53-73.
- Husain, Ishrat, and Rashid Faruquee, eds. 1994. *Adjustment in Africa: Lessons from Country Case Studies*. World Bank Regional and Country Studies. Washington, D.C.: World Bank.
- Jondrow James, C. A. K. Lovell, I. S. Materov, and P. Schmidt. 1982. "On Estimation of Technical Inefficiency in Stochastic Frontier Production Model." *Journal of Econometrics* 19(2-3): 233-38.
- Kraay, Aart. 1999. "Exportations et performances économiques: étude d'un panel d'entreprises chinoises." *Revue d'Economie du Développement* 7(1-2): 183-207.
- Lovell, C.A.K., J. Defourny, and A.G.M. N'Gbo. 1992. "Variation in Productive Efficiency in French Workers Cooperative." *Journal of Productivity Analysis* 3(1-2): 103-117.
- Matin, Kazi M. 1992. "Openness and Economic Performance in Sub-Saharan Africa: Evidence from Time-Series Cross-Country Analysis." Policy Research Working Paper no. 1025. World Bank, Development Research Group, Washington, D.C.
- Nishimizu, Mieko, and Sherman Robinson. 1984. "Trade Policies and Productivity in Semi-Industrialized Countries." *Journal of Development Economics* 16(1-2): 177-206.
- Pack, Howard. 1988. "Industrialization and Trade." In Hollis Chenery and T. N. Srinivasan, eds., *Handbook of Development Economics*. Amsterdam: North-Holland.
- Roberts, Mark, and James R. Tybout. 1995. "An Empirical Model of Sunk Costs and the Decision to Export." Policy Research Working Paper no. 1436. World Bank, Development Research Group, Washington, D.C. Processed.
- . 1997. "Producer Turnover and Productivity Growth in Developing Countries." *The World Bank Research Observer* 12(1): 1-18.
- Rodrik, Dani. 1988. "Imperfect Competition, Scale Economies and Trade Policy in Developing Countries." In Robert E. Baldwin, ed., *Trade Policy Issues and Empirical Analyses*. National Bureau of Economic Research Conference Report Series. Chicago: University of Chicago Press.
- Schmidt, Peter, and Robin C. Sickles. 1984. "Production Frontiers and Panel Data." *Journal of Business and Economic Statistics* 2(4): 367-74.

- Sullivan, Theresa, James R. Tybout, and Mark Roberts. 1995. "What Makes Exports Boom? Evidence from Plant-Level Panel Data." World Bank, Africa Region, Washington, D.C. Processed.
- Tybout, James R. 1992. "Linking Trade and Productivity: New Research Directions." *World Bank Economic Review* 6(2): 189–211.
- Tybout, James R., Bernard Gauthier, Giorgio Barba Navaretti, and Jaime DeMelo. 1997. "Firm-Level Response to the CFA Devaluation in Cameroon." *Journal of African Economies* 6(1): 3–34.
- UNCTAD (United Nations Conference on Trade and Development). 1998. *Trade and Development Report*. Paris.
- World Bank. 1994. *Adjustment in Africa: Reforms, Results and the Road Ahead*. New York: Oxford University Press.

Part IV

Government Performance from a Beneficiary Perspective

A Quest for Revenue and Tax Incidence

Duanjie Chen, John Matovu, and Ritva Reinikka

One of the main accomplishments of the Ugandan government in the 1990s was the removal of massive implicit taxation on exports. This chapter assesses how tax policy evolved after export taxation was eliminated, how the government was able to meet its revenue needs in a less predatory fashion, and how these policies affected households and firms. Because of the past predatory taxation and prolonged conflict, government revenue was only 5 percent of gross domestic product (GDP) when Uganda began its recovery in 1986. Simultaneously, the needs for public spending on social services and infrastructure were massive to support impoverished households' efforts to increase their production, consumption, and welfare, and to encourage enterprises to invest and diversify. This led policymakers to pursue a rapid increase in domestic revenue and a corresponding increase in public services. Rebuilding the government's revenue base was an essential feature of Uganda's economic recovery. Institution building for tax administration resulted in the semiautonomous Uganda Revenue Authority (URA), established in 1991, inspired by Ghana's example. Because the URA is not part of the civil service, it can offer higher pay and attract more qualified staff. Consequently, domestic revenue more than doubled in real terms during the first half of the 1990s, and by 1996 was 11.3 percent of GDP (table 9.1).¹ In conjunction with large aid inflows, this allowed public expenditure to grow far more rapidly than GDP (which itself was growing rapidly) without destabilizing the economy.

1. In Uganda GDP includes the nonmonetary (subsistence) sector. Domestic revenue was 7.6 percent of monetary GDP in 1986 and increased to 15.5 percent of monetary GDP in 1999.

Table 9.1. Central Government Revenues, 1991/92–1998/99

<i>Revenue category</i>	<i>1991/92</i>	<i>1992/93</i>	<i>1993/94</i>	<i>1994/95</i>	<i>1995/96</i>	<i>1996/97</i>	<i>1997/98</i>	<i>1998/99</i>
<i>U Sh millions</i>								
Taxes on income and profits	23,600	40,900	53,000	77,200	82,600	102,200	124,750	170,040
Excise taxes	15,000	18,800	40,500	50,600	217,000	301,500	304,050	322,870
Petroleum products	n.a.	n.a.	n.a.	n.a.	149,900	197,500	188,270	193,210
Other	n.a.	n.a.	n.a.	n.a.	67,100	104,000	115,780	129,660
Taxes on goods and services	55,500	75,100	92,800	153,000	188,700	209,600	247,200	298,600
Value added tax	n.a.	n.a.	n.a.	n.a.	n.a.	209,600	247,200	298,600
Sales tax	43,400	62,900	75,300	128,700	162,300	n.a.	n.a.	n.a.
Commercial transaction levy	5,400	9,600	15,300	22,300	25,600	n.a.	n.a.	n.a.
Other	6,700	2,600	2,200	2,000	800	n.a.	n.a.	n.a.
Taxes on international trade	78,600	124,230	152,500	205,500	100,500	74,800	78,400	96,530
Import duties	76,600	124,230	152,500	176,700	75,900	72,300	78,050	96,480
Export duties (coffee)	2,000	0	0	28,800	24,600	2,500	350	50
Total tax revenue	172,700	259,030	338,800	486,300	588,800	688,100	754,400	888,040
Total nontax revenue (fees and licenses)	13,295	22,404	25,063	40,400	38,400	43,300	47,060	62,700
Total revenue	185,995	281,434	363,863	526,700	627,200	731,400	801,460	950,740

(table continues on following page)

Table 9.1 continued

<i>Revenue category</i>	<i>1991/92</i>	<i>1992/93</i>	<i>1993/94</i>	<i>1994/95</i>	<i>1995/96</i>	<i>1996/97</i>	<i>1997/98</i>	<i>1998/99</i>
CPI, annual average (1991 = 100)	195	253	270	287	308	332	352	351
Real domestic revenue	95,415	111,075	134,725	183,795	203,612	220,098	227,974	270,866
GDP at factor cost	2,588,800	3,625,938	4,069,439	4,922,397	5,565,388	6,022,953	7,104,303	7,887,246
GDP at market prices	2,745,491	3,870,388	4,400,270	5,367,456	6,122,089	6,663,235	7,791,426	8,647,425
Monetary GDP at factor cost	1,794,145	2,481,870	2,890,811	3,619,057	4,213,995	4,717,950	5,467,267	6,119,562
<i>Percentage share of total domestic revenue</i>								
Taxes on income and profits	12.7	14.5	14.6	14.7	13.2	14.0	15.6	17.9
Excise taxes	8.1	6.7	11.1	9.6	34.6	41.2	37.9	34.0
Petroleum products	n.a.	n.a.	n.a.	n.a.	23.9	27.0	23.5	20.3
Other	n.a.	n.a.	n.a.	n.a.	10.7	14.2	14.4	13.6
Taxes on goods and services	29.8	26.7	25.5	29.0	30.1	28.7	30.8	31.4
Value added tax	n.a.	n.a.	n.a.	n.a.	n.a.	28.7	30.8	31.4
Sales tax	23.3	22.3	20.7	24.4	25.9	n.a.	n.a.	n.a.
Commercial transaction levy	2.9	3.4	4.2	4.2	4.1	n.a.	n.a.	n.a.
Other	3.6	0.9	0.6	0.4	0.1	n.a.	n.a.	n.a.

(table continues on following page)

Table 9.1 continued

Revenue category	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99
Taxes on international trade	42.3	44.1	41.9	39.0	16.0	10.2	9.8	10.2
Import duties	41.2	44.1	41.9	33.5	12.1	9.9	9.7	10.1
Export duties (coffee)	1.1	0.0	0.0	5.5	3.9	0.3	0.1	0.0
Total tax revenue	92.9	92.0	93.1	92.3	93.9	94.1	94.1	93.4
Total nontax revenue (fees and licenses)	7.1	8.0	6.9	7.7	6.1	5.9	5.9	6.6
Total revenue	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Real change in total revenue	-4.5	16.4	21.3	36.4	10.8	8.1	3.6	18.8
Total revenue as share of GDP at factor cost	7.2	7.8	8.9	10.7	11.3	12.1	11.3	12.1
Total revenue as share of GDP at market prices	6.8	7.3	8.3	9.8	10.2	11.0	10.3	11.0
Total revenue as share of monetary GDP at factor cost	10.4	11.3	12.6	14.6	14.9	15.5	14.7	15.5

n.a. Not applicable.

CPI Consumer price index.

Source: Ministry of Finance, Planning, and Economic Development data.

The policy of rapidly increasing public revenue presented a tradeoff for the economic liberalization program. In particular, it curtailed the scope for trade reform. The coffee export tax was abolished early on, but tariffs and other import taxes were retained, initially at a high level because of the quest for revenue. Even by 1996, import taxes (including petroleum) still accounted for more than half of total revenue. As argued in chapter 2, the Ugandan government initially did not recognize the close relationship between export taxes and import taxes, specifically that import taxes are ultimately borne by export producers, in particular, coffee farmers. Hence, the switch from export taxation to import taxation probably achieved less than expected in terms of export orientation and diversification.

For most of the 1990s the government had an explicit target of increasing revenue by one percentage point of GDP each year. This target was not backed, however, by a concrete strategy and administrative measures to encourage such growth. Over time the government increasingly relied on ad hoc increases in tax rates—particularly fuel taxes—to achieve the revenue target, without specific knowledge of the supply-side effects. While import tariffs protected the producers oriented toward the local market, high tax rates generally encouraged seeking and granting of firm-specific exemptions and tax holidays, adversely affecting competition. The revenue target was met in the early 1990s, but since 1996 the recovery has nearly stalled.

The rapid increase in domestic revenue may not have been the best strategy. The corresponding expansion in government expenditure may not have paid off well at the margin in terms of service delivery (see chapter 11 in this volume), while the cost of taxation was probably high in terms of bureaucratic control and opportunities for corruption (see chapter 10 in this volume). Thus resource misallocation and foregone private investment likely undermined growth and the prospects for increasing public revenue in a more sustainable manner.

As discussed in chapters 2 and 3, Ugandan policymakers have demonstrated a remarkable ability to readjust economic policy when necessary. During the second half of the 1990s, import tariffs were reduced considerably and several tax reforms were implemented, including the value added tax (VAT) and income taxation. Consequently, the tax system is gradually being transformed from high tax rates and selective incentives toward lower rates and more standard provisions across the board. The challenges now are to build a tax culture of compliance and administration that the public perceives as fair and efficient. This chapter takes first a closer look at the policy of rapidly increasing revenue and recent tax reforms. It then uses household survey evidence (see appendix A at the end of the book for details) to identify which taxes are progressive and whether tax reforms helped the poor or left them worse off. Similarly, it examines business taxation to answer three questions: What is the actual tax burden on firms' capital investment and the overall cost of production across various industries? How does this burden compare to that in Kenya and Tanzania, which compete for the same foreign

investment? How does poor compliance and tax administration affect tax incidence on the enterprise sector?

Revenue Trends and Tax Reforms

In the 1990s, import duties levied on both consumer goods and raw materials accounted for the largest share of central government revenues, reflecting a policy switch from export to import taxation (table 9.1). The share of import duties reached its highest level of 44 percent in 1992/93. Including sales tax on imported goods, import taxation has been well over half of total revenues. Subsequent import liberalization produced a more uniform tariff tax structure and reduced the level and dispersion of tariffs (from 10 to 350 percent in 1992/93 to 0 to 15 percent today for nonregional trade). Petroleum is the most important taxable item; since 1991/92 it has contributed more than 30 percent of total revenues, including import duty and excise tax. The ad valorem rate for fuels ranges from 100 percent to more than 200 percent for paraffin, diesel, and petroleum products, with an estimated weighted average rate of 174 percent (table A9.6). A high fuel tax is common in many industrial economies, particularly for environmental reasons. What makes it problematic in Uganda is that Kenya and Tanzania's much lower fuel tax rates result in substantial smuggling (table A9.9).

A tax on coffee exports was reintroduced as a stabilization measure during the coffee boom in 1994/95 (see chapter 3 in this volume). A year later, international coffee prices declined to less than the price threshold set for the coffee tax. The tax rate of 32 percent above the threshold level was revised to 25 percent in 1995/96, and later abolished. In principle, a coffee tax could shift forward to buyers of the export good, or it could shift to its producers in the form of a reduced producer price. Elastic supply of and inelastic demand for the taxed commodity usually shift the tax to consumers, but with inelastic supply, elastic demand, and a competitive producer market, the tax burden falls on producers. Small developing countries that produce primary commodities are usually price-takers internationally. Hence, even though the coffee stabilization tax was not targeted at coffee farmers, it did indirectly tax them.

The second largest source of revenue is the VAT, which followed the sales tax on goods and the commercial transaction levy on services. Introducing the VAT was regarded as crucial to the government's longer-term strategy to broaden the tax base, improve compliance, and increase revenue collection. By 1991/92, taxes on goods and services constituted 30 percent of total revenues, and have remained at that level since then. The introduction of the VAT in 1996 was accompanied by a small temporary decrease in its share of revenue compared with the sales tax, which has since been recovered. While sales taxes varied considerably by commodity (table A9.1), the VAT has a single rate of 17 percent. To take into account equity concerns, some goods considered to have substantial budget shares in the consumption basket of

the lowest income earners were exempted, including unprocessed foodstuffs, social services, passenger transport services, and fuels.²

Before liberalization, the government instituted a range of tax incentives in the early 1990s to compensate firms that undertook major investment projects for prevailing distortions. The 1991 Investment Code included project-based licensing of large investments. A typical license entitled its holder to a full or partial income tax holiday and duty exemptions on imported inputs (see chapter 2 in this volume). As distortions were later reduced by the economic liberalization program, the government implemented an income tax reform in 1997 to streamline the tax incentive system. (Duty-free treatment of imported capital goods for all firms had been introduced in 1995.) The objective of the income tax reform was to broaden the tax base, increase administrative simplicity, and encourage long-term investment and technology transfer. Table A9.6 summarizes key features of the pre- and post-1997 business taxation, including capital taxes, indirect taxes applicable to inputs, and payroll taxes.³

Finally, the graduated personal tax (GPT) is a major source of locally raised revenue, although its revenue yield is limited. The legal base of the GPT is income, but in practice it is an income tax, a wealth tax, or a poll tax, depending on the district and subject of taxation (Bahl 1997). Because the threshold is about half the lower threshold of the central government income tax on individuals, the tax is regressive over much of the income scale.⁴ The GPT is assessed and collected as a presumptive tax on almost all tax subjects in rural areas and the self-employed in urban areas. In its present form the GPT represents an expensive form of tax administration and, because presumptive assessment can imply subjectivity and arbitrariness, is often perceived as unfair.

2. Excise taxes are of two types: those levied on imports and those levied on locally produced goods that are often considered as luxury items. The share of nonpetroleum excise duties in total revenues was only 8.1 percent in 1991/92, and increased to about 14 percent in 1998/99. Income taxes are composed of the corporate (profit) tax and pay-as-you-earn personal income tax. The overall contribution of income and profit taxes to revenue remained relatively modest, averaging about 14 percent throughout the 1990s. Only since 1997/98 has this contribution increased noticeably, likely reflecting the income tax reform of 1997.

3. Investment analysis in chapter 7 relates the probability of a firm to invest and its investment level to several variables, including firm characteristics, changes in demand, and profits. Using the same flexible accelerator model of investment, tax exemptions are added in the regression. They enter negatively but are insignificant. Hence, despite their important role as policy instrument, tax exemptions do not seem to explain either the probability that a firm invests or the level of investment of Ugandan firms in 1996–97.

4. In 1997 the GPT had 36 rate brackets, with a specific rate up to a maximum payment of U Sh 80,000 at the annual income level of U Sh 820,000.

Method and Data for Tax Incidence Analysis

In examining the impact of tax reforms on households, particularly whether tax reforms have made the poor better or worse off, this chapter applies the welfare dominance analysis (see annex 9.1). The method is based on the concentration curves that measure the fraction of total expenditure on a commodity ascribed to different income groups when ordered according to the level of income or consumption expenditure.⁵ In this analysis, concentration curves plot households from poorest to wealthiest on the horizontal axis against the cumulative proportion of taxes paid by households (figures A9.1 and A9.2). In this method, the more a concentration curve moves away from the 45-degree straight line, the more progressive is the tax. For one tax to dominate the other, the difference in their concentration curves must be non-negative over the whole range of incomes. When the Gini coefficient for a given tax is greater than the Gini coefficient of per capita expenditure, then the tax is considered to be progressive. Similarly, the comparison of Gini coefficients before and after the tax reforms indicate how the progressivity of taxation has changed over time (tables A9.2 and A9.3).

Several assumptions are made. The factors that produce the incomes are assumed to pay the associated direct taxes, while households that consume the taxed items are assumed to pay the indirect taxes. Thus smokers pay taxes on tobacco and households that use paraffin pay taxes on paraffin. Import duties are more difficult to capture from a household survey, because of the lack of differentiation between domestically produced and imported consumer goods. The prices of all goods for which imports compose a large share of the market are assumed to go up by the amount of the tariff when it is levied. Finally, most of the analysis relies on statutory tax rates rather than on any estimates of taxes actually paid.

The data on household expenditures are obtained from the 1992/93 integrated household survey (see appendix A at the end of the book). Table A9.1 shows the various consumer goods and their corresponding tax rates before and after reforms. Most import duties were reduced considerably by 1995. This table also shows the various rates of the 1992 sales tax, which was replaced by a uniform 17 percent VAT rate in 1996 (some goods are zero-rated). Uganda uses a different import tariff regime for regional and external trade. The different tax rates on various products depending on the import source

5. The concentration curve is similar to the Lorenz curve, which is a graphical presentation of inequality. For the Lorenz curve household expenditures are arranged in ascending order, and the cumulative share of total expenditures is plotted against the cumulative share of population. For complete equality the Lorenz curve would be a straight line; it becomes more curved when inequality rises. The Gini coefficient is the ratio of the area between the straight line and the Lorenz curve to the total area under the straight line.

could be identified, but identifying the origin of the imported product consumed by a particular household would be difficult. Therefore, no attempt is made to calculate import duties based on the countries of import, but the external regime of import duties is used.

For the tax incidence on firms, the marginal effective tax rate (METR) on investment and production costs is chosen as the quantitative indicator. The key assumption underlying the METR concept is that a profit-maximizing firm invests (or produces) as long as the after tax marginal revenue from its investment (production) exceeds the marginal cost. While the marginal revenue is not easily observable in practice, data on the marginal cost can be obtained. For example, when estimating the METR on capital, the marginal cost is the sum of the financing cost of investment and the economic depreciation rate, adjusted for all relevant taxes and tax allowances. Hence, the marginal effective tax rate measures the impact of a tax system on an incremental unit of capital investment or business activity (see annex 9.2).⁶

The METR incorporates the effects of both statutory tax rates and related tax incentives (such as tax depreciation, tax credit, tax deductibility, and tax holidays) as well as various industry-specific and economywide factors interacting with these taxes (including financial costs, inflation, and capital structure). Because of this interaction, the effective tax rate can vary by industry or tax jurisdictions under the same tax regime. The difference in the METR across various investors or sectors quantifies the tax bias at the margin and, other things being equal, indicates how tax policy is likely to affect investment decisions.

In a low-income country like Uganda where the tax administration is relatively weak, the actual tax incidence is likely to differ from the formal tax structure. While the analysis can be extended to compare the impact of the formal tax structure across industries or jurisdictions, obtaining adequate information about actual administrative practices and detailed industrial parameters is more difficult. Thus the issue is not so much whether the METR method can handle the real world, but how well analysts understand the real world and are able to quantify the differences between the formal tax structure and actual tax collection. Although the analysis presented in this chapter is based on Uganda's formal tax system, it uses actual firm-level data for key nontax parameters (see appendix B at the end of the book). The capital structure by industry was obtained from the URA taxpayer database, while the cost structure by industry was estimated from 1992 input-output tables

6. For example, if the gross-of-tax rate of return to capital is 15 percent and the net-of-tax rate of return is 12 percent, the marginal effective tax rate on capital is 25 percent if the after tax return is used as the denominator, or 20 percent if the before tax return is the denominator. This study uses the former convention, as it is more convenient when calculating the METR on the cost of production.

(Republic of Uganda 1995). Firm survey evidence is also used to explore the effect of compliance and tax administration on the METR.

Tax Incidence on Households

This section presents the tax incidence analysis on households both before and after tax reforms. It first explores the extent to which the overall tax system is progressive or regressive. To determine this, all the taxes paid by the household are aggregated and the (extended) Gini coefficients of the aggregate taxes are compared with those of total household expenditure. The results presented in table A9.2 indicate that, by and large, the tax structure was progressive before reforms. Concentration curves for the main tax categories shown in figure A9.1 confirm this. Most individual tax categories were also found to be progressive before reforms, with the exception of the excise tax and the graduated personal tax. In particular, the excise tax on paraffin—which is heavily consumed by the poor—was highly regressive. By attaching a higher weight to commodities consumed by the poor (parameter v in tables A9.2 and A9.3), excise taxes on paraffin became even more regressive. Pay-as-you-earn was the most progressive tax. This tax is levied on formal sector employees and hence tends to be concentrated among the better-off. Because the minimum threshold to be liable for this tax is relatively high, it exempts the lowest income groups. Import taxes were the second most progressive category, followed by the sales tax.

The incidence analysis shows that after reforms, the overall tax system remained progressive (table A9.3). The results are consistent with findings of similar studies on Ghana and Madagascar (Younger 1996; Younger and others 1999). The Gini coefficients before and after reforms confirm that substitution of the VAT for the sales tax does not necessarily worsen the welfare of the poor (tables A9.2 and A9.3).⁷ The pay-as-you-earn tax remains the most progressive tax after reforms. However, determining conclusively which of the other taxes (VAT, import tax, and excise tax) dominates after the reforms is not possible.

Some important changes in the Gini coefficients occurred after the tax reforms (table A9.3). The coefficient of the aggregate excise taxes shows that these taxes were made more progressive by the reform. Import duties, however, became more regressive. The Gini coefficient of the coffee stabilization tax is considerably below that of other taxes, implying that an export tax on a primary commodity can be highly regressive. The burden lies heavily on rural producers as exporters shift the tax to them. As confirmed by the test statistic (table A9.5), the coffee stabilization tax dominates all other taxes.

7. While the results show that the VAT is a progressive tax, it is inconclusive from the welfare dominance test whether the VAT is much more progressive than a sales tax (tables A9.4–A9.5).

To raise public revenue, petroleum products have been heavily relied on, as their demand is considered inelastic. Applying the statutory tax rates directly to petroleum consumption shows that petroleum taxes (apart from those on paraffin) are very progressive. This incidence analysis, however, ignores the indirect or intermediate effects of petroleum taxation on the other sectors. These indirect price effects of petroleum taxes can be obtained from the input-output table and assigned to the corresponding commodities in the household survey (Republic of Uganda 1995). Two types of taxes are considered. First, import duties levied on petroleum products are imputed on all other sectors. Second, the excise tax has a strong effect on prices in the transport sector. When these effects are taken into account, petroleum taxes are no longer as progressive as in the initial analysis.⁸

Marginal Effective Tax Rate for Firms

This section covers estimates of the METR on capital and cost of production for Ugandan firms operating in commercial agriculture, agroprocessing, manufacturing, construction, transportation, communication, and tourism. The METR on capital includes four types of assets (buildings, machinery, inventories, and land), two different tax regimes (the pre- and post-1997 tax system), and three tax codes (regular taxable, tax holiday, and small firms). Various policy options are also simulated.⁹ The METR estimation on the cost of production includes three key inputs: capital, labor, and fuel.

The estimation of the METR is not only sensitive to tax policy, but also to the choice of nontax parameters, such as macroeconomic indicators and industry-specific parameters. These include inflation rate, interest rate, debt-to-assets ratio, economic depreciation rate, capital structure, and cost structure (table A9.7). While inflation and the interest rate are usually the same for all industries within an economy, the other parameters vary by sector. Depreciable assets used by different industries can have a different useful life and replacement cost, which results in a different economic depreciation rate. Capital structures also vary by industry. Compared with tourism, for example, the capital structure in manufacturing is more intensive in machinery and inventories and less intensive in buildings.¹⁰

8. While the excise tax on gasoline—without taking into account indirect effects on other sectors—gives progressive Gini coefficients of 0.899 to 0.992 (for $v = 2, 4, 6, 8, 10$), taking into account indirect effects on other sectors yields less progressive results of 0.436 to 0.726 for the same values of v . The higher the value of the parameter v , the higher weight is attached to goods consumed by the poor.

9. Overall, the discussion focuses on large and medium-size firms (firms that have more than 20 employees); small firms are discussed as a special case.

10. Chen and Reinikka (1999) provide a discussion on nontax parameters as well as sensitivity analyses for the base case assumptions.

METR on Capital

Capital investment generally involves two categories of capital, depreciable and nondepreciable assets. These categories can be further divided into buildings and machinery (depreciable), and inventory and land (nondepreciable). Capital taxes in Uganda are summarized in box 9.1. As mentioned earlier,

Box 9.1. Capital Taxes

Capital taxes include company income tax (and related tax allowances), personal income taxes on investment income, presumptive tax on small businesses, municipal property taxes, and import duties applicable to capital goods. The company income tax is 30 percent. Firms are allowed to carry over their operating losses indefinitely, except for those firms that enjoy a tax holiday. Two types of deductions from the company income tax are allowed: the initial investment allowance and the annual depreciation allowance. Investment in machinery and plant is strongly encouraged through tax incentives; such investment is entitled to both the initial allowance and the annual depreciation allowance available to all taxable firms.

The initial allowance for investment in machinery and plant (except for vehicles) is 50 percent in five main industrial locations—Kampala, Entebbe, Namanve, Jinja, and Njeru—and 75 percent elsewhere in Uganda. The annual depreciation rate is 40, 35, 30, and 20 percent for the four different classes of machinery and plant, respectively. For industrial buildings, there is no initial allowance, and the annual depreciation rate is much smaller (5 percent) than for machinery. However, expenditures on acquiring farm structures are entitled to a higher annual depreciation allowance of 20 percent. Before the 1997 tax reform, the annual depreciation rate for structures was 4 percent, while machinery and plant were divided into three classes, with the annual depreciation rate at 50, 40, and 20 percent, respectively. The classification of machinery was also changed significantly in 1997.

Before the income tax reform, a holder of the certificate of investment incentives was exempted from company income tax, withholding tax, and tax on dividends for a certain period, depending on the total value of the investment. New tax holidays were repealed in 1997, and interest and dividends are both taxed at 15 percent. A presumptive tax on small businesses was introduced in 1997, while previously most small firms had no tax obligations. Instead of paying a regular income tax, a small firm with annual turnover below U Sh 50 million is subject to a presumptive tax up to 1 percent of its gross turnover, unless it opts to file the regular income tax return. This tax is final and no deductions for capital expenditure or other business expenses are allowed. Finally, municipalities impose a property tax on immovable property or buildings, but not on vacant land. For example, in Kampala the property tax rate is 10 percent on the ratable value, which is obtained by deducting maintenance cost from the gross value, or the rent one may expect to receive from the property.

capital investment by asset type varies by industry. Consequently, even if a certain type of asset incurs the same METR, the different capital structure by industry will result in a different aggregate METR on capital across industries. The cost structure by input varies also by industry.

ASSET TYPE. The base case is the 1997 regular taxable firm. As table 9.2 shows, machinery is the lowest taxed asset in Uganda. This is mainly because of the generous initial allowance of 50 percent, along with the annual depreciation allowance that begins the first year. In fact, the METR on machinery is negative in several industries, which indicates a tax subsidy.¹¹ The transportation sector, however, incurs a relatively high METR of 17 percent on machinery, mainly because vehicles are not eligible for the initial allowance.

Inventories are the highest taxed asset, with an METR of 45 percent. This is mainly because of the first-in-first-out (FIFO) accounting method used by most Ugandan firms, combined with a positive inflation rate. Buildings, except those used by commercial agriculture, are taxed the second highest (an METR of more than 40 percent), mainly because of the local property tax on buildings, combined with less generous tax depreciation allowances. Because of a more generous depreciation allowance for farm works, buildings used in commercial agriculture bear a low tax burden (an METR of 12 percent). Structures used by the construction industry incur a higher METR than other sectors, mainly because of a higher economic depreciation rate. Finally, nonfarm land is also subject to the local property tax, resulting in a relatively high METR (42 percent), while farmland incurs a significantly lower METR (28 percent).

As shown in table 9.2, while nondepreciable assets such as inventories and land are taxed at the same level across industries, depreciable assets, such as buildings and machinery, are taxed unevenly. This is because depreciable assets used by different industries have different useful lives and different tax depreciation allowances. For a given depreciable asset, the wider the gap between the economic and tax depreciation rate, the higher the METR.

INDUSTRIES. The aggregate METR for each industry is simply a proportional difference between the weighted average of the before tax and after tax rate of return by asset, based on the industry-specific capital structure. Obviously, the larger the share of the assets that are highly taxed, the higher the industry's aggregate METR. As shown in table 9.2, tourism incurs the highest METR (39 percent) in the base case. This is mainly a result of its high capital weight in buildings, the second highest taxed asset. Manufacturing incurs the second highest METR (33 percent), mainly because the

11. As a firm is taxed as a whole rather than by asset type or at the margin, this tax subsidy on machinery can be thought of as reducing the tax on income generated by other type of investment.

Table 9.2. Marginal Effective Tax Rate on Capital for Ugandan Firms
(percent)

<i>Category</i>	<i>Commercial agriculture</i>	<i>Agroprocessing</i>	<i>Manufacturing</i>	<i>Construction</i>	<i>Transportation</i>	<i>Communications</i>	<i>Tourism</i>
<i>Regular taxable case, 1997</i> (interindustry dispersion: 3.9)							
Buildings	11.7	43.4	44.3	48.4	42.7	44.9	43.0
Machinery	-0.3	0.6	1.4	-0.4	16.6	-1.1	2.9
Inventory	45.2	45.2	45.2	45.2	45.2	45.2	45.2
Land	27.5	41.7	41.7	41.7	41.7	41.7	41.7
Aggregate	26.2	23.2	32.9	23.5	20.9	31.0	39.2
<i>Regular taxable case, pre-1997</i> (interindustry dispersion: 3.4)							
Buildings	30.4	46.5	47.6	51.9	45.9	48.2	46.2
Machinery	20.4	29.9	32.9	21.0	25.5	32.6	30.4
Inventory	45.2	45.2	45.2	45.2	45.2	45.2	45.2
Land	27.5	41.7	41.7	41.7	41.7	41.7	41.7
Aggregate	32.3	38.1	42.5	34.1	28.7	42.8	43.9
<i>Difference from the 1997 regular taxable case</i>							
	6.1	14.9	9.6	10.6	7.8	11.9	4.7

(table continues on following page)

Table 9.2 continued

Category	<i>Commercial</i>						
	<i>agriculture</i>	<i>Agroprocessing</i>	<i>Manufacturing</i>	<i>Construction</i>	<i>Transportation</i>	<i>Communications</i>	<i>Tourism</i>
<i>Tax-holiday case, pre-1997</i>							
(interindustry dispersion: 2.4)							
Buildings	15.8	28.5	29.0	31.1	28.2	32.1	28.4
Machinery	26.7	25.3	26.6	25.6	27.6	31.5	28.7
Inventory	15.3	12.8	12.8	12.8	12.8	15.3	12.8
Land	8.0	18.2	18.2	18.2	18.2	20.0	18.2
Aggregate	15.0	23.6	22.3	21.0	26.9	30.2	26.3
Difference from the 1997							
regular taxable case	-11.2	0.4	-10.6	-2.5	6.0	-0.7	-12.9

Source: Authors' calculations based on data provided by the Ministry of Finance, Planning, and Economic Development and the URA.

sector invests about two-thirds of its total capital in the two highest taxed assets, inventories and buildings.

In contrast, transportation enjoys the lowest METR on capital of all sectors (21 percent). The primary reason is its heavy capital weight in machinery, particularly vehicles which have a relatively high annual depreciation allowance (30 percent). For the same reason, agroprocessing and construction incur a relatively low METR (23 and 24 percent, respectively). The METR on capital for commercial agriculture and the communications industry are in the middle (with METRs of 26 and 31 percent, respectively). Agriculture has a high capital share in inventories, while communications has a high capital share in buildings.

SMALL FIRMS. Small firms do not pay regular income taxes unless they opt to do so, but are instead levied a presumptive tax up to 1 percent of their gross turnover. Here, small firms refers to firms qualifying for and choosing to pay the presumptive tax. Because the presumptive tax is imposed on the gross receipts without any adjustments, small firms are neither entitled to the generous initial allowance for investment in machinery nor subject to any restrictions on writing off business expenditure. Consequently, the METR for small firms is lower than for large and medium-size regular taxable firms on all other assets but machinery (table A9.8). However, unless engaged in commercial agriculture, small firms still pay municipal property taxes. Therefore, buildings and land are taxed higher than investment in machinery and inventory by small firms. As depreciable assets wear off at a different pace from industry to industry, buildings and machinery incur a different METR across industries, despite being subject to the same presumptive tax rate and having no differentiated sector-specific tax allowances. Compared with the base case (regular taxable firm) by industry, small firms are taxed significantly less as measured by the aggregate METR on capital. The gap ranges from 15 percentage points in agroprocessing to more than 24 in manufacturing. Furthermore, the interindustry dispersion is smaller than in the base case of the regular taxable firm.

Impact of Tax Reform

This section examines the impact of income tax reforms on regular taxable firms and compares them with the firms that had been granted tax holidays.

REGULAR TAXABLE FIRMS. As shown in table 9.2, the tax burden incurred by large and medium-size regular taxable firms was significantly reduced following the 1997 income tax reform. The difference in the aggregate METR between the two systems is 5 to 15 percentage points. The most striking change is the difference in the METR on machinery, varying from 9 percentage points for transportation to 34 percentage points for the communications sector. This is mainly because of the generous initial allowance for investment in machinery and equipment available to all tax paying firms under the new system. The other contributor is the zero-rated import duty for imported machinery.

Following the reform, the METR on buildings declined about three percentage points, mainly because the annual depreciation allowance increased from 4 to 5 percent. The wider gap (about 19 percentage points) for commercial agriculture reflects a higher annual allowance for farm works. The METR for inventory and land did not change.

REGULAR TAXABLE VERSUS TAX HOLIDAY FIRM. Corporate tax holidays were abolished in 1997 and replaced mainly by an initial investment allowance for machinery. Consequently, the METR on machinery was reduced approximately 25 percentage points across industries, except in transportation. This indicates that, given the generous allowances, profitable firms that invest heavily in machinery can benefit from opting out from the tax holiday status. For all other assets, however, the METR was lower under the tax holiday regime.¹²

Those investing heavily in machinery gained most from the tax reform, reflecting the policymakers' desire to provide incentives for acquiring new technologies. The most evident example is the transportation industry, where the advantage measured by the METR for regular taxable firms over their tax holiday counterparts is 6 percentage points. However, the METR for the regular taxable firms in the tourism sector is 13 percentage points more than their tax holiday counterparts, because of the high capital share in structures. Similarly, commercial agriculture and manufacturing incur a higher METR (11 percentage points) under the new system, as these industries invest more in nondepreciable assets, particularly inventories for which the tax holiday regime was more advantageous.¹³

METR on Cost Production

The METR on cost of production is used to evaluate the impact of all business taxes—including capital, payroll, and indirect taxes—on overall business activities. It is estimated as an integration of the METR on various inputs, using the augmented Cobb-Douglas production function (see annex 9.2). As fuel tax is an important revenue source in Uganda, motor fuel—along with capital and labor—is included as an input for production.¹⁴ As shown in

12. As can be seen from table 9.2, interindustry tax distortion increased following the tax reform (see annex 9.2 for definition). Further analysis shows that the main contributor was the difference in the METR between commercial agriculture and all other sectors. As farm works are entitled to a fast write-off and properties used for commercial agriculture are exempt from municipal property tax, buildings and land are taxed much less than in the other sectors.

13. Chen and Reinikka (1999) provide policy simulations and sensitivity analyses for nontax parameters, including choice of accounting method, initial allowance for buildings, municipal property tax on small firms, inflation rate, debt-to-assets ratio, and economic depreciation rate.

14. The combined fuel tax rate for Uganda is the ad valorem rate on the total cost, insurance, and freight destination warehouse cost, including all handling charges. The

table 9.3, the cost structure varies across industries. Capital accounts for the largest share, which probably reflects the low labor costs in Uganda. Furthermore, as agroprocessing requires a higher share of transportation services than commercial agriculture, the share of fuel in its total cost is 9 percent, while it is only 1 percent in commercial agriculture.

Table 9.3 summarizes the METR on each of the three inputs as well as on the overall cost of production by industry. The METR on capital uses the base case (regular taxable firm under the 1997 tax system), the METR on labor is the statutory payroll tax rate of 10 percent, and the METR on fuel is estimated at 174 percent (table A9.6).¹⁵ As the METR on fuel is significantly higher than on capital, industries that use more fuel incur a higher METR on production cost than on capital alone. Agroprocessing and transportation, with the lowest METR on capital, fall in that category. In other words, the high fuel tax may actually negate some of the benefits of the tax reform—which strongly encourages investment in machinery and equipment in agroprocessing and the transportation sector—as these two sectors spend the most on fuel. In contrast, all other industries incur a lower METR on production cost than on capital, mainly because of the low METR on labor and the small share of fuel in the total cost. As concerns the cost of production, tourism and manufacturing are still the highest taxed industries in Uganda, while construction replaces transportation as the lowest taxed industry.

Cross-Border Comparison for Foreign Firms

This section compares the impact of taxation on foreign direct investment in Kenya, Tanzania, and Uganda. It attempts to determine which of the three countries could best attract foreign investors, if tax cost were the only deciding factor. Manufacturing and tourism are the focus, as these are key areas for foreign direct investment in Eastern Africa. For simplicity, tax provisions and economic parameters for foreign firms are based on the United Kingdom's tax system, which accounts for the largest share (about 25 percent) of the total actual foreign investment in Uganda.

Cross-Border Comparison of METR on Capital

Tax rates and provisions for Kenya and Tanzania are summarized in table A9.9. To focus the cross-country comparison exclusively on the burden of taxation, Uganda's nontax parameters and capital structure are also applied

weighted average rate is based on data provided by the URA on fuel sales by product in 1997.

15. As the payroll tax in Uganda is imposed on the total payroll without ceilings, the statutory payroll tax rate can be seen as the marginal rate. Ignoring the shift effect assumes that the employer's share of payroll tax is fully borne by the employer.

Table 9.3. Marginal Effective Tax Rate on Cost of Production for Ugandan Firms
(percent)

<i>Factor of production</i>	<i>Commercial agriculture</i>	<i>Agroprocessing</i>	<i>Manufacturing</i>	<i>Construction</i>	<i>Transportation</i>	<i>Communications</i>	<i>Tourism</i>
<i>METR^a</i>							
Capital	26.2	23.2	32.9	23.5	20.9	31.0	39.2
Labor	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Fuel	174.0	174.0	174.0	174.0	174.0	174.0	174.0
Aggregate	25.8	26.7	30.6	21.1	24.3	25.5	34.2
<i>Cost structure^b</i>							
Capital	89.2	52.2	66.8	50.2	67.1	60.4	68.8
Labor	9.5	38.8	28.2	45.6	26.4	36.7	27.2
Fuel	1.3	9.0	5.0	4.2	6.4	2.9	4.0

a. METR by input and on overall cost of production.

b. Input share in total cost of production (excluding other inputs).

Source: Authors' calculations based on data provided by the Ministry of Finance, Planning, and Economic Development and the Uganda Revenue Authority; Republic of Uganda (1995) for cost structure.

to Kenya and Tanzania.¹⁶ With these assumptions, Uganda has a tax disadvantage compared with Kenya in both manufacturing and tourism, mainly because of Kenya's preferential tax treatment targeted to these two sectors (table 9.4). In tourism, Uganda is also less competitive than Tanzania in terms of taxation, mainly because of its local property tax on buildings, which accounts for 71 percent of capital in the tourism sector.

Various factors contribute to this outcome, including the following:

- Kenya and Tanzania have no property tax on structures. Consequently, even without considering the initial investment allowances available in Kenya, buildings are taxed significantly less in Kenya and Tanzania.¹⁷ A slightly more generous tax depreciation rate for buildings in the tourism sector (6 percent versus 5 percent) also contributes to a lower METR on buildings in Tanzania.
- Kenya provides an initial investment allowance of 60 percent for both buildings and machinery for manufacturing and tourism. Therefore, despite Kenya's slightly higher corporate income tax rate, buildings are taxed much more lightly than in Uganda and Tanzania.

Table 9.4. Marginal Effective Tax Rate on Capital for Foreign Firms
(percent)

<i>Factor of production</i>	<i>Uganda</i>	<i>Kenya</i>	<i>Tanzania</i>
<i>Manufacturing</i>			
Buildings	38.9	1.9	25.6
Machinery	-3.9	12.3	31.0
Inventory	59.0	69.0	61.9
Land	32.8	27.5	39.0
Aggregate	33.8	28.8	40.0
<i>Tourism</i>			
Buildings	36.5	0.9	15.9
Machinery	-1.8	10.0	28.5
Inventory	59.0	69.0	61.9
Land	32.8	27.5	39.0
Aggregate	32.6	7.5	21.9

Note: Uganda's nontax parameters are applied to Kenya and Tanzania.

Source: Authors' calculations based on data provided by the Uganda Revenue Authority; Ministry of Finance, Planning, and Economic Development; Bureau of Statistics; and the World Bank.

16. A simulation using country-specific parameters is carried out in Chen and Reinikka (1999).

17. Should buildings also be exempted from the municipal property tax in Uganda, Uganda could gain a tax advantage over Kenya and Tanzania in manufacturing and over Tanzania in tourism.

- A nonzero import duty on most machinery imported to Kenya and Tanzania contributes significantly to higher METRs on machinery in these two countries.
- The different property tax rates on land affect the METR on land: Tanzania, at 39 percent, has the highest METR on land, followed by Uganda with 33 percent and Kenya with 28 percent.

Cross-Border Comparison of Cost of Production

Again, to isolate the impact of taxation, Uganda's nontax parameters, including the cost structure, are applied to Kenya and Tanzania. As before, the METR on labor is the average payroll tax payable by employers, and the METR on fuel is the effective average tax rate on motor fuels. As shown in table 9.5, Kenya has the lowest METR on labor, followed by Tanzania (0.1 and 4 percent, respectively, compared with 10 percent in Uganda). Tanzania has the lowest METR on fuel, followed by Kenya (26 and 64 percent, respectively, compared with 174 percent in Uganda).¹⁸ As a result, measured on cost of production, Uganda becomes the highest taxed country in both manufacturing and tourism. Tanzania's tax competitiveness in tourism becomes

Table 9.5. Marginal Effective Tax Rate on Cost of Production for Foreign Firms
(percent)

<i>Factor of production</i>	<i>Uganda</i>	<i>Kenya</i>	<i>Tanzania</i>
<i>Manufacturing</i>			
Capital	33.8	28.8	40.0
Labor	10.0	0.1	4.0
Fuel	174.0	62.0	25.4
Overall	30.7	21.5	28.8
<i>Tourism</i>			
Capital	32.6	7.5	21.9
Labor	10.0	0.1	4.0
Fuel	174.0	62	25.4
Overall	29.9	7.2	17.0

Note: Uganda's nontax parameters are applied to Kenya and Tanzania.

Source: Authors' calculations based on data provided by the Uganda Revenue Authority; Ministry of Finance, Planning, and Economic Development; Bureau of Statistics; the Uganda Investment Authority; and the World Bank.

18. For Kenya and Tanzania, the fuel tax rate by product is estimated based on the tax and the price per liter, while Uganda's shares of various products in total sales were used as weights to estimate the combined fuel tax rate.

more evident, while its manufacturing sector now has a lower tax burden than its counterpart in Uganda. Kenya has an even greater tax advantage over Uganda in both sectors.

Compliance and Tax Administration

A typical tax incidence analysis assesses the tax structure without dealing with administrative realities. Administration, however, can create major distortions in even a well-designed tax system if it is not managed efficiently and fairly. This section examines key features of taxpayer compliance and tax administration, based on firm survey evidence (see appendix B at the end of the book). The purpose is to isolate factors likely to change the true tax burden on firms from what the formal system and the METR analysis indicate.

Tax Compliance

Taxpayer compliance depends on economic incentives embedded in the tax structure and the effectiveness in detecting and penalizing noncompliance (see Das-Gupta and Mookherjee 1998). According to the 1998 firm survey, a third of Ugandan firms were in a tax loss position in 1997, that is, they neither paid the corporate income tax nor had a tax holiday (table A9.10). While this estimate may appear high, this ratio is not out of line with international experience. For example, Canadian statistics show that an average of more than 40 percent of active nonfinancial firms are in a tax loss position. Twenty-six percent of Ugandan firms did not pay the VAT in 1997, possibly because many smaller firms are not registered for the VAT. Commercial agriculture has the largest share of non-VAT paying firms. This is broadly consistent with the design of the VAT system (for instance, foods are zero-rated in general). Eight percent of Ugandan firms with five or more employees do not pay taxes.

Whether or not firms are content with their own level of taxes, their owners clearly feel disadvantaged when they see their competitors escaping taxation. In the 1994 survey of Ugandan firms, respondents identified competitors' evasion of taxes as a major constraint (World Bank 1994). Some 60 percent of firms reported that they faced unfair competition. Furthermore, firms estimated the informal economy (part of the economy evading taxes, duties, or laws and regulations) to be as high as 43 percent. In 1998 this perception remained, with tax evasion considered the leading constraint from unfair competition. However, the numerical constraint scores for competitors smuggling or evading taxes have declined.

Despite some improvement in perceptions, the legacy of a predatory state, coupled with limited improvement in service delivery, continues to adversely affect tax compliance in Uganda. In the 1998 survey, firms in manufacturing—the second highest taxed sector measured by the METR—estimated that half of their competitors gain an advantage through tax evasion. In construction and agroprocessing, the reported share was about 40

percent. In tourism, the highest taxed sector as measured by the METR, firms reported that a third of their competitors evade taxes. In commercial agriculture, however, where the share of tax paying firms is the lowest, only 5 percent of competitors were perceived to evade taxes.

Tax Administration

A prominent feature of the Ugandan tax administration is frequent tax audits, which are either desk or field operations or a mixture of both. Predetermined criteria do not exist for conducting an audit, but factors such as compliance record, quality of returns submitted, and size of firm are considered important. Sixty-eight percent of all firms were audited either for the corporate income tax, VAT, or both during 1995–97. Forty-one percent of firms reported that they were audited for the corporate income tax, while as many as 60 percent of all firms were audited for the VAT. The latter is equivalent to three-quarters of the VAT-paying firms. In the international comparison, Uganda's audit figures are extremely high. For example, in Canada all large corporations (about 1,000) are audited, and the remaining 13,000 or so corporations face audit rates of 5 percent or less. The high auditing frequency indicates a serious lack of voluntary compliance and a low level of mutual trust between the tax authority and the taxpayer.

The URA routinely "assesses" tax returns submitted by taxpayers. These assessments are typically desk reviews of self-declarations and supporting documents. The tax officer may accept the taxpayer's declaration as is, or "assess" an additional tax to be paid. A tax audit may also be involved that may lead to a demand for additional taxes to be paid as an "assessment." As shown in table A9.10, as many as 51 percent of Ugandan firms disagreed with the URA on their assessment during 1995–97. Sixty-eight percent of these cases were resolved through negotiation between the firm and URA officers, while 10 percent appealed to a third party. None of the disputes was taken to court. The rest remained unsettled at the time of the survey. At the end, roughly a third of the resolved disputes ended with a result closer to the taxpayer's own assessment, a third were closer to the URA's assessment, and the rest were between the two assessments. Depreciation allowances appear to be one of the main causes for disputes in the corporate income tax assessments. The firm survey also indicates that most tax holiday firms have little or no involvement with the tax authority, which may be an additional incentive for initially acquiring tax holiday status.

The Impact on the METR

The firm survey reveals important differences between the formal tax system and actual practice, which can affect the METR results presented here. First, among the firms that were audited, at least every third firm had to pay additional taxes, while every fourth firm incurred additional costs, such as

bribes (see chapter 10 in this volume). All firms whose tax assessment differed by 100 percent or more “always” (five on the scale of one to five) had to pay bribes to URA officials, while on average, all survey firms reported that bribes were “seldom” required (two on the scale of one to five). Bribes may affect the effective tax burden in two ways. On the one hand, despite being a cost, bribes can reduce the tax burden (measured by the METR) if they provide an opportunity for tax evasion. On the other hand, the extra costs may increase the tax burden when used, say, to avoid a lengthy appeal and settlement process (which in itself would increase the burden, but is not captured by the METR based on the formal tax system).

Second, as the VAT is a consumption tax and therefore should not affect capital investment and taxable business activities, the METR model generally ignores it. However, if the input tax credit under the VAT system is not refunded quickly or not at all, then VAT can place an additional tax burden on the business sector.¹⁹ As the VAT was introduced in Uganda only in 1996, implementation problems can be expected to arise. In 1998 the main complaint from the business sector concerned refunding the input VAT credit. As table A9.10 shows, 81 percent of firms purchase inputs from VAT-registered suppliers but only 56 percent of these firms claim input tax credits. Whether this results from the VAT credit and liability offset procedure is not clear.²⁰ Another potential reason is that firms with excess input tax credits decline to claim for refunds, for example, because of higher compliance costs. This could be tempting for firms that can pass on the input VAT cost to consumers, but less for the firms that have to absorb the cost themselves. In the former case, the VAT would cascade and increase tax revenue in the short term, but at the cost of consumer welfare in the long run. In the latter case, firms may incur a profit loss that can affect the corporate income tax revenue in turn.

Fifty-two percent of the firms that claimed an input tax refund received their expected amount in 1998. However, a significant portion (18 percent) of firms that claimed the input tax credit did not receive any refund, while the rest (40 percent) received a partial refund. Furthermore, the waiting period for even a partial refund of the input VAT credit can be lengthy. Of the firms that received at least a partial refund, more than half waited more than six weeks, while 10 percent waited more than six months. The lengthy process for input VAT refund is likely to curb compliance as well as increase the cost of doing business. It ties up a considerable portion of

19. When the input tax credit is not refunded, the VAT could be modeled as a sales tax on capital or any other taxable input. In the case where the refund period is abnormally long and no interest is paid by the revenue authority, the interest cost could be modeled as an increment on the cost of financing.

20. When offset procedures are being used, apparently no supporting documentation is required and the approval is granted after a desk review, subject to a later audit. However, such a loose arrangement can cause major difficulties at the audit stage.

working capital that has a high opportunity cost, considering a bank lending rate of more than 20 percent.

Hence, two types of opposing factors emerge from the survey evidence that could alter the METR results. First, tax evasion would reduce the actual METRs compared with the formal tax system. Because compliance is firm specific and tax administration also tends to treat firms differently, this impact is not the same across industries, or even within a particular sector. Second, delays in the VAT refunds and payment of bribes could have the opposite effect of increasing the tax burden compared with the formal tax system. The net effect is ambiguous. Similarly, the impact of frequent tax audits and assessments on the METR is also ambiguous, depending on whether these contribute to enforcement of the formal rules or cause an extra cost to firms.

Conclusions

The National Resistance Movement government rescinded predatory implicit and explicit taxation on exports in the early 1990s, one of the major accomplishment in Uganda's recovery. However, whether the rapid increase in domestic revenue was a good strategy is less clear. The corresponding expansion in government expenditure may not, at the margin, have had a high payoff in terms of service delivery, while the cost of taxation was high because of bureaucratic control, resource misallocation, and foregone household consumption and private investment. These effects were likely to undermine growth, and hence the prospects for sustainable increases in public revenue.

Ugandan policymakers, however, have been able to readjust their economic policy when necessary. During the second half of the 1990s, once it became obvious that import taxes were an implicit tax on exports, these taxes were considerably reduced and several other tax reforms were introduced, including the VAT and income taxation. Consequently, the Ugandan tax system is gradually being transformed from high tax rates and selective incentives and exemptions toward lower rates and more standard provisions.

Household survey analysis reveals that tax reforms implemented in the 1990s were generally propoor. First, given the zero rating of goods consumed by the poor, replacing the sales tax with the VAT did not lead to the poor being worse off. Second, import taxation remained progressive after tax reforms, but less so. In aggregate, excise taxes became more progressive. Third, increased taxation on paraffin is highly regressive, while taxes on other petroleum products are progressive. Fourth, given the liberalized market, export taxes on coffee used during commodity booms tend to hurt the poor.

The METR analysis demonstrates that—even when the country's level of public revenue is low at the macroeconomic level—rapidly increasing taxation may constrain private investment at the microeconomic level, for two reasons. First, the formal enterprise sector in these economies typically represents a small share of output, but a high proportion of the effective tax base. Second, access to credit is limited and interest rates are high,

particularly for smaller firms, and hence most private investment is financed by profits and personal savings. Consequently, taxation reduces both the expected revenue from a given investment project and the availability of investment finance.

From the perspective of foreign investors, Uganda appears to have higher taxes than neighboring countries, particularly Kenya. Raising nominal tax rates is therefore no longer a feasible policy option for Uganda. At the microeconomic level, the Kenyan tax system appears to place the lowest burden on firms investing in manufacturing and tourism. However, at the macroeconomic level, Kenya's share of tax revenue in GDP is the highest of the three countries. Uganda's tax disadvantage results mainly from a property tax on buildings, which does not exist in Kenya and Tanzania, and its significantly higher fuel taxation. A strong case exists for harmonization of fuel taxes within the region.

To level the playing field, discretionary corporate tax holidays were abolished in 1997 in Uganda and replaced by an initial investment allowance for machinery for all firms. Consequently, the METR on machinery was significantly reduced. The analysis indicates that profitable firms that invest heavily in machinery clearly benefited from this policy change. However, for all other assets the METR was lower under the tax holiday regime.

The METR estimates reflect the formal tax structure. Tax administration, if not fair and efficient, can distort the best intentions of policymakers and produce a very different outcome in terms of the actual tax burden firms face. Using firm survey evidence, several factors that can alter the METR results were identified. First, widespread tax evasion and firm-specific exemptions—which show up strongly in the 1997 data despite efforts to curb them in prior years—are likely to reduce the METRs. Second, delays in VAT refunds and payment of bribes are likely to have the opposite effect of increasing the METR compared with the formal tax system. However, the net effect is ambiguous.

Tax administration is an important area to be tackled in Uganda in the future. In particular, efforts to combat corruption and mechanisms to resolve grievances between the business sector and the tax authority are critical. These efforts require regular dialogue with the private sector to build trust, and tax education and training for both taxpayers and administration staff.

Annex 9.1. Household Incidence Analysis and the Concept of Welfare Dominance

The theoretical model used in this chapter for the household incidence analysis of tax reforms relies on the work of Yitzhaki and Slemrod (1991). In this model, for any social welfare function favoring equitable distribution of income, a marginal reduction in taxes on, say, good x_s and a marginal increase in taxes on, say, good x_r , that keep the tax revenues constant, will improve social welfare if the x_s 's concentration curve is below x_r 's curve everywhere.

Formally, let the social welfare function be given by

$$(A9.1) \quad \varpi = \sum_h \mu_h v_h(y_h, p_1, \dots, p_n),$$

where v_h is the indirect utility of household h , y_h is the income of household h , p_i are commodity prices (with $i = 1, \dots, n$) and μ_h is the social weight for each household h 's indirect utility. Suppose the government considers a tax reform involving only two commodities, x_s and x_t . It considers marginally increasing the tax on commodity x_t and marginally decreasing that on commodity x_s to leave total revenue constant (a revenue neutral change). If we denote with x_i^h the consumption of commodity i by household h and with X_i the total consumption of commodity i by all households, then the tax reform keeps total tax revenues R unchanged, with

$$(A9.2) \quad R = \sum_k \tau_k X_k,$$

where k are the taxed commodities and τ_k is the tax rate on commodity k . Under these assumptions, it can be shown that the welfare of a household h is not worsened by the proposed tax reform if and only if

$$(A9.3) \quad \left[\frac{x_s}{X_s} - \alpha_{st} \frac{x_t}{X_t} \right] > 0,$$

where α_{st} is defined by Wildasin (1984) and Mayshar (1988) as the marginal social cost of raising one dollar of revenue by taxing the t -th commodity. This may be generalized to consider all households h with $h=1, \dots, m$,

$$(A9.4) \quad \left[\frac{\sum_{h=1}^m x_s^h}{X_s} - \alpha_{st} \frac{\sum_{h=1}^m x_t^h}{X_t} \right] > 0.$$

The expression (A9.4) can be seen as the difference between the height of the relative concentration curve of commodity x_s and the height of the relative concentration curve of commodity x_t multiplied by a constant. These concentration curves are similar to the familiar Lorenz curve, but instead of total income, they consider the fraction of total expenditure on a commodity attributable to different income groups. Consequently, for any additive social welfare function, a tax change increases social welfare if and only if the concentration curve of commodity x_s is not as high as the concentration curve of commodity x_t (multiplied by a constant) along the entire income distribution. This method is generally referred to as welfare dominance.

The dominance test may often be inconclusive because of the requirement that each concentration curve must be above the other everywhere along the income distribution. In this case, conclusions can be only drawn by specifying the weights attached to each household in the social welfare function. Yitzhaki (1983), for example, provides a framework for analyzing welfare

dominance by using extended Gini coefficients. These allow for adjustments in the social weights given to various households and provide a clearer notion of how alternative social welfare functions differ with tax regimes. Specifically, the extended Gini coefficient is a weighted integral of the area between the Lorenz curve and the 45-degree line as a fraction of 0.5 (which is the total area under the 45-degree line) and is given by

$$(A9.5) \quad G(v) = -v \text{COV}[e(1 - F(e))^{v-1}],$$

where v is a parameter that affects the weighing of the points on the concentration curve, $F(e)$ is cumulative tax payment, and e measures the household's tax payment. When $v = 2$, $G(2)$ yields the traditional Gini coefficient, while higher values would give more weight to commodities consumed by the poorest households. Using equation (A9.5), it can then be shown that a revenue neutral decrease in the tax on commodity x_s , financed by an increase in commodity x_t , decreases the extended Gini index, if

$$(A9.6) \quad \int_0^1 [\Phi_s(F) - \alpha_{st} \Phi_t(F)](1 - F)^{v-2} dF > 0,$$

where $\Phi_i(F)$ for $[i = s, t]$ is the concentration curve. Both concepts of welfare dominance and of extended Gini coefficient are used in this chapter to examine the welfare implications of tax reforms.

In practice, all welfare dominance techniques tend to be difficult, as concentration curves tend to cross each other, especially toward the end of the distribution. A solution to this problem was developed by Davidson and Duclos (1997), who proposed a set of variance estimators to test the hypothesis that two concentration curves are statistically different from one another.

Annex 9.2. Marginal Effective Tax Rate

The METR on capital calculated in this study is the effective corporate tax rate on capital, while the METR on cost of production is an integration of the METRs on all inputs, using the augmented Cobb-Douglas production function. The METR is estimated for both domestic and foreign firms. Unless otherwise specified, all estimates are based on the 1997 tax regime and recent economic indicators. The METR calculation is based on the assumption that profit-maximizing firms base their investment or business decisions on the foreseeable incremental net revenue at the present value. Taxes reduce the profits accruing to the firm, while tax allowances mitigate such a reduction. Because of the interaction between statutory tax provisions and actual economic and industrial conditions, the effective tax rate can vary by industry under the same tax regime. Furthermore, for a cross-jurisdiction comparison, the effect of taxation can be singled out by applying the same set of economic and industrial conditions to different tax regimes.

The method used to estimate the METR has been extensively documented, by Broadway, Bruce, and Mintz (1984); Chen and Mintz (1993); McKenzie, Mintz, and Scharf (1992), Mintz (1990); and others. Other useful references include Dunn and Pellechio (1990) and Shah (1995).

METR on Capital

As described, the METR on a given type of real capital investment is defined as the proportional difference between the gross-of-tax rate of return (r^G) and the net-of-tax rate of return (r^N) required by financial investors. The gross-of-tax rate of return (r^G) is the marginal revenue product, or user cost of capital, net of economic depreciation. The net-of-tax rate of return (r^N) is the weighted average of the return to debt and equity securities held by the financial investor. Thus, the effective tax rate (t) is defined as

$$(A9.7) \quad t = (r^G - r^N)/r^G \quad \text{or} \quad t = (r^G - r^N)/r^N.$$

The latter definition is used in this chapter.

Real Cost of Financing

For domestic firms, the real cost of financing (r^f) is defined by

$$(A9.8) \quad r^f = \beta i(1 - U) + (1 - \beta)\rho - \pi$$

where β is the debt-to-assets ratio, i is the cost of debt, U is the statutory corporate income tax rate, ρ is the cost of equity, and π is the inflation rate. While interest costs are deductible for income tax purposes, the cost of equity is not. That is, the cost of financing for a domestic firm is the weighted average cost of financing, net of inflation rate. For foreign firms, the real cost of financing (r^f) is defined by

$$(A9.9) \quad r^f = [\beta' I'(1 - U') + (1 - \beta') \rho'](1 - \gamma)/(1 - x) + \gamma[i(1 - U) - \pi + \pi'] - \pi',$$

where β' is the debt-to-assets ratio in the home country, I' is the cost of debt in the home country, U' is the statutory corporate income tax rate in the home country, ρ' is the cost of equity in the home country, γ is the ratio of debt raised in the host country to total investment fund, x is the weighted average withholding tax rate in the host country, i is the cost of debt in the host country, U is the statutory corporate income tax rate in the host country, π' is the inflation rate in the home country, and π is the inflation rate in the host country.

According to the equation (A9.9), the cost of financing to a foreign firm is the weighted average of the cost of its investment funds taken from the home country and debt raised in the host country. The former is the weighted average cost of financing at home net of withholding tax payable in the host country, and the latter is the cost of debt in the host country adjusted for income

tax deductibility and the difference in inflation rates between the home and the host country.

Net-of-Tax Rate of Return on Capital

For domestic financial investors, the net-of-tax rate of return on capital is defined by the formula

$$(A9.10) \quad r^N = \beta i + (1 - \beta)\rho - \pi.$$

This is the rate of return on capital required by the financial investor or the supplier of investment funds. For foreign investors, the formula is

$$(A9.11) \quad r^N = [\beta' I'(1 - U') + (1 - \beta') \rho' - \pi'](1 - \gamma) + \gamma(i - \pi).$$

This is the net-of-tax rate of return on capital required by fund suppliers, including foreign financial investors in the host country. Applying equations (A9.10) and (A9.11) to equation (A9.7), respectively, yields the effective corporate tax rate on capital for domestic and foreign firms.

Gross-of-Tax Rate of Return on Capital

DEPRECIABLE ASSETS. For domestic firms, the formula is

$$(A9.12) \quad r^G = (1 + tm)(r^f + \delta)(1 - k)[1 - A + \tau(1 - U)/(\alpha + r^f + \pi)]/[(1 - U)(1 - tp - tg)] - \delta,$$

where tm is the tax on transfer of property or transaction tax (for example, import duty) on capital goods where applicable, δ is the economic depreciation rate, k is the investment tax credit rate, A is the present tax value of the accumulated capital cost allowance, τ is the capital tax rate, α is the tax depreciation rate, tp is the property tax rate, and tg is the gross receipts tax rate or presumptive tax. For international firms, the formula is

$$(A9.13) \quad r^G = (1 + tm)(r^{f'} + \delta)(1 - k)[1 - A + \tau(1 - U)/(\alpha + r^{f'} + \pi)]/[(1 - U)(1 - tp - tg)] - \delta.$$

INVENTORY. For domestic firms, the formula is

$$(A9.14) \quad r^G = (1 + tm)(r^f + U\pi\zeta)/[(1 - U)(1 - tg)] + \tau,$$

where tm is the sales tax on inventory where applicable, and ζ is one for the FIFO accounting method and zero for the last-in-first-out (LIFO). For international firms, the formula is the same except that the financing cost should be the one relevant to the international firms, that is, r^f should be replaced by $r^{f'}$.

LAND. For domestic firms, the formula is

$$(A9.15) \quad r^G = r^f(1 + tm)(1 + \tau)(1 - U)/(r^f + \pi)/[(1 - U)(1 - tp - tg)].$$

For international firms, the formula is the same except that the financing cost should be the one relevant to the international investors, that is, r^f should be replaced by $r^{f'}$.

Aggregation

The effective tax rate for a given industry is the proportional difference between the weighted average of the before tax rate of return by asset type and the after tax rate of return, which is the same across asset type within the industry. That is, the marginal effective tax rate t_i for industry i is calculated as

$$(A9.16) \quad t_i = (\sum_j r_{ij}^G w_{ij} - r_i^N) / r_i^N,$$

where j denotes asset type (such as investments in buildings, machinery, inventories, and land) and w_{ij} denotes the weight of asset type j in industry i . The above equations are general formats of the formulas used in this chapter. Because of the variance among different sectors or jurisdictions, some variables can be zero for some sectors or jurisdictions. For example, none of the three countries in this study have capital-based taxes, and hence $\tau = 0$ in equation (A9.12) – (A9.15).

METR Dispersion

METR dispersion, or the weighted standard deviation, is used to measure the tax distortion. There are three measures of dispersions: overall, interindustry, and interassets dispersion. Only interindustry dispersion is estimated in this chapter. Let w_i , w_j , and w_{ij} denote the capital weights for the i^{th} industry and the j^{th} type of asset, respectively. The interindustry METR dispersion σ_i is calculated as the weighted standard deviation:

$$(A9.17) \quad \sigma_i = \sum_j w_j \{ \sum_i w_{ij} (t_{ij} - t_i)^2 \}^{1/2}.$$

The expression t_i is the average effective tax rate for the asset j across industries, and t_{ij} is the effective tax rate for the j^{th} asset type in the i^{th} industry.

METR in Other Inputs and Cost of Production

METR ON LABOR. This chapter assumes that only payroll taxes paid by employers are effective labor taxes borne by employers. Another assumption is that the marginal unit of labor input is an average worker. Therefore, the METR on labor is the total payroll taxes paid by employers on average labor costs. Because payroll taxes in Tanzania and Uganda are imposed on total payrolls, the statutory tax rate itself can be seen as the effective tax rate on labor. In Kenya, the ceiling of taxable payroll is K Sh 80 per month, well below the monthly payroll. As a result, the METR on labor in Kenya is estimated to be as low as 0.1 percent. According to the International Labour

Organisation (1997), the average monthly payroll in Kenya was K Sh 3,324 for the manufacturing industry and tourism (1991 figure).

METR ON OTHER INPUTS. The METR on other inputs for production is the transaction taxes firms have to pay on these inputs. Motor fuel is the only other input included apart from capital and labor. The average transaction tax rate (the fuel tax rate) is used as the METR.

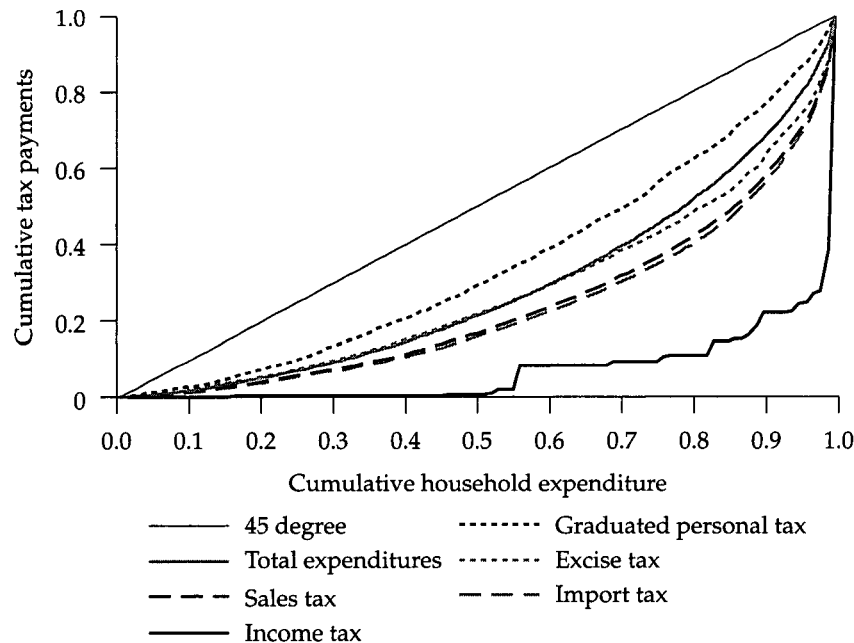
METR ON COST OF PRODUCTION. By using the augmented Cobb-Douglas production function, the METR on cost of production T can be estimated as

$$(A9.18) \quad T = \Pi(1 + t_i)^{\alpha_i} - 1.$$

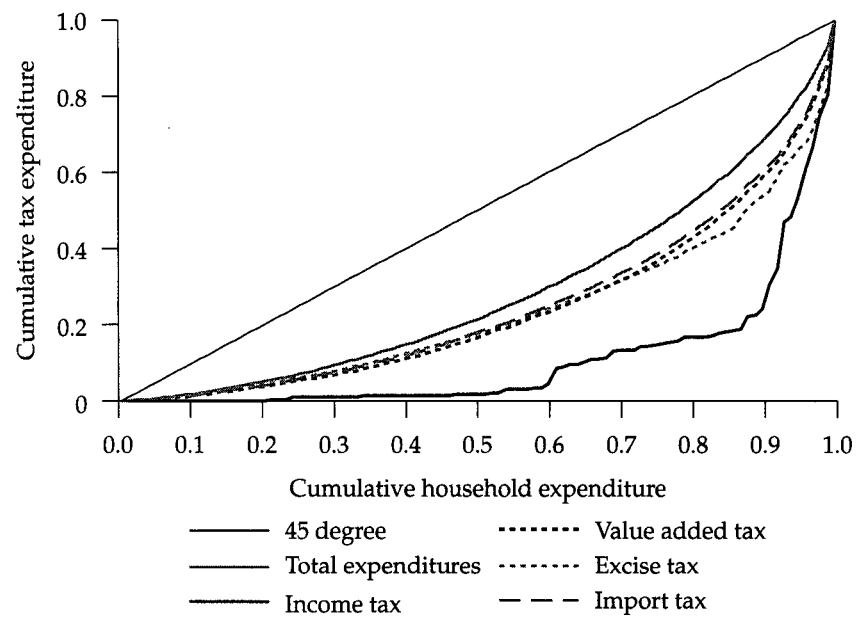
In the formula, i indicates an input (capital, labor, and fuel), t_i is the METR on each input i , and α_i is the share of total cost for input i . The detailed derivation may be found in McKenzie, Mintz, and Scharf (1992).

Annex 9.3. Figures and Tables for Household Incidence and METR

Figure A9.1. Concentration Curves for Main Taxes before Reform



Source: Authors' calculations based on the 1992/93 integrated household survey and data provided by the Ministry of Finance, Planning, and Economic Development.

Figure A9.2. Concentration Curves for Main Taxes after Reform

Source: Authors' calculations based on the 1992/93 integrated household survey and data provided by the Ministry of Finance, Planning, and Economic Development.

Table A9.1. Consumption Goods and Corresponding Tax Rates
(percent)

<i>Consumption good</i>	<i>1992 import duties</i>	<i>Sales tax/CTL</i>	<i>1995 import duties^a</i>	<i>VAT</i>
<i>Matooke, potatoes, maize, cassava</i>	0	0	0	0
Rice	30	30	20;4	0
Bread, macaroni, spaghetti	30	30	20;6	17
Meat, poultry and fish	0	0	0	0
Milk fresh (liquid)	0	10	0	0
Milk (powdered)	30	10	10;2	0
Other dairy products	30	10	0	0
Butter	10	20	20;6	17
Ghee	10	20	10;2	17
Hydrogenated oil	10	30	10;2	17
Margarine	10	30	20;4	17
Refined cooking oil and other oils	10	20	10;2	17
Fruits, beans, lentils and nuts	0	0	0	0
Sugar (Uganda)	0	10	0	17
Sugar (imported)	20	10	20;6	17
Cocoa	30	30	20;6	17
Salt	10	10	10;2	17
Soda (all brands)	0	40	20;12	17
Passion fruit/orange juice	0	20	20;6	17
Other nonalcoholic drinks	0	40	20;12	17
Beer	350	70	20;12	17
Uganda waragi-refined	0	50	20;12	17
Other alcoholic beverages	100	50	20;12	17
Cigarettes (all)	100	50	30;12	17
Expenditure in restaurants and cafes	0	10	0	0
Matches	40	20	20;6	17
Soap, detergents, toothpaste	30	50	20;6	17
Cosmetics	50	70	20;6	17
Shaving equipment, insecticide, and shoe polish	30	30	20;6	17
Clothing, footwear, household furnishings	30	10	20;4	17
Bags	30	30	20;6	17
Tapes and records	30	50	20;6	17
Rent (including imputed)	0	0	0	0
Water charges	0	10	0	17
Electricity	0	10	0	17
Paraffin	0	30	0	0

(table continues on following page)

Table A9.1 continued

<i>Commodity</i>	<i>1992 import duties</i>	<i>Sales tax/CTL</i>	<i>1995 import duties^a</i>	<i>VAT</i>
Other fuel and power	20	30	0	0
Plastic utensils	30	10	20;4	17
Enamel and metal utensils	20	10	10;2	17
Porcelain, glass, chinaware	30	30	20;4	17
Cutlery and kitchen tools	30	30	10;2	17
Bulbs, switches, plugs, cables	20	30	10;2	17
Tires, tubes, and other parts and tools for transport	20	30	10;2	17
Petrol, diesel, oil, greases	75	30	0	0
Stamps, aerogrammes, telephones	0	10	20;4	17
Expenditures on sports and theatres	0	10	0	0
Hotels and other touring	0	10	0	0
Beds, sofas, chairs, other furniture	0	30	20;6	17
Carpets, mats, decoration articles	30	30	20;6	17
Personal cars and vehicles	30	20	20;6	17
Bicycles	20	10	20;6	17
Television sets	10	30	20;6	17
Cassette players and musical systems	40	20	20;6	17
Video decks, cameras, musical instruments	30	50	20;6	17
Jewelry	50	10	20;6	17
Watches	30	30	20;6	17

CTL Commercial transaction levy.

a. Figures after the semicolon represent the import duties charged on commodities under the preferential trade area and/or customs union.

Source: Authors' calculations based on the 1992/93 integrated household survey and data from the Ministry of Finance, Planning, and Economic Development and the Uganda Revenue Authority.

Table A9.2. Extended Gini Coefficients of Taxes before Reforms, 1992

<i>V</i>	<i>Excise taxes</i>	<i>Import duties</i>	<i>Sales tax</i>	<i>PAYE tax</i>	<i>Graduated tax</i>	<i>Petroleum tax</i>	<i>Paraffin tax</i>	<i>Beverage excise taxes</i>	<i>Alcoholic drinks excise taxes</i>	<i>Tobacco excise taxes</i>	<i>Aggregate taxes paid</i>	<i>Total expenditures</i>
2	0.452	0.540	0.521	0.904	0.303	0.889	0.334	0.746	0.649	0.515	0.557	0.426
4	0.620	0.717	0.699	0.971	0.489	0.981	0.522	0.905	0.786	0.705	0.722	0.626
6	0.685	0.775	0.759	0.986	0.569	0.989	0.602	0.934	0.833	0.769	0.777	0.699
8	0.723	0.805	0.791	0.991	0.616	0.991	0.649	0.945	0.858	0.805	0.807	0.739
10	0.748	0.825	0.811	0.992	0.646	0.992	0.681	0.949	0.875	0.828	0.825	0.764

PAYE Pay-as-you-earn.

Note: The higher the value of the parameter *v*, the higher weight is attached to goods consumed by the poor.

Source: Authors' calculations based on the 1992/93 integrated household survey and data provided by the Ministry of Finance, Planning, and Economic Development.

Table A9.3. Extended Gini Coefficients of Taxes after Reforms, 1995–96

<i>V</i>	<i>Excise taxes</i>	<i>Import duties</i>	<i>VAT</i>	<i>PAYE tax</i>	<i>Coffee stabilization tax</i>	<i>Petroleum tax</i>	<i>Paraffin tax</i>	<i>Beverage excise taxes</i>	<i>Alcoholic drinks excise taxes</i>	<i>Tobacco excise taxes</i>	<i>Aggregate taxes paid</i>	<i>Total expenditures</i>
2	0.537	0.504	0.525	0.904	0.209	0.889	0.334	0.746	0.690	0.515	0.538	0.426
4	0.692	0.691	0.712	0.971	0.407	0.981	0.522	0.905	0.820	0.705	0.712	0.626
6	0.746	0.753	0.772	0.986	0.488	0.989	0.602	0.934	0.861	0.769	0.769	0.699
8	0.777	0.787	0.803	0.991	0.529	0.991	0.649	0.945	0.883	0.805	0.801	0.739
10	0.798	0.808	0.823	0.992	0.555	0.992	0.681	0.949	0.897	0.828	0.820	0.764

PAYE Pay-as-you-earn.

VAT Value-added tax.

Note: The higher the value of the parameter *v*, the higher weight is attached to goods consumed by the poor.

Source: Authors' calculations based on the 1992/93 integrated household survey and data provided by the Ministry of Finance, Planning, and Economic Development.

Table A9.4. Summary of Welfare Dominance Test Statistics, 1992

<i>Tax</i>	<i>Paraffin</i>	<i>Expenditure (total)</i>	<i>Import duties</i>	<i>Sales tax</i>	<i>Excise tax</i>	<i>PAYE</i>	<i>Graduated tax</i>	<i>Alcoholic drinks excise taxes</i>	<i>Beverage excise duties</i>	<i>Tobacco excise</i>	<i>Petroleum excise</i>
Paraffin	0	1	1	1	1	1	0	1	1	1	1
Expenditure (total)	0	0	1	1	-1	1	0	1	1	1	1
Imports	0	0	0	0	0	1	0	1	1	0	1
Sales tax	0	0	1	0	0	1	0	1	1	0	1
Excise tax	1	-1	1	1	0	1	0	1	1	0	1
PAYE	0	0	0	0	0	0	0	0	0	0	0
Graduated tax	1	1	1	1	1	1	0	1	1	1	1
Alcoholic excise	0	0	0	0	0	1	0	0	0	0	1
Beverage excise	0	0	0	0	0	1	0	0	0	0	1
Tobacco excise	0	0	0	0	0	1	0	0	1	0	1
Petroleum tax	0	0	0	0	0	0	0	0	0	0	0

PAYE Pay-as-you-earn.

Note: 1 in rows implies that tax is dominated (or more regressive), 0 implies that the tax dominates other taxes, -1 represents that the tax is neither dominant nor dominated (indecisive).

Source: Authors' calculations based on the 1992/93 integrated household survey and data provided by the Ministry of Finance, Planning, and Economic Development.

Table A9.5. Summary of Welfare Dominance Test Statistics, 1995–96

<i>Tax</i>	<i>Paraffin</i>	<i>Expenditure (total)</i>	<i>Import duties</i>	<i>VAT</i>	<i>Excise tax</i>	<i>PAYE</i>	<i>Coffee tax</i>	<i>Alcoholic drinks excise duties</i>	<i>Beverage excise duties</i>	<i>Tobacco excise</i>	<i>Petroleum excise</i>
Paraffin	0	1	1	1	1	1	0	1	1	1	1
Expenditure (total)	0	0	1	1	1	1	0	1	1	1	1
Imports	0	0	0	1	-1	1	0	1	1	0	1
VAT	0	0	0	0	-1	1	0	1	1	0	1
Excise tax	0	0	-1	-1	0	1	0	1	1	0	1
PAYE	0	0	0	0	0	0	0	0	0	0	0
Coffee tax	1	1	1	1	1	1	0	1	1	1	1
Alcoholic excise	0	0	0	0	0	1	0	0	0	0	1
Beverage excise	0	0	0	0	0	1	0	0	0	0	1
Tobacco excise	0	0	0	0	0	1	0	0	1	0	1
Petroleum tax	0	0	0	0	0	0	0	0	0	0	0

PAYE Pay-as-you-earn.

VAT Value-added tax.

Note: 1 in rows implies that tax is dominated (or more regressive), 0 implies that the tax dominates other taxes, -1 represents that the tax is neither dominant nor dominated.

Source: Authors' calculations based on the 1992/93 integrated household survey and data provided by the Ministry of Finance, Planning, and Economic Development.

Table A9.6. Business Taxes in Uganda
(percent)

<i>Taxes and allowances</i>	<i>1997 system</i>	<i>Pre-1997 system</i>
<i>Capital taxes</i>		
Company income tax	30	30 (resident) 35 (nonresident)
Tax holidays	n.a	3–6 years
Investment allowance		
Structures	n.a	“Approved business” only
Machinery	50–75	“Approved business” only
Tax depreciation rate		
Industrial buildings ^a	5	4
Machinery ^b		
Class 1	40	50
Class 2	35	40
Class 3	30	20
Class 4	20	n.a
Inventory accounting	FIFO/LIFO	FIFO/LIFO
Loss carry-over	Forward indefinitely	Forward indefinitely
Personal tax on investment income		
Withholding tax on interests	15	15
Withholding tax on dividends	15	15
Presumptive tax on small firms	1 on turnover	n.a
Property tax	10	10
<i>Indirect taxes on business</i>		
Import duty on capital goods	n.a	5+
Average fuel tax	174	[Not calculated]
<i>Payroll taxes</i>	10	10

n.a Not applicable.

a. Straight line method.

b. Declining balance. The classification of machinery and equipment for tax depreciation allowance varies significantly between the 1997 and pre-1997 systems. For example, computers belonged to Class 3 under the pre-1997 tax system but Class 1 under the 1997 system (see Chen and Reinikka 1999, footnote 16, for details).

Source: Ministry of Finance, Planning, and Economic Development and Uganda Revenue Authority data.

Table A9.7. Nontax Parameters for Uganda
(percent)

<i>Category</i>	<i>Commercial agriculture</i>	<i>Agroprocessing</i>	<i>Manufacturing</i>	<i>Construction</i>	<i>Transportation</i>	<i>Communications</i>	<i>Tourism</i>
Expected inflation rate	4.9	4.9	4.9	4.9	4.9	4.9	4.9
Expected interest rate	21.4	21.4	21.4	21.4	21.4	21.4	21.4
Debt-to-assets ratio	25.0	25.0	25.0	25.0	25.0	25.0	25.0
<i>Economic depreciation rate^a</i>							
Buildings	4.1	3.7	4.0	5.3	3.5	4.2	3.6
Machinery	14.2	16.5	18.7	18.9	22.7	21.2	23.9
<i>Tax depreciation allowance^b</i>							
Buildings	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Machinery	30.0	30.0	30.0	35.0	30.0	39.0	30.0
<i>Capital structure by asset type</i>							
Buildings	10.6	28.7	33.5	10.2	9.9	57.2	71.1
Machinery	20.0	47.8	26.9	47.9	83.8	29.6	9.0
Inventory	33.4	17.7	33.7	37.3	3.2	2.1	1.2
Land	36.0	5.8	5.9	4.6	3.1	11.1	18.7
<i>Cost structure by input for production</i>							
Capital	96.6	54.1	72.9	66.0	74.0	60.6	69.3
Labor	3.0	37.2	23.0	31.1	20.9	36.5	26.7
Motor fuel	0.4	8.7	4.1	2.8	5.1	2.9	4.0

a. Based on Canadian data.

b. As a reference.

Source: Ministry of Finance, Planning, and Economic Development; Uganda Revenue Authority; and World Bank.

Table A9.8. Marginal Effective Tax Rate on Capital for Small Ugandan Firms
(percent)

<i>Asset</i>	<i>Commercial agriculture</i>	<i>Agroprocessing</i>	<i>Manufacturing</i>	<i>Construction</i>	<i>Transportation</i>	<i>Communications</i>	<i>Tourism</i>
Buildings	4.5	18.9	19.2	20.4	18.7	19.4	18.8
Machinery	2.0	2.1	2.3	2.3	2.5	2.4	2.6
Inventory	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Land	1.0	12.4	12.4	12.4	12.4	12.4	12.4
Aggregate	2.4	7.8	8.9	5.1	4.4	13.2	15.9
Difference from the 1997 regular taxable case	-23.8	-15.4	-23.9	-18.5	-16.5	-17.7	-23.3
Interindustry dispersion: 2.2							

Source: Authors' calculations based on data provided by the Ministry of Finance, Planning, and Economic Development and the Uganda Revenue Authority.

Table A9.9. Business Tax Provisions Applicable to Manufacturing and Tourism in Uganda, Kenya, and Tanzania, 1998
(percent)

<i>Taxes and allowances</i>	<i>Uganda</i>	<i>Kenya</i>	<i>Tanzania</i>
<i>Capital taxes</i>			
Corporate income tax	30	32.5	30
<i>Investment allowance</i>			
Buildings	n.a.	60	n.a.
Machinery	50–75	60	n.a.
<i>Tax depreciation rate</i>			
Buildings			
Manufacturing	5 SL	2.5 SL	4 SL
Tourism	5 SL	2.5 SL	6 SL
<i>Machinery</i>			
Manufacturing	30 DB	14.2 DB	14.2 SL
Tourism	31 DB	22.3 DB	19.5 SL
Inventory accounting	FIFO/LIFO	FIFO/LIFO	FIFO/LIFO
Loss carryover	Forward indefinitely	Forward indefinitely	Forward indefinitely
Withholding tax on dividends	15	7.5	15
<i>Property tax</i>			
Structure	10	n.a.	n.a.
Land	10	8	11.5–12.5
<i>Payroll tax</i>	10	5 up to 80K Sh/mo	4
<i>Indirect taxes</i>			
Import duty on capital goods	0	5	0–5
Import duty on raw materials	7	15	10–20
Taxes on fuel (average)	174	64	26

n.a. Not applicable.

SL Straight line method.

DB Based on declining balance.

FIFO First-in-first-out.

LIFO Last-in-first-out.

Source: Ministry of Finance, Planning, and Economic Development; Uganda Revenue Authority; and World Bank data.

Table A9.10. Summary of Firm Survey Results on Tax Administration
(percent)

<i>Firm category</i>	<i>Commercial agriculture</i>	<i>Agroprocessing</i>	<i>Manufacturing</i>	<i>Construction</i>	<i>Tourism</i>	<i>Total</i>
<i>Tax-paying firms, 1997</i>						
Corporate income	29	46	41	80	54	46
VAT	19	80	80	96	79	74
Paid no taxes	7	11	8	4	7	8
<i>Tax holiday firms</i>						
1995	13	51	36	5	33	32
1996	15	50	37	13	26	31
1997	18	48	42	12	26	35
Disagreed with assessment	37	51	51	64	57	51
Resolution						
Negotiations	73	65	71	69	63	68
Court	0	0	0	0	0	0
Appeal	9	4	12	6	12	10
Unresolved cases	18	31	17	25	25	22
Total	100	100	100	100	100	100
Firms audited	41	69	71	80	71	68
Corporate income	26	46	35	72	43	41
VAT	30	59	66	68	64	60

(table continues on following page)

Table A9.10 continued

<i>Firm category</i>	<i>Commercial agriculture</i>	<i>Agroprocessing</i>	<i>Manufacturing</i>	<i>Construction</i>	<i>Tourism</i>	<i>Total</i>
Audit resulted in						
Additional taxes	20	31	30	30	50	32
Other costs	20	29	25	10	30	24
Firms with inputs VAT credit	87	79	76	100	76	81
Filed for refund	22	54	49	60	22	45
Received expected refund	4	11	29	20	18	19
Received less or equal 50	7	19	10	20	0	12
Received more than 50	7	12	2	12	0	6
Received no refund	4	12	8	8	4	8
<i>Waiting period for VAT refund</i>						
Up to 1 week	0	6	21	26	35	18
2–5 weeks	0	21	37	31	35	30
6–13 weeks	78	31	29	26	15	30
14–26 weeks	22	27	10	0	0	12
Over 26 weeks	0	15	3	17	15	10
Total	100	100	100	100	100	100

VAT Value-added tax.

Note: Figures are a percentage of the total number of responses in each question.

Source: Authors' calculations based on the 1998 enterprises survey.

References

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

- Bahl, Roy. 1997. "Issues in Local Taxation in Uganda." World Bank, Eastern Africa Department, Washington, D.C. Processed.
- Broadway, Robin, Neil Bruce, and Jack M. Mintz. 1984. "Taxation, Inflation, and the Effective Marginal Tax Rate in Canada." *Canadian Journal of Economics* 27(1): 286–99.
- Chen, Duanjie, and Jack M. Mintz. 1993. "Taxation of Capital in Canada: An Inter-Industry and Inter-Provincial Comparison." In Allan Maslove, ed., *Business Taxation in Ontario*. Toronto: University of Toronto Press.
- Chen, Duanjie, and Ritva Reinikka. 1999. "Business Taxation in a Low-Revenue Economy. A Study on Uganda in Comparison with Neighboring Countries." Africa Region Working Paper no. 3. World Bank, Washington, D.C. Processed.
- Das-Gupta, Arindam, and Dilip Mookherjee. 1998. *Incentives and Institutional Reform in Tax Enforcement: An Analysis of Developing Country Experience*. Oxford, U.K.: Oxford University Press.
- Davidson, Russell, and Jean-Yves Duclos. 1997. "Statistical Inference for the Measurement of the Incidence of Taxes and Transfers." *Econometrica* 65(6): 1453–65.
- Dunn, David, and Anthony Pellechio. 1990. *Analyzing Taxes on Business Income with the Marginal Effective Tax Rate Model*. Discussion Paper no. 79. Washington, D.C.: World Bank.
- International Labour Organisation. 1997. *Yearbook of Labour Statistics*. Geneva.
- Mayshar, Joram. 1988. "Note on Measuring the Marginal (Welfare) Cost of Taxation." Working Paper no. 175 (January). Hebrew University of Jerusalem, Department of Economics, Jerusalem. Processed.
- McKenzie, Kenneth, Jack M. Mintz, and Kim Scharf. 1992. "Measuring Effective Taxes in the Presence of Multiple Inputs: A Production Based Approach." *International Tax and Public Finance* 4(3): 337–57.
- Mintz, Jack M. 1990. Corporate Holidays and Investment. *World Bank Economic Review* 4(1): 81–102.
- Republic of Uganda. 1995. "Input/Output Tables for Uganda (1989 & 1992)." Ministry of Finance and Economic Planning, Statistics Department, Entebbe.
- Shah, Anwar, ed. 1995. *Fiscal Incentives for Investment and Innovation*. Oxford, U.K.: Oxford University Press.

- Wildasin, David E. 1984. "On Public Goods Provision with Distortionary Taxes." *Economic Inquiry* 22(2): 227-43.
- World Bank. 1994. "The Private Sector in Uganda: Results of the World Bank Enterprise Survey." World Bank, Eastern Africa Department, Washington, D.C. Processed.
- Yitzhaki, Shlomo. 1983. "On an Extension of the Gini Inequality Index." *International Economic Review* 24(3): 617-28.
- Yitzhaki, Shlomo, and Joel Slemrod. 1991. "Welfare Dominance: An Application to Commodity Taxation." *American Economic Review* 81(3): 480-96.
- Younger, Stephen D. 1996. "Estimating Tax Incidence in Ghana: An Exercise Using Household Data." In David E. Sahn, ed., *Economic Reform and the Poor in Africa*. Oxford, U.K.: Clarendon Press.
- Younger, Stephen D., David E. Sahn, Steven Haggblade, and Paul A. Dorosh. 1999. "Tax Incidence in Madagascar: An Analysis Using Household Data." *World Bank Economic Review* 13(2): 303-31.

The Cost of Doing Business: Firms' Experience with Corruption

Jakob Svensson

Firms in Uganda perceive corruption as one of the most serious impediments to conducting business. Despite this, little is known about the incidence and cost of corruption in the private sector, nor about its effect on firm performance, because until recently it was considered impossible to measure corruption systematically. However, with appropriate survey methods and interview techniques, quantitative data on corruption can be collected. This chapter exploits such data from a recent survey of private enterprises in Uganda (see appendix B at the end of the book).¹

This chapter presents three main findings. First, firms typically must pay bribes when dealing with public officials whose actions directly affect the firms' business operations, and more than three-quarters of firms must pay bribes. Second, the amount paid could partly be explained by certain characteristics of the firm, such as profitability, which suggests that the amount paid in bribes depends on how much a firm can afford. Third, firms that pay higher bribes, on average, apparently do not receive more beneficial government favors in return. The econometric work suggests that the relationship between ability to pay and amount paid is not driven by reverse causation, and that bribery slows firm growth, far more than taxation does. Furthermore, the time required to receive a public service is apparently not affected by the amount of bribes paid.

These findings shed light on a hotly contested issue: the consequences of corruption on firm growth and performance. At a conceptual level this has been debated for several decades (for an excellent review, see Bardhan 1997). On the one hand, corruption is considered similar to a tax, with the primary

1. See Republic of Uganda (1998) for results of a household survey on corruption.

difference that the payment does not end up as public revenues.² This “tax effect” reduces both the return to private capital (because part of output will be extracted in bribes) and the amount of internally generated funds or retained profits firms can use for capital investment. To the extent that corruption also deprives the government of revenue required to provide productive public goods, corruption is likely to slow growth more than taxation. In addition, the uncertainty and secrecy that necessarily accompany bribe payments are likely to compound this difference (see Shleifer and Vishny 1993). On the other hand, proponents of the “grease argument” claim that in an economy plagued by bureaucratic delays, bribery allows firms to avoid tax and regulatory burdens and get things done faster. We find no support for the grease argument, but robust evidence that higher corruption is associated with lower firm growth.

The quantitative data are consistent with the firm managers’ perceptions of corruption. Figure A10.1 displays the top five constraints (of 24 constraints listed in the questionnaire) as perceived by firm managers. In the sample of all firms, corruption (based on average values) is ranked as the fifth most serious constraint to business operations. Median values show that managers perceive six areas, including corruption, as a major problem.

When restricting the sample to subgroups of the sample population, corruption is an even bigger problem. Figure A10.1 displays the top five constraints for large firms (those with more than 100 employees), foreign-owned firms (majority foreign owned), and exporting firms. For both large and foreign-owned firms, corruption is perceived as the second most important constraint. Exporting firms’ perceptions are very similar.

Taken together, the results support the claim that corruption has a large adverse effect on firms. Of course, some firms may benefit from corruption, possibly a great deal. Some firms may choose to compete based on costly preferential bureaucratic access—by devoting resources to obtain valuable licenses, preferential market access, control of privatized companies, and so forth—instead of focusing on improving productivity. In certain areas and for some firms, bribes may substitute for other costs, such as taxes. What this type of econometric work identifies is what is true on average, or in general. On average, the Ugandan data reveal that corruption is a heavy burden on firms.

The next section describes the data collection effort in detail, followed by a discussion of the general pattern of bribe payments with respect to incidence, level, and effect on firm growth. Next, three typical (or average) firms from subgroups of the sample are considered: one trying to obtain connection to public services, one involved in trade, and one paying taxes. Conclusions follow.

2. See Johnson, Kaufmann, and Shleifer (1997) on the public finance aspect of corruption and Bardhan (1997), Tanzi (1998), and Wei (1999) for reviews of existing literature.

The Data

Can reliable data on corruption be collected? For a long time, the common view has been that given the secretive nature of corrupt activities, it is virtually impossible to collect reliable quantitative information on corruption. However, Kaufmann (1997) forcefully argues that this presumption is incorrect. With appropriate survey methods and interview techniques, firm managers are willing to discuss corruption with remarkable candor.³

The empirical strategy used to collect information on bribe payments across firms in Uganda featured the following six components:

- An industry association (Ugandan Manufacturers' Association) carried out the survey. In Uganda, as in many other countries, people have a deep-rooted distrust of the public sector. To avoid suspicion of the overall objective of the data collection effort, the survey was done by a body in which most firms had confidence.
- Corruption-related questions and the entire survey were carefully piloted and built on existing surveys on regulatory constraints.
- Survey experts trained the enumerators.
- Questions on corruption were phrased indirectly to avoid implicating the respondent of wrongdoing.
- The corruption-related questions were asked at the end of the interview, by which time the enumerator presumably had established credibility and trust.
- To enhance the reliability of the corruption data, multiple questions on corruption were asked in different sections of the questionnaire. (Consistent findings across different measures significantly increase the reliability of the data.) The survey instrument had roughly 500 entries, with a handful of them related to corruption.

The data collection effort was also aided by the fact that the issue of corruption has largely been desensitized in Uganda. The past few years have seen several awareness-raising campaigns on the consequences of corruption, and the media regularly and freely report on corruption cases (see Ruzindana, Langseth, and Gakwandi 1998; World Bank 1998).

Incidence, Level, and Effects of Corruption

The survey provides bribery data for 176 firms of 243 sampled. Of the 67 firms that did not respond to the main corruption questions, about one-third declined to answer other sensitive questions (for example, about costs and

3. The Ugandan enterprise survey (see appendix B), carried out during January-June 1998, was initiated by the World Bank and the Ugandan Private Sector Foundation. Its primary goal was to collect data on constraints facing private enterprises in Uganda.

sales). As a group, the approximately 40 firms that did not answer questions about corruption in particular did not differ significantly in size, profits, and location from the firms that did reply to corruption-related questions. Thus, no evidence suggests that the sample of 176 firms is not representative.

Incidence

Of the 176 firms that answered the question on bribe payment, 19 percent (33 firms) reported that they did not have to pay bribes, while 81 percent (143 firms) reported that they did. Table 10.1 shows noticeable differences between the two groups of firms. Nonbribing firms have characteristics suggesting they operate in sectors with little or no contact with the public sector, that is, in the informal sector. They receive significantly fewer public services, proxied by infrastructure services. They are less involved in foreign trade, proxied by share

Table 10.1. Sample Characteristics

<i>Characteristic</i>	<i>Firms that reported zero bribe payments</i>	<i>Firms that reported positive bribe payments</i>
Infrastructure service provision	3.24	3.70 ^b
Export share	0.15	0.33 ^a
Pay tax index	2.58	3.04
Pay tax index (non-tax exempted only)	2.50	3.28 ^a
Time spent dealing with taxes and regulations (log)	1.93	2.49 ^a
Cost of accountant, and so forth (log)	3.30	4.74 ^a
Cost of security (log)	7.17	7.48
Incidence of robbery and theft	0.52	0.58
Size (log)	3.61	3.88

Note: Average values. Variable definition: infrastructure service = index (0–5) of availability of public services (electricity, water, telephones, waste disposal, paved roads), 1 if available, 0 otherwise; index is the sum of the binary availability variables for the five services; export = share of sales exported (1997); pay tax = index (0–6), sum of six binary (0 = no, 1 = yes) variables reflecting types of taxes the firm pays (import duty, import commission, withholding tax, excise tax, VAT, corporate income tax) (1997); time spent dealing with taxes and regulations = percentage of senior management's time spent each month dealing with government regulations (1997); cost of accountant = monthly cost of accountant, lawyer, agent, specialized service provider to deal with regulation and taxes in US\$ (1997); cost of security = annual cost of security in US\$ (1997); incidence of robbery and theft = binary variable taking the value 1 if the firm was a victim of robbery, and/or theft during 1995–97, 0 otherwise; size = total employment (1997).

a. Rejection of the null hypothesis that the two means are equal at the 5 percent level.

b. Rejection of the null hypothesis that the two means are equal at the 10 percent level.

Source: Author's calculations based on the 1998 enterprise survey.

of output exported. They pay fewer types of taxes, particularly when controlling for tax exemptions. These findings suggest that firms typically must pay bribes when dealing with public officials whose actions could seriously affect business operations. This interpretation is further supported by the finding that firms reporting positive bribe payments spend significantly more time dealing with government regulations, and spend more money on accountants and specialized service providers to deal with regulations and taxes.

The results support the bureaucratic extortion model presented in Svensson (2000a) (see also Bliss and Di Tella 1997; Svensson 2000b). An integral assumption in this model is that public servants have discretionary power within the given regulatory system to customize the nature and amount of harassment on firms to extract bribes. Svensson shows that the extent to which this can be done depends on how tightly the civil servants can control the firm's business decisions and influence the firm's cash flow. These indirect "control rights" stem from the existing regulatory system and the discretion bureaucrats have in implementing, executing, and enforcing rules and benefits that affect the firm, such as business regulation, licensing requirements, permissions, taxes, exemptions, and provision of public goods and services.

The last two rows but one in table 10.1 show that the cost of security and incidence of robbery and theft is similar for the two groups. In fact, the cost of security per worker is higher for the nonbribing firms. Thus, while being in the informal sector where civil servants have few control rights over the firm's business operations insulates the firm from public corruption, it does not protect the firm from other sources of discretionary redistribution, such as theft. The average firm in the nonbribing group has fewer employees—mostly because of the existence of a few large firms in the nonbribing group—and the difference is significant if three outliers (large firms) are dropped from the nonbribing sample. Dropping these firms results in a significant difference between the two groups; larger firms are more likely to have to pay bribes.

Level

The evidence suggests that bribe payments constitute a heavy burden on firms. For the firms that reported positive bribes, the average amount of corrupt payments was about US\$8,280, with a median payment of US\$1,820.⁴ These are large amounts, corresponding, on average, to US\$88 per worker, or roughly 7.9 percent of total costs (1 percent in the median). Including firms reporting zero bribe payments, the average payment is US\$6,730 with a median payment of US\$450, or 6.4 and 0.5 percent, respectively.

Approximately 50 percent of the firms reporting positive bribe payments pay more annually in graft than for security (including guards, equipment,

4. Using an exchange rate of US\$1 = U Sh 1,100.

and so forth). Table 10.2 compares the size of reported graft with other cost items: wages, interest payments and cost of fuel. The cost of fuel, on average, was 6.3 percent of total costs; wages were 18.1 percent, and interest payments were 6.8 percent. The median values—which are significantly lower for corruption but similar for fuel and wages—show that the variance on reported graft differs more than the variance in wage costs and fuel.

Of the 167 firms for which data on both bribe payments and taxes are available, 70 percent reported higher bribe payments than corporate income taxes, with a median difference of US\$800. This high number is partly driven by several small firms that do not pay corporate taxes. Still, the ratio of bribe payment to corporate taxes for the firms that paid corporate taxes averages 120 percent (and 31 percent at the median). Table 10.3 compares the size of reported graft and investment in machinery and equipment. A majority of

Table 10.2. Comparison of Corruption and Other Costs
(percent)

Category	Firms reporting positive graft		All firms	
	Mean	Median	Mean	Median
Corruption to total costs	7.9	1.0	6.4	0.5
Interest payments to total costs	6.8	0.0	8.3	0.0
Fuel to total costs	6.3	4.0	6.2	3.8
Wages to total costs	18.1	15.0	18.6	15.0

Note: Number of firms in sample of enterprises reporting positive graft = 132, and 164 firms in "all firms" sample.

Source: Author's calculations based on the 1998 enterprise survey.

Table 10.3. Corruption and Investment
(US\$)

Category	All firms	Firms reporting positive graft	Firms reporting positive investment	Firms reporting positive investment and graft
Corruption (mean)	6,818	8,376	9,108	11,645
Investment (mean)	149,000	124,545	253,636	220,909
Corruption (median)	455	1,727	909	4,545
Investment (median)	1,136	418	27,273	37,273
Number of firms	172	140	101	79

Source: Author's calculations based on the 1998 enterprise survey.

firms reported small or no investment in 1997. Consequently, almost 50 percent of the firms reported larger bribe payments than total investment. The distribution of bribes across firms is depicted in figures A10.2 and A10.3.

Despite the careful data collection strategy, the sample likely has cases of misreporting, with the average graft numbers in particular being sensitive to such misreporting. However, this chapter is not concerned with the level of bribes per se, but rather on the correlates. The strategy used to collect information on graft should have minimized any systematic biases in the correlation between reported graft and the set of variables related to corruption. As mentioned earlier, evidence exists that firms that cannot avoid dealing extensively with the public sector must pay bribes.

Svensson (2000a) develops and tests a model in which the amount paid is a function of firm characteristics. The model's intuition is straightforward. Thomas (1999) argues that the malfunctioning institutional system in many Sub-Saharan countries (lack of performance-based evaluations, discretionary dismissal powers) has given bureaucrats and office holders with hiring and firing power the opportunity to demand payments from those lower in the hierarchy (for a detailed analysis of the institutional system in several Sub-Saharan countries see Thomas 1999). Increased uncertainty of tenure has created strong incentives for those in government posts to quickly extract as much as possible to protect against impending unemployment or transfer to a less lucrative position. Consequently, many public institutions and bureaucrats act like a price discriminator with a focus of extracting rents.

In such a system, a firm with higher current profits or expectations of higher profit in the future will be forced to pay higher bribes. Likewise, if the firm cannot credibly threaten to change its business activity or location, or import or export goods through other channels to avoid paying bribes, it will have to pay higher bribes. Firm characteristics such as profitability and the degree of reversibility of the installed capital stock thus determine the relative bargaining strength of the firm relative to the bureaucrats.

Svensson (2000a) tests this hypothesis using data on current and expected profits, and a measure of the reversibility of the installed capital stock.⁵ Table 10.4 reports summary statistics on these variables. Firms reporting high corruption (more than US\$1,000) have significantly higher current profits, as well as higher expected future profits (proxied by employment size and capital stock), and use a production technology that would be costly to change (low

5. Expected future profits are proxied by the value of installed capital and employment size. The opportunity cost of capital is the product of the resale value of capital times the degree of reversibility. The latter is measured as the difference between resale and replacement value of capital after controlling for the age of the capital stock. A negative value indicates that the firm's stock of capital is costly to move.

Table 10.4. Characteristics of Firms that Reported Positive Bribes

<i>Variable</i>	<i>All firms</i>	<i>All firms^a</i>	<i>Low bribe payments^b</i>	<i>High bribe payments^a</i>
<i>Profit (1997 US\$)</i>				
Mean	211,060	284,390	57,540	540,110
Median	27,270	27,270	11,230	95,690
Standard deviation	1,134,460	1,048,116	119,660	1,489,290
<i>Bribes</i>				
Mean	7,850	6,270	280	13,020
Median	910	910	180	9,090
Standard deviation	19,840	13,480	280	17,390
<i>Capital stock (1997 US\$)</i>				
Mean	365,760	346,760	174,550	540,890
Median	90,910	90,910	38,640	227,270
Standard deviation	667,190	648,260	394,500	809,010
<i>Employment (1997)</i>				
Mean	119	109	36	192
Median	34	33	20	81
Standard deviation	262	251	53	346
<i>Reversibility (log)</i>				
Mean	0.001	0.001	0.002	0.000
Median	0.011	0.011	0.012	0.009
Standard deviation	0.034	0.034	0.033	0.035
Number of observations	119	117	62	55

Note: Sample of firms for which data on corruption and other variables are available. Variable definition: profit = gross sales less operating costs and interest payments, capital stock = resale value of plant and equipment, reversibility = residual from the regressing of the ratio of resale to replace values of the capital stock to the average age of the capital stock and a constant (all variables in logs), employment = total employment.

a. Excluding two extreme outliers.

b. Low bribe payment is graft smaller than US\$1,000.

Source: Author's calculations based on the 1998 enterprise survey.

reversibility). This is consistent with the rent-extraction hypothesis. However, these are just partial correlates, and two valid objections are as follows:

- Larger firms pay more bribes, but also make larger profits and have more capital installed; size is the determining factor.
- Those firms that pay higher bribes receive valuable government favors in return, and thus make larger profits; reverse causation is an influence.

To check what mechanism best describes the data, Svensson (2000a) set up and tested the relationship between corruption, profit, capital stock,

employment size, and the opportunity cost (defined as the degree of reversibility times capital stock) within a multiple regression framework.⁶ Table 10.5 depicts four of these corruption-level regressions, with different dependent variables (corruption in U.S. dollars, logarithm of corruption, corruption per employee). Irrespective of specification, corruption is positively

Table 10.5. Corruption Regressions

Equation	(1) ^a	(2) ^b	(3) ^c	(4) ^{c,d}
Constant	8,701 (4,509)	8.83 ^f (0.892)	120.1 ^f (45.1)	112.8 ^g (54.5)
Employment	11.39 ^g (4.76)	0.0023 ^f (0.0004)	n.a. n.a.	n.a. n.a.
Profit	0.0037 ^f (0.0010)	5.5E-7 ^f (1.0E-7)	0.0041 ^f (7.4E-4)	0.0069 ^f (0.0018)
Opportunity cost	-0.259 ^f (0.089)	-3.5E-5 ^f (1.3E-5)	-0.238 ^g (0.091)	-0.260 ^f (0.098)
Capital stock	0.0059 ^g (0.0023)	9.8E-7 ^f (3.5E-7)	0.0042 ^h (0.0022)	0.0037 (0.0024)
Wald ^e	29.63 ⁱ	51.64 ⁱ	36.20 ⁱ	21.82 ⁱ
S.E. regression	12,168	1.74	123.0	128.2
Adjusted R ²	0.18	0.35	0.21	n.a.
Observations	117	117	117	117

n.a. Not applicable.

Notes: All regressions are adjusted for selectivity (Heckman 1979), the inverse Mills ratio is not reported (see Svensson 2000a for details). Opportunity cost is the product of capital stock and reversibility. Variable definition: profit = gross sales less operating costs and interest payments in US\$ (1997), capital stock = resale value of plant and equipment in US\$ (1997), opportunity cost = product of the resale value of capital in US\$ (1997) times the degree of reversibility, reversibility = residual from a regression of the ratio of resale to replace values of the capital stock on the average age of the capital stock and a constant (all variables in logs), employment = total employment (1997).

a. Dependent variable is bribe payments in US\$.

b. Dependent variable is log of bribe payments in US\$.

c. All variables scaled by employment.

d. 2SLS estimation.

e. Test statistic for the hypothesis that the coefficient on employment, profit, opportunity cost, and capital stock is zero.

f. Significant at the 1 percent level.

g. Significant at the 5 percent level.

h. Significant at the 10 percent level.

i. Rejection of the null hypothesis of zero coefficients at the 1 percent level.

Source: Author's calculation based on 1998 enterprise survey.

6. Profit is defined as gross sales less operating costs and interest payments. The capital stock is measured as the resale value of plant and equipment, and labor force is total employment. All data are for 1997 and the monetary values expressed in U.S. dollars.

correlated with current profits, expected future profits, and the opportunity cost of capital. After controlling for size, firms with higher profits pay more in bribes and firms with better outside options pay less. The results also suggest that for most firms, more investment (through higher expected profits) implies that more bribes need to be paid.

The last column in table 10.5 deals with the potential endogeneity problem by instrumenting for profits using a set of firm-specific variables that arguably are uncorrelated with both the error term in the regression and reported bribes, but are correlated with firms' profit potential (and realized profits). The instrument set includes proxies of human capital, age of the firm, a measure of foreign ownership, distance to the main trading center (the capital Kampala), and the cost of security per employee. As shown by Reinikka and Svensson (chapter 7 in this volume), measures of human capital are correlated with productivity and profits. Distance to the main trading center presumably affects firms' operating costs, and risk arising from, for example, crime, has been found to be an important determinant of performance.

The results in the final column support the claim that, on average, the level and rate of graft are influenced by firms' abilities to pay. The instruments perform well, picking up around 6 percent of the variation in profits across firms, and we cannot reject the null hypothesis of the validity of the instruments; that is, we find no evidence that the instruments for the profit rate belong in the corruption regression.⁷ These results do not prove that bribe-paying firms do not receive preferential government treatment. They may benefit, but the results suggest that the firm's ability to pay determine the price of this benefit.

Table 10.6 shows the effects on corruption (bribe payment) of both a one standard deviation increase in the explanatory variables (column 1), and a 1 percent increase in the explanatory variables (column 2). The calculations show; for example, that a one standard deviation increase in profits per employee is associated with roughly US\$100 in additional bribe payments per employee (equal to 0.76 standard deviations), while a 1 percent increase in the capital stock results in a 0.22 percent increase in bribes paid.

Effects

So far the analysis has focused on who, why, and how much firms need to pay in bribes. A logical follow-up question is "What are the effects?" From the previous two subsections it is obvious that evaluating the effects of corruption (such as on firm growth) is a tricky exercise. The problem is identification, because both growth and corruption are likely to be jointly determined. For example,

7. Svensson (2000a) also experiments with other sets of instruments. The results remain similar to those reported in table 10.5 (column 4).

Table 10.6. Effects on Corruption of Changes in Firm Characteristics

<i>Equation</i>	<i>(1)^a Change in bribe payment per employee due to a one standard deviation increase in (US\$)</i>	<i>(2)^b Change in bribe payment due to a 1 percent increase in (%)</i>
Capital stock per employee	25.5 (0.19)	n.a.
Profits per employee	104.2 (0.76)	n.a.
Reversibility index	-42.1 (-0.31)	-0.118
Capital stock	n.a.	0.218
Profits	n.a.	0.152
Employment	n.a.	0.632

n.a. Not applicable.

Note: Variable definition: profit = gross sales less operating costs and interest payments in US\$ (1997), capital stock = resale value of plant and equipment in US\$ (1997), reversibility = residual from a regression of the ratio of resale to replace values of the capital stock on the average age of the capital stock and a constant (all variables in logs), employment = total employment (1997).

a. Calculations based on regression 1, Table 10.5, with standard deviations in parentheses.

b. Calculations based on Svensson (2000a).

Source: Author's calculation based on the 1998 enterprise survey.

consider two firms of similar size and age in a given sector. One of the firms produces a good or brand perceived to have a favorable demand forecast, while the other firm produces a good with much less favorable demand growth. Assume that both firms must clear certain business regulations and licensing requirements or require some public infrastructure services. Also assume that public servants have discretion in implementing and enforcing these regulations and services. A rational rent-extracting bureaucrat would try to extract as high a bribe as possible. In this arrangement, a bureaucrat would be expected to demand higher bribes from the firm producing the good with a favorable demand forecast, simply because this firm's expected profits are higher, and thus its ability to pay is greater. If the forecasts also influence the firms' willingness to invest and expand, a positive (observed) relationship between corruption and growth would be expected when comparing these two firms.

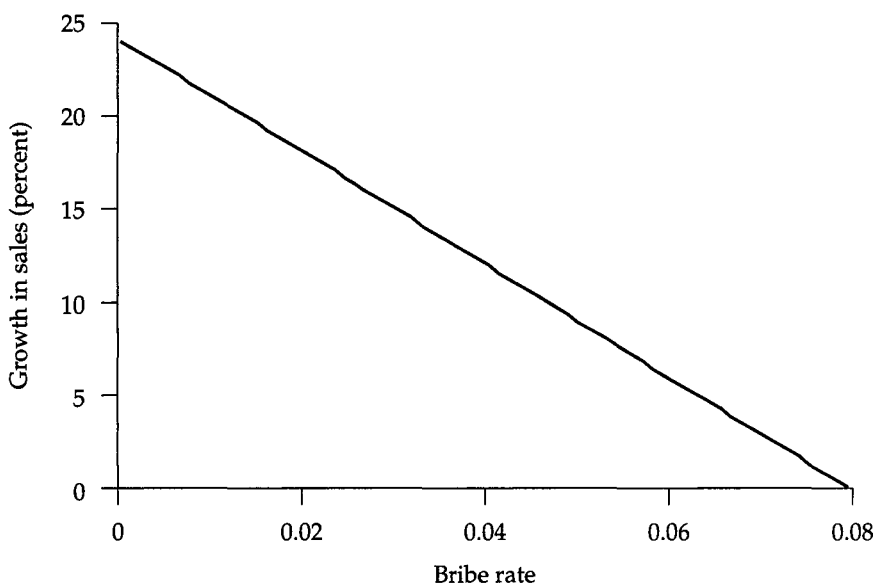
Fisman and Svensson (2000) try to overcome this simultaneity problem by instrumenting for bribes using industry-location averages as instruments.⁸ They argue that if this problem is specific to firms, but not to industries or

8. Fisman and Svensson (2000) show that the IV-technique employed is likely to provide a lower bound (in absolute terms) of the effects of bribery on growth.

locations, netting out this firm-specific component yields a bribe measure that depends only on the underlying characteristics inherent to particular industries and locations. For example, in industries, the number of produced goods sold abroad, import reliance, and dependence on publicly provided infrastructure services all determine to what extent bureaucrats can extract bribes. Figure 10.1 illustrates the key findings in Fisman and Svensson (2000). The higher the average bribery-to-sales rate, the lower the growth rate. As evident, the effect is of considerable magnitude. A 1 percentage point increase in the rate of "required" bribe payments reduces a firm's annual growth rate by about 3.5 percentage points.

Fisman and Svensson (2000) also compare the effects of corruption on growth with the effects of taxation on growth. They find that in the whole data set, the negative effect of bribery on firm growth is more than three times greater than that of taxation on growth. Moreover, after excluding outliers, they find a much greater negative impact of bribery on growth and a considerably attenuated effect of taxation. This provides some validation for firm-level theories of corruption, which posit that corruption retards the development process much more than taxation.

Figure 10.1. Corruption and Growth



Note: The bribe rate is the average bribery to sales rate. The bribe rate varies from 0 to 0.075 (7.5 percent) in the sample. The graph is based on the results reported in Fisman and Svensson (2000) and is evaluated at the mean of the controls initial sales (in logarithms), firm's age (in logarithms), and the average tax to sales rate.

Source: Fisman and Svensson (2000).

It is worth repeating that in reality, some firms may still benefit—and possibly a great deal—from corruption. This type of analysis identifies what is true on average, and the Ugandan data suggest that in general, there is a strong negative relationship between bribery payments and firm growth.

Case Studies

The experience of three typical firms—one trying to obtain public services, one involved in trade, and one paying a range of taxes—is described based on the survey data. These experiences are not based on one specific firm in each category, but on three average firms with these specific characteristics.

Case Study 1: Getting Connected

Although reported bribe payments are the key corruption variable frequently used, other methods exist for collecting objective data pertaining to corruption. Specifically, cost data on providing homogeneous public services (goods) can reveal evidence of corruption. The survey collected information on two variables related to delivery of public services. The respondents were asked to report the total costs, including informal payments, of acquiring a connection to the public grid and acquiring a telephone line.

The fee for a telephone connection (around US\$100) is supposed to be fixed. Thus, deviations from the given price typically reflect graft. Connection costs to the public grid are more problematic, and are a complex function of load requirements, necessary upgrades, and distance to existing voltage connection. The complexity in determining the price of connection implies that the public electricity company has large discretion over the cost.

Data on costs of acquiring a telephone line were obtained from 90 firms.⁹ Of those 90 firms, 83 percent (75 firms) reported costs above the fixed price. On average, a firm paid US\$130 in addition to the fixed price, more than twice the stated cost to acquire a telephone line. The average firm had to wait approximately 13 weeks to get connected. No relationship exists between connection cost and time waited. The simple correlation is 0.04. This stands in stark contrast to the “efficiency grease” hypothesis that predicts a negative correlation between bribes and bureaucratic delays, but is in accordance with the basic hypothesis laid out earlier. If public sector employers have discretion over implementation, delays are endogenously determined to explicitly extract bribes.

Figure A10.4 and table 10.7 present evidence that the excess cost paid by firms constituted informal payments (bribes). Of the 75 firms that reported excess connection costs, 13 did not report bribe data. For the remaining 62

9. Two extreme outliers (reporting errors) were dropped from the sample of firms reporting connections to the telephone system and the public grid.

Table 10.7. Partial Correlation between Connection Costs and Bribery

<i>Equation dependent variable</i>	<i>(1)^{a,b} Connection costs to public grid (log)</i>	<i>(2)^c Excess cost of telephone connection (log)</i>
Constant	9.162 (0.000)	10.75 (0.000)
Bribe payments (log)	0.508 (0.000)	0.068 (0.001)
Adjusted R ²	0.44	0.15
Number of observations	25	62

Note: Standard errors adjusted for heteroskedasticity (White 1980). *p* values in parentheses.

a. Regression 1 includes a proxy of informality (infrastructure service).

b. Connection costs (public grid) has mean U Sh 6,330,400 and median U Sh 2,500,000.

c. Excess cost of telephone connection has mean U Sh 155,600 and median U Sh 90,000.

Source: Author's calculations based on the 1998 enterprise survey.

firms there is a high correlation between the excess cost and reported bribe payment (the simple correlation is 0.41), as illustrated in figure A10.5. Table 10.7, column (2), reports the simple regression of corruption on excess cost. Excess cost of connection is highly correlated with reported bribe payment.

Of the 29 firms that obtained a connection to the public grid during 1995–97, 25 answered the question on bribes, and all 25 reported paying bribes. On average a firm paid US\$5,540 for connection to the public grid, with the median firm paying roughly US\$2,700, and waited a little more than 12 weeks to get the connection. Part of the cost of connection may be caused by reasons other than corruption, in particular, the firm's distance from an existing voltage connection. The survey has no data on this, but used an infrastructure service provision index indicating access to basic public services, such as water, electricity, telephones, waste disposal, and paved roads, as a rough proxy of the proper cost adjustment for location. The maintained hypothesis is that the infrastructure service provision index is likely to be highly correlated with distance to existing power connections.

Table 10.7, column (1), displays the result of regressing reported bribe payment and the infrastructure service provision index on the cost of obtaining a connection to the public grid. Both variables enter highly significant, thereby providing evidence that high cost of connection is linked both to location-specific characteristics and corruption. Figure A10.4 shows the partial correlation (controlling for location) between connection costs and bribes (0.67). Again, the time to get connected and the cost (controlling for location) is not correlated (partial correlation is 0.08). These findings are consistent with recent empirical results from other developing countries. Kaufmann and Wei (1999) examine the relationship between perception of corruption and management time wasted with bureaucrats. Contrary to the efficient grease argument, they find that firms that face more "bribe

demand" are also likely to spend more management time with bureaucrats rather than less.

These results have two clear implications. First, collecting data on provision of homogeneous public services (goods) is a potentially fruitful way to collect evidence of corruption indirectly. The data reveal that the provision of public services provides a powerful tool to extract bribes. Second, the data also suggest that clearer rules can improve the situation from the firms' perspective. The relationship between bribe payments and excess cost of telephone connection is weaker than that between bribe payments and cost of getting connected to the public grid. However, clearer rules are not sufficient if no mechanisms exist for accountability of the public sector charged with providing public goods. Thus, even though a set price for a telephone connection theoretically exists, most firms must pay significantly more for a telephone line. More generally, the finding suggests that fighting corruption is not purely a technical problem. Although reforms of rules and regulations are important, the focus must be on creating a sustainable, credible, and ongoing system of accountability of public institutions and public servants.

Case Study 2: Exporting and Importing

Being engaged in trade, either exporting or importing, typically implies that a firm must pay bribes. In fact, 91 percent of the trading firms reported positive bribe data, with an average level of graft equal to US\$9,800 (the median was US\$2,050). Consistent with these findings, the median exporter perceived corruption as a major problem (see figure A10.4).

No evidence exists that bribes speed up the process of getting goods in or out of the country. For the average firm, imported goods require 66 days to arrive. It takes 30 days from the original shipping port (typically in Europe) to Mombassa or Dar es Salaam, an additional 27 days from the port to the clearance point (Nakawa inland terminal), and 9 more days from the clearance point to the firm. Thus, firms involved in trade face additional costs because of both corruption and inefficient public services. Again, provision of necessary services such as public transport and clearances gives corrupt civil servants a mechanism to extract bribes.

Case Study 3: Paying Taxes

Firms that pay fewer types of taxes also face a lower probability of paying bribes, particularly when controlling for tax exemptions. On average, the senior management in a firm that pays a majority of taxes spends almost 20 percent of its time dealing with government officials regarding taxes, permits, regulations, and so forth. The cost of accountants, lawyers, and auditors to deal with taxes and regulations cost the median enterprise nearly US\$3,300 a year. As table 10.8 shows, the level and rate of bribes are significantly higher

Table 10.8. Differences in Tax Assessment and Corruption

<i>Category</i>	<i>Tax assessment differs by 0–50%</i>	<i>Tax assessment differs by 51–100%</i>
Graft rate (bribery US\$/employment)	59.6	157.6
Graft level (US\$)	4,530	14,450
Time spent dealing with taxes, etc. (%)	15.1	16.5
Number of firms	37	18

Source: Author's calculations based on the 1998 enterprise survey.

for firms reporting large differences between their assessment of taxes to be paid and the tax authority's assessment. On average, a firm with a difference in tax assessment of more than 50 percent pays three times as much in bribes as a firm reporting a difference in tax assessment less than 50 percent.

Ample anecdotal evidence suggests that the tax system provides bureaucrats with a potentially powerful tool to extract bribes. The firm survey evidence supports this assertion, although it is difficult to separate the benefits of lower taxes paid because of the bribe and the actual cost of the bribe. However, it is safe to conclude that with respect to the tax system, the biggest loser is the public, because corruption deprives the government of income required to provide public goods and services.

The relationship between number of taxes and corruption also has implications for tax policy in general. Streamlining the number of taxes and simplifying the tax code can help mitigate the problem, and the tax reform enacted in 1997 aimed at this (see chapter 9 in this volume). However, the simplification must be followed by auditing and accounting standards, and these standards must be applied both to the firms and to the tax authority.

Conclusions

Ugandan firms perceive corruption as one of the most serious impediments to conducting business. However, until recently it has been considered impossible to measure corruption systematically. No data were available concerning the incidence and cost of corruption in the private sector or how much it affected firms' performance. With appropriate survey methods and interview techniques, however, quantitative data on corruption can be collected. The data show that firms typically must pay bribes when dealing with public officials whose actions directly affect the firms' business operations. Such dealings cannot easily be avoided when exporting, importing, or requiring public infrastructure services. The data reveal that more than 80 percent of the firms must pay bribes during a typical business year. The amount paid could partly be explained by firm-specific characteristics, such

as current and expected future profits and the reversibility of the capital stock. This suggests that the amount paid in bribes is not a flat fee for a given service provided by a public official, but a proportional tax on profits: the more the firm can pay, the more it will have to pay. In other words, the "price" for a given public service depends on ability to pay. No evidence exists that firms that pay higher bribes, on average, receive more beneficial government favors in return. In fact, the rate of bribery is negatively correlated with firm growth. The negative effect of bribery on firm growth is more than three times greater than the effect of taxation on growth.

The chapter has argued that clearer rules with respect to taxes and public service provision can help mitigate the problem. However, without institutionalized mechanisms for accountability of the public sector these changes will be insufficient. These mechanisms include both formal or government induced measures—it is important to select measures that are in line with Uganda's implementation capabilities—and measures to empower civil society and the private sector. Collective action or measures on the part of the business community could include the following:

- Collecting and disseminating information about corrupt practices
- Informing the private sector and the public about service standards, guidelines, and norms of major service providers
- Increasing individual firm's ability to commit to no bribery
- Recognizing those who are making efforts to resist corrupt practices.

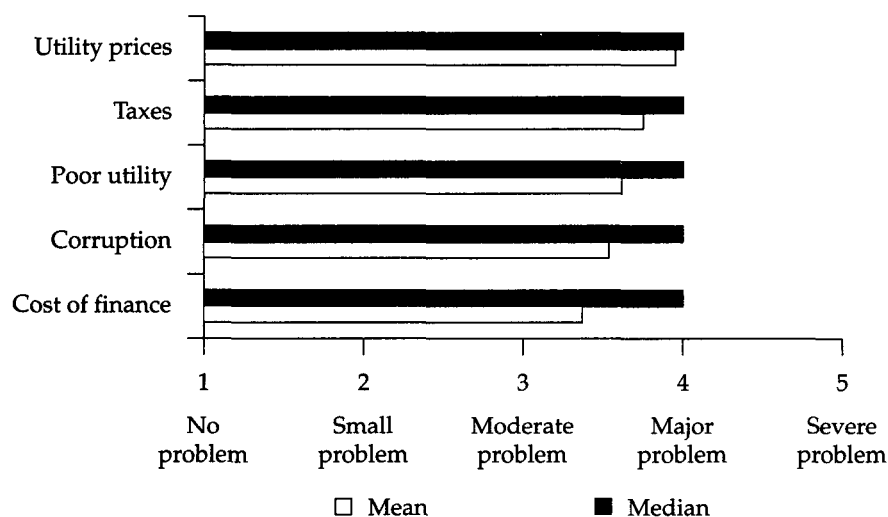
As Paul (1997) argues, corruption generally can be effectively tackled only when reform of the political process and restructuring of regulatory systems are complemented by a systematic effort to increase citizens' ability to monitor and challenge abuses of the system and to inform citizens about their rights and entitlements. Breaking the culture of secrecy that pervades the functioning of the government and empowering people to demand public accountability are two important components of such an effort.

Recent reviews of the growth performance of Sub-Saharan Africa have identified recurring features of African politics that are likely to undermine the results of traditional institutional reforms such as tax reforms. These include restricted civil society involvement, perceptions of the state as a vehicle of wealth accumulation, prevalence of patronage politics, and a small elite with close political connections. Although each may not be applicable to every country, a successful national anticorruption program must also tackle these fundamental determinants of corruption.

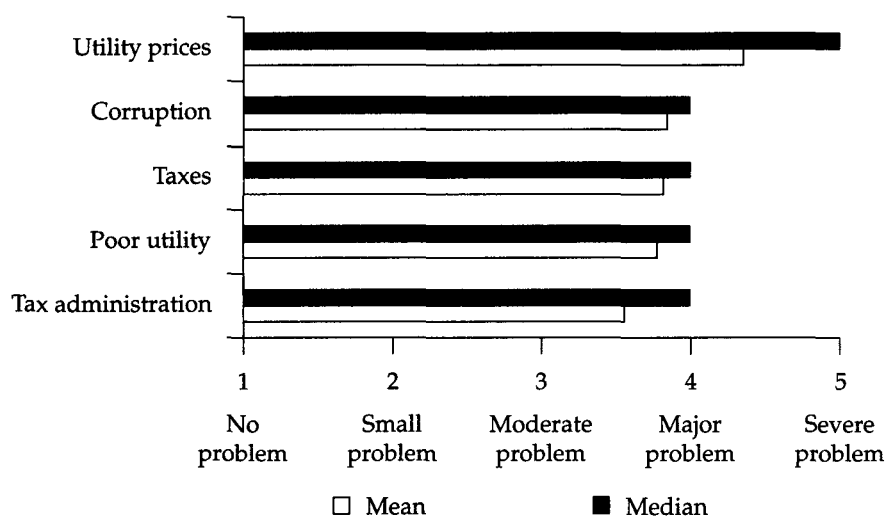
Annex 10.1. Ranking of Constraints and Payment of Bribes

Figure A10.1. Ranking of Constraints to Investment by Firm Category, 1998

All firms

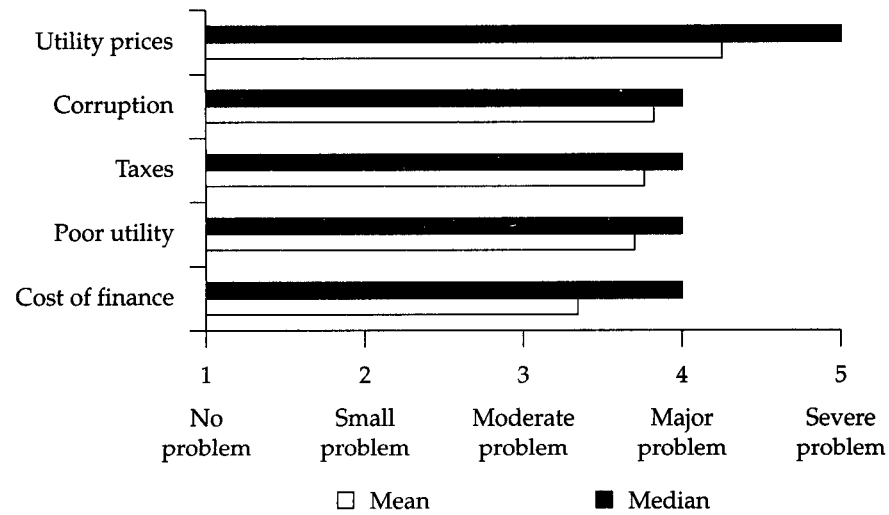
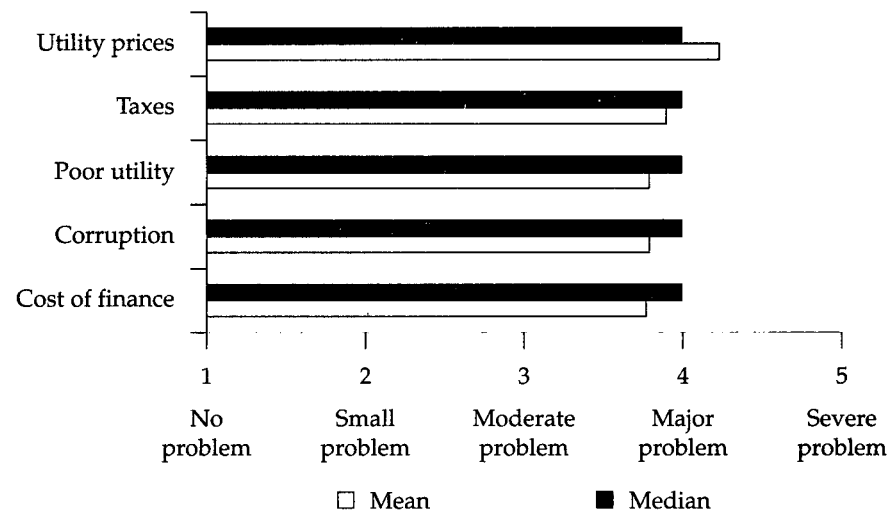


Large firms



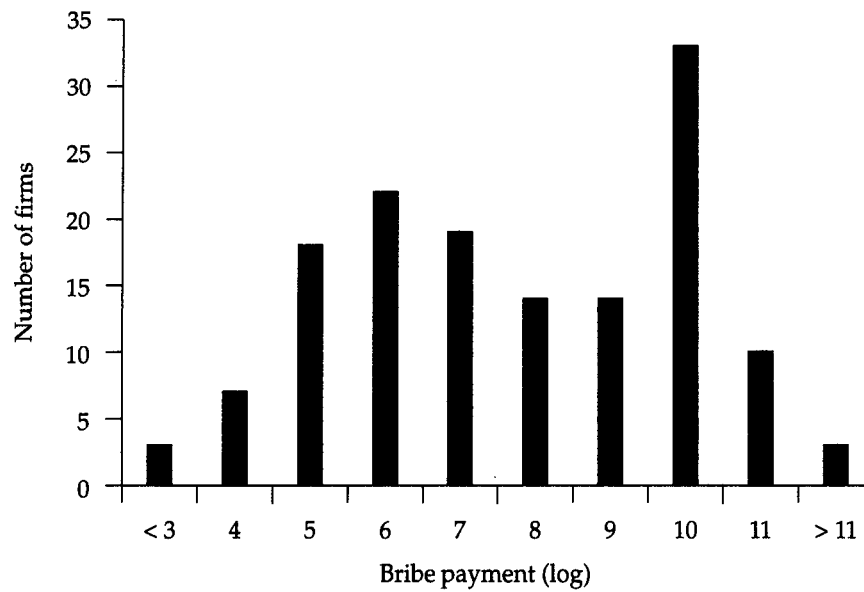
(figure continues on following page)

Figure A10.1 continued

Foreign firms*Exporting firms*

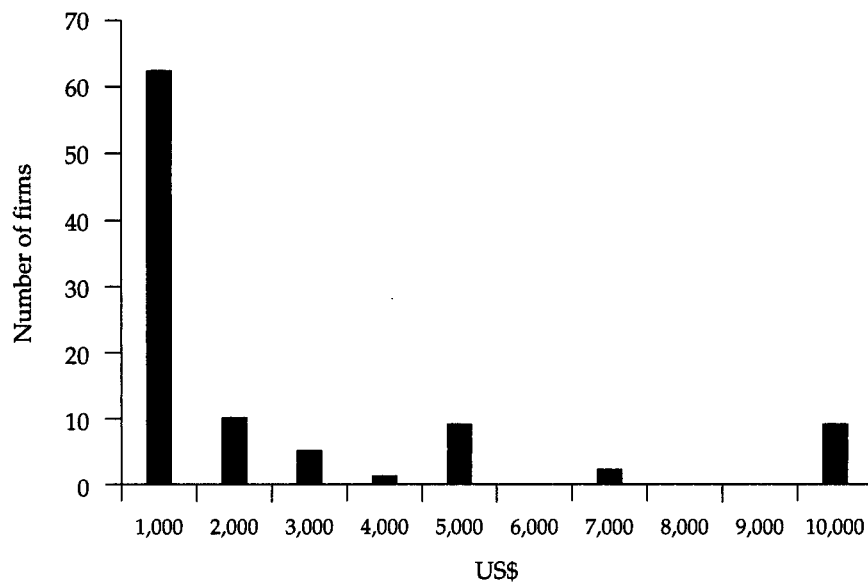
Source: Author's calculations based on the 1998 enterprise survey.

Figure A10.2. Distribution of Firms According to Logarithm of Bribe Payments in U.S. Dollars

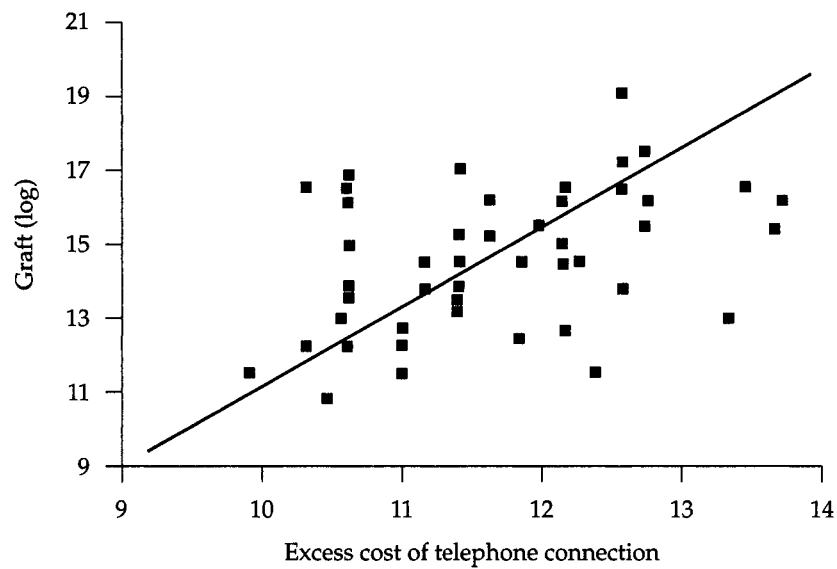


Source: 1998 enterprise survey.

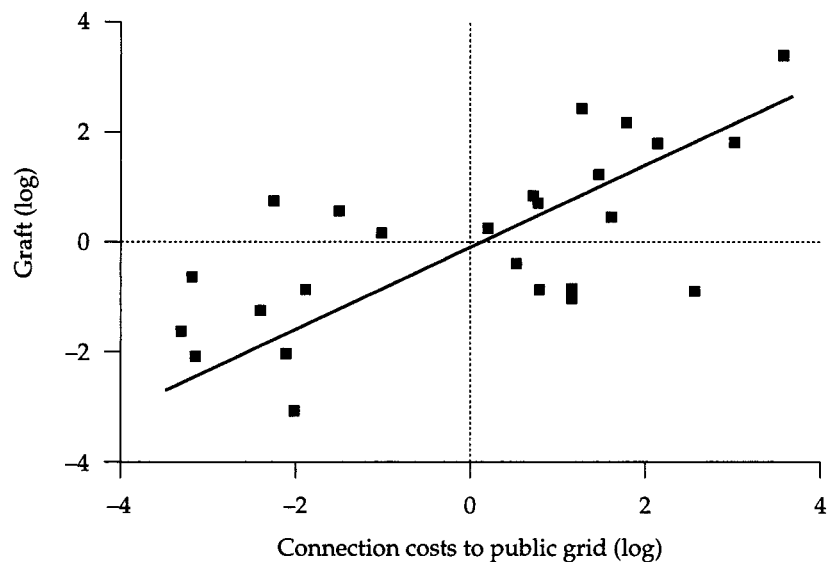
Figure A10.3. Distribution of Firms According to Bribe Payments



Source: 1998 enterprise survey.

Figure A10.4. Correlation between Graft and Excess Cost of Telephone Connection

Source: Author's calculations based on the 1998 enterprise survey.

Figure A10.5. Partial Correlation between Graft and Connection Costs to Public Grid

Source: Author's calculations based on the 1998 enterprise survey.

References

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

Bardhan, Pranab. 1997. "Corruption and Development: A Review of Issues." *Journal of Economic Literature* 35(September):1320–46.

Bliss, Christopher, and Rafael Di Tella. 1997. "Does Competition Kill Corruption." *Journal of Political Economy* 105(October): 1001–23.

Fisman, Raymond, and Jakob Svensson. 2000. "Are Corruption and Taxation really Harmful to Growth? Firm Level Evidence." Policy Research Working Paper no. 2485. Development Research Group, World Bank, Washington, D.C.

Heckman, J. 1979. "Sample Selection Bias as a Specification Error." *Econometrica* 47: 53–161.

Johnson, Simon, Daniel Kaufmann, and Andrei Shleifer. 1997. "The Unofficial Economy in Transition." *Brookings Papers on Economic Activity* 2: 159–239.

Kaufmann, Daniel. 1997. "Corruption: Some Myths and Facts." *Foreign Policy* (summer): 114–31.

Kaufmann, Daniel, and Shang-Jin Wei. 1999. "Does Grease Money Speed up the Wheels of Commerce?" Policy Research Working Paper no. 2254. World Bank, Development Research Group, Washington, D.C.

Paul, Samuel. 1997. "Corruption: Who Will Bell the Cat?" *Economic and Political Weekly* 32: 1350–55.

Republic of Uganda. 1998. "National Integrity Survey. The Report to the Inspectorate of Government." Kampala.

Ruzindana, Augustin, Petter Langseth, and Arthur Gakwandi, eds. 1998. *Fighting Corruption in Uganda: The Process of Building a National Integrity System*. Kampala: Fountain Publishers.

Shleifer, Andrei, and R. W. Vishny. 1993. "Corruption." *Quarterly Journal of Economics* 108: 599–617.

Svensson, Jakob. 2000a. "Who Must Pay Bribes and How Much? Evidence from a Cross-Section of Firms." Policy Research Working Paper no. 2486. Development Research Group, World Bank, Washington, D.C.

———. 2000b. "Foreign Aid and Rent-Seeking." *Journal of International Economics* 51(2): 437–61.

Tanzi, Vito. 1998. "Corruption Around the World: Causes, Consequences, Scope, and Cures." *IMF Staff Papers* 45: 559–94.

- Thomas, Melissa. 1999. "The Incentive Structure of Systemic Corruption." World Bank, Washington, D.C. Processed.
- Wei, Shang-Jin. 1999. "Corruption in Economic Development: Beneficial Grease, Minor Annoyance, or Major Obstacle." Policy Research Working Paper no. 2048. Development Research Group, World Bank, Washington, D.C.
- White, H. 1980. "A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity." *Econometrica* 50: 1–16.
- World Bank. 1998. "Uganda: Recommendations for Strengthening the Government of Uganda's Anticorruption Program." Mission Report. Africa Region, Poverty Reduction and Social Development, Washington, D.C.

Recovery in Service Delivery: Evidence from Schools and Health Centers

Ritva Reinikka

It is commonly held that Uganda had a well-functioning social service delivery system in the 1960s. The subsequent economic and social decay all but decimated this system, however. Undoubtedly, institutional recovery is more complex than implementing policy reforms by “a stroke of the pen.” While evidence on economic performance is fairly readily available, much less information exists on Uganda’s institutional recovery during the past 15 years, either in terms of institutional assessments or systematic recording of performance indicators. This chapter sheds light on service delivery in education and health. The two subsequent chapters, which explore household responses to recent policy initiatives in these two sectors, complement this analysis.

The principal motivation for the study reported in this chapter was the substantial increase in public spending on basic services, albeit from a small base, since Uganda’s recovery started in the late 1980s, while several officially reported outcome and output indicators remained stagnant. The most obvious disparity in output indicators was in primary school enrollments. Despite increases in budgetary allocations for education, officially reported enrollments increased only slightly during the first half of the 1990s. The hypothesis for the study was that actual service delivery, or output, was much worse than budgetary allocations implied because public funds, or inputs, were subject to capture by bureaucrats and did not reach the intended facilities (see, for example, Bardhan and Mookherjee 1998). To test this hypothesis, the study’s author compared budgets and actual spending in the primary education and health care sectors.

This chapter draws on Ablo and Reinikka (1998). Comments by Jakob Svensson are greatly appreciated.

While this chapter does not attempt a comprehensive analysis of public sector efficacy, the government's ability to translate budgetary allocations into actual spending at the facility level can be a useful proxy for it. As adequate public accounts are not available in many African countries, including Uganda, a diagnostic survey of schools and clinics was carried out to collect actual spending data.¹ Survey work is typically limited to examining the effects of policies and interventions on households and firms, while inputs, such as flows of public funds, and outputs, such as primary enrollments, are left solely for official statistics or administrative records. As this study shows, a diagnostic survey of the supply side can provide a useful reality check when institutions are weak and official statistics are not a reliable guide for policymakers.

While the Ugandan school survey results indicate some improvement in the input flow to service facilities during 1991–95, particularly in salary payments, they also confirm a serious lack of accountability. For example, only 2 percent of public nonwage education spending reached the schools in 1991, and only 20 percent in 1995. If efficiency of input flow is an indicator of the extent of institutional recovery, by 1995 this recovery was limited at best. The dismal situation revealed by this school survey sparked action by the central government, which began publishing information about monetary transfers to districts and demanding that transfer information be posted at schools and district headquarters. A recent replication of the school survey shows that schools now receive more than 90 percent of the nonwage spending intended for them, although often with delay (Republic of Uganda 2000). Hence, at least in some areas, institutional recovery in Uganda appears to be accelerating.

The 1996 school survey unearthed other important information critical to understanding the education delivery system and the efficacy of potential interventions. First, instead of being stagnant as official statistics indicate, primary enrollments increased by 60 percent in 1991–95. This indicates that, while input flow suffered from major problems, education system performance in the first half of the 1990s improved more than the information system that reports it. Furthermore, in 1997 the universal primary education initiative, discussed in chapter 12, resulted in a sudden increase in enrollment as households responded strongly to the president's election pledge of free education for four children per family.

Second, the survey showed that public primary education was mostly funded by parents who, on average, contributed as much as 73 percent of total school spending in 1991 (42 percent at the median school). When the government retreated from funding and managing primary schools during the repressive Amin and Obote regimes, parents took over. The survey data show

1. In 1990, the government initiated efforts to develop and implement a financial tracking system for primary education and health (Republic of Uganda 1990, 1992). These efforts bore little or no fruit.

that by 1991 this situation had not changed much. However, the government's share increased during the survey period, and by 1995 parents financed 60 percent of total school spending on average (at the median school the parental share was roughly halved to 23 percent). Strikingly, parental contributions continued to increase in real terms despite higher public spending.

The health facility survey showed that these facilities did not keep systematic financial or patient records in 1991–95. Therefore, assessing the flow of funds or services delivered was not possible. The public service facilities in the two sectors seem to vary their institutional behavior depending on the institutional context and incentives. However, limited, recent evidence from four districts shows that operations such as opening hours and staff availability, as well as recordkeeping, have improved in health facilities since 1996 (World Bank 1999).

The prevailing normative view of government assumes that once the right policy or intervention has been found—to correct market failure or externalities or to achieve a better distribution of income—the government implements it as designed, and the desired effects will follow. Some view governments as benevolent single agents, behaving in the same way everywhere in the world, and policymaking as a technical problem rather than a political process that varies between countries (Dixit 1996). New theoretical literature, however, takes a more nuanced view by differentiating governments as providers of public goods. Svensson (1997), for example, finds that as society's polarization and degree of social conflict increase, the control of public policy is less effective. This results in more public spending, but fewer public goods. This emphasizes the importance of separating the effects of public capital on welfare from the effects of public spending on public capital.

Pritchett (1996) argues that governments differ from the private sector in the degree to which they behave as profit-maximizing investors. If public investment is guided by motives other than profitability, the cost of cumulated public capital is likely to be higher than its value in terms of future returns. Therefore, using investment cost to measure public capital across countries may be misleading. Similarly, as demonstrated in this chapter, using budget allocations to measure actual frontline service delivery may be misleading.

Several recent empirical papers also highlight the divergence between the actual and potential impact of public spending on health outcomes in developing countries. Filmer and Pritchett (1999) find that 95 percent of cross-national variation in child mortality can be explained by factors not related to health policy, such as per capita income, income distribution, female education, and various cultural factors. Meanwhile, the impact of public spending—typically measured by budget allocations—is very small and statistically insignificant.

The rest of this chapter is divided into four sections. The first section briefly describes the diagnostic survey carried out in Uganda in 1996. The next section examines official data on primary enrollments over time and compares them with the facility survey data for 1991–95. It presents the main results of

the primary school survey with respect to actual public and private spending at both the national and regional level. The chapter then explores service delivery and public spending on primary health care. Finally, the chapter concludes and summarizes the policy changes the government introduced following the survey findings. The concluding section also highlights recent evidence on improvements made since 1996.

Diagnostic Survey

Ideally, the public accounting system should provide timely information about actual spending on various budget items and programs. This is not often the case in many low-income countries. Because the revival of the accounting system has been slow in Uganda, a field survey was necessary to gauge the extent to which public resources actually filtered down to the intended facilities. A survey of 19 districts covering 250 government-aided primary schools and nearly 100 health clinics was carried out in 1996, covering the period 1991–95.²

Apart from school and health unit income and expenditure, the objective of the survey was to collect data on primary enrollments and patient records at the facility level.

From 10 to 20 schools were visited in each district.³ Of the districts surveyed, Bushenyi had the most primary schools, with 399 in 1994, while Bundibugyo had the least, with 59. In the districts with fewer than 100 government-aided schools, the enumerators visited 10 schools; in districts with 100–200 schools, they visited 15; and in those with more than 200 schools, they visited 20. The primary school-leaving examination results,

2. For the sample selection, the country was first divided into regions. To bring out regional differences more clearly, the traditional four regions (north, east, west and central) were reconfigured into seven regions, namely: northwest, north, northeast, east, central, southwest, and west. Kampala was treated as a separate region because it enjoys many advantages over the rest of the country. The 39 districts were then arrayed into 3 groups, based on the fiscal year in which a particular district first received a separate budget vote under the decentralization program which commenced in 1993. The objective was to pick one district per region in each successive phase of decentralization. In practice, only two districts were selected from the smaller regions. After some other minor adjustments, the following 19 districts were selected: Kampala; Arua, Moyo (northwest); Apac, Gulu (north); Soroti, Moroto, Kapchorwa (northeast); Jinja, Kamuli, Pallisa (east); Mukono, Mubende, Kiboga (central); Bushenyi, Kabale (southwest); and Kabarole, Hoima, Bundibugyo (west). Kiboga, which is a new district, had to be dropped subsequently because of limited data availability.

3. At the time of the survey, there were about 8,500 government-aided primary schools, which were supposed to receive a large proportion of their funding from central and local governments. The rest of the schools, about 1,500, were either private or community schools.

supplemented by information about school facilities, were used as criteria to select schools within a district. Both good and poor performers were included in the stratified random sample.

Every district had many more schools than health facilities. Two districts—Kapchorwa and Kisoro—had no government health centers, while some had as many as 10. In some cases, missionary, private, or nongovernmental organization (NGO) facilities compensated for the lack of government facilities. Enumerators visited five primarily government facilities in each district, such as two health centers, two dispensaries/maternal units, and one aide post, or some other combination.

Most of the enumerators who collected the data from schools and clinics were former teachers and health workers who lived in those districts. They used standardized forms, and supplemented the quantitative data with qualitative observations. Enumerators were trained and closely supervised by a joint Ugandan-World Bank research team to ensure quality and uniformity of data collection and to assess the standard of recordkeeping in schools and clinics.

Education and Public Spending

Before the introduction of free universal primary education in 1997, official data indicates that primary school enrollment in government schools was almost stagnant for 10 years (table 11.1). Because the number of children of

Table 11.1. Official Enrollment Data from Government-Aided Primary Schools, 1987–97

<i>Year</i>	<i>Number of schools</i>	<i>Number of teachers</i>	<i>Number of students (millions)</i>
1987	7,627	72,970	2.31
1988	7,905	75,551	2.42
1989	7,684	81,418	2.53
1990	7,667	81,590	2.28
1991	8,046	78,259	2.54
1992	8,325	86,821	2.36
1993	8,430	91,905	2.67
1994	8,442	84,043	2.60
1995	8,531	—	2.64
1996	—	82,600	2.74
1997 ^a	10,000	98,700	5.30

— Not available.

a. These data are from a nationwide headcount of pupils and teachers in August.

Source: Ministry of Education data.

primary school age had increased along with high population growth, it follows that net primary enrollment rates must have fallen.⁴

The official data cannot, however, be easily verified without going to the school level because the districts kept virtually no reliable educational statistics at the time. The well-developed recordkeeping of the 1960s broke down during the political and military turmoil of the 1970s and early 1980s, and had not recovered by mid-1990. The main source of official data for primary enrollments was the annual school census carried out by the Ministry of Education, which sent questionnaires to district education officers. The officers sent them on to schools, which returned the questionnaires through the same channel. Fieldwork by the school census staff was minimal.

Chapter 12 discusses in more detail the free universal primary education for four children per family introduced in January 1997. This substantially increased primary enrollment, which rose to 5.3 million students, based on a nationwide headcount later in 1997, revealing a high private demand for education. Most of the increase was in the first grade (P1). Both underaged and overaged children entered P1 in 1997, producing an exceptionally large cohort of 2.1 million children.

The school survey results, however, did not correspond with the trend in the official enrollment figures (table 11.2). Instead of being stagnant, primary enrollment in the sample schools increased 60 percent between 1991 and 1995. The overall student-teacher ratio increased from 26:1 in 1991 to 37:1 in 1995. The survey results seem more plausible than the official figures, given the continuous improvement in the political and socioeconomic environment and public finance since 1986. As the survey was based on a careful examination of individual school records, it suggests that the

Table 11.2. Enrollment Data from Surveyed Schools, 1991–95

<i>Year</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>
Number of students	81,318	90,330	109,063	119,919	129,087
Annual increase in students (%)	8	11	21	10	8
Number of teachers	3,077	3,312	3,663	3,897	3,498
Annual increase in teachers (%)	—	8	11	6	–10

— Not available.

Source: School survey.

4. The 1992/93 integrated household survey recorded an average gross primary enrollment of slightly more than 90 percent, while net enrollment (the proportion of children between 6 and 12 years of age enrolled in school) was 67 percent nationally. The net enrollment rate among the lowest expenditure quintile was only 46 percent, and 59 percent for the second lowest quintile, compared with 81 percent for the highest quintile. High dropout and repetition rates were also common (World Bank 1996a,b).

officially reported enrollment statistics grossly understate the progress made in the 1990s. Determining where in the delivery system the incentive to underreport was the highest or how it might have changed over time is difficult. At the school level, it would have meant fewer tuition fees remitted to the district, while at the district level underreporting would have required smaller transfers of capitation grants to schools.

Availability of Data on Public Spending

The total budgetary allocation for recurrent expenditure on education almost tripled in real terms during 1991–95 (table 11.3). Neither functional nor spatial disaggregation of education spending is easy, however. First, at the central government level, data were not available on salaries paid to primary school teachers either by district or by school in 1991–95. The only data available were the aggregate salary payments, which lumped together payments to teachers in the primary, secondary, and tertiary levels, as well as those made to non-teaching staff. This made systematic comparison of budget allocations for teacher salaries and actual spending at the school level impossible. Also, some teachers were not on the central government payroll, which further complicated efforts to track salary spending. Additional teachers were hired directly by schools and funded by parent-teacher associations (PTAs). The only systematic spending data available at the central government level were capitation grants for nonwage spending.

Second, initially the intention was to track public spending through the entire delivery system, which included the central government, districts, and schools. The field survey revealed that the district-level records for both nonwage and wage spending were even worse than at the central government level. The quality of available information both on transfers from the center and disbursements to schools was so poor—both before and

Table 11.3. Recurrent Budget Allocation for Education, 1991–97
(1991 prices)

<i>Year</i>	<i>U Sh (millions)</i>	<i>Index</i>
1991	19,202	100
1992	30,002	156
1993	24,569	128
1994	32,258	168
1995	51,891	270
1996	49,027	255
1997	68,081	355

Note: The exchange rate ranged from U Sh 960 to U Sh 1,200 per U.S. dollar during 1991–95. Data are from fiscal years.

Source: Ministry of Finance and Economic Planning data.

after decentralization—that districts were excluded from the expenditure tracking exercise. School records were relatively comprehensive, however. Presumably parents who contributed substantially to school income before 1997 demanded financial information and accountability from the school. Therefore a detailed comparison of budgetary allocations and actual spending could only be made between the central government outlays for nonwage spending and the equivalent school income.⁵

Actual Spending at Primary Schools

Table 11.4 presents a summary of the sources of income for the 250 sample schools (both cash and in-kind). During 1991–95, the central government's financial contribution to primary education consisted of three components: primary teacher salaries, capital expenditure, and capitation grants.

Teacher salaries was the largest item, consistent with the finding that public spending choices tend to favor teacher salaries over their actual contribution in producing educational outputs (Pritchett and Filmer 1997). Capital expenditure was limited almost entirely to rehabilitation rather than

Table 11.4. Summary of School Income Data, 1991–95

(1991 prices in millions of U Sh)

<i>Income</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>
Teachers' salary payments by government	213.9	214.7	381.3	748.6	914.6
Capitation grants received by schools	4.2	15.8	58.0	60.9	58.3
Other government funding	73.8	62.5	73.6	118.7	147.1
Total government contribution	291.9	293.0	512.9	928.2	1,120.0
Tuition collected	55.4	96.8	116.6	136.2	141.3
Amount of tuition retained by schools	2.2	7.4	10.6	23.7	50.3
PTA levies	591.1	609.6	775.2	934.9	1,032.7
PTA salary payments	125.8	134.1	196.0	300.7	475.9
Total parent contribution	772.3	840.5	1,087.8	1,371.8	1,649.9

Source: School survey.

5. Donor assistance for primary education has come in two main ways. First, financing has been made available for textbooks and other scholastic materials. Second, donors have provided substantial financing for school construction. With the exception of one major donor-funded project, tracking of donor and NGO expenditures was difficult in the absence of any disaggregated data at the center.

new construction.⁶ The capitation grant for nonwage expenditure is a payment per student enrolled and is a 50 percent matching government contribution against the mandated tuition fees paid by parents. The capitation grant is intended to defray part of the costs of textbooks and other learning materials, as well as general school running costs.

The survey confirmed that the main sources of income for government-aided primary schools were, in order of importance, (a) PTA levies collected from parents by the school, (b) central government transfers and PTA contributions for teacher salaries, (c) government funding for capital expenditures and capitation grants, and (d) retained tuition fees. PTA funds are under the full control of the schools, and the PTA executive committee oversees their use. Because their level depends on the ability of parents to pay, these levies vary widely between schools and across regions.

The government's total contribution to the funding of primary schools almost quadrupled during 1991–95 in real terms, albeit from a negligible base. This is proportionately more than the overall increase in education spending. Despite an increase in government spending, spending by parents doubled during the same period. The average parental contribution per student increased by 35 percent in real terms between 1991 and 1995, while the average government contribution more than doubled (table 11.5).

Table 11.6 shows total expenditure by parents and government at the median school during 1991–95. A comparison of the means and medians shows that the distribution of parent expenditure at the school level is highly asymmetric, with the median only a fraction of the mean. Hence the median is a better measure of the general tendency in parent expenditure. The distribution of government spending is much less asymmetric, although the medians are lower than the means. Parent expenditure per student doubled during 1991–95 at the median, while the increase in government spending was almost fivefold during the same period.

Table 11.7 shows the proportion of school income from parents and government during 1991–95. Although declining in importance during the survey period, parental contributions were clearly the mainstay of finance in

6. Since the 1970s the central government had virtually abandoned its responsibility for classroom construction. In principle, the provision of classrooms became the responsibility of local governments. As the local government tax base needed to support school construction is underdeveloped, local governments in turn passed the responsibility for classroom construction on to parents. To shoulder this and other school-related financial obligations, PTAs increasingly resorted to PTA levies. In addition, the central government is responsible for counterpart funding, which is the government's share of the cost of donor-financed development projects. The central government also incurs expenditure on teacher training, examinations, and school inspections, which have a separate allocation.

Table 11.5. Mean Parental and Government Contribution to School Income Per Student, 1991–95
(1991 prices in U Sh)

<i>Year</i>	<i>Parents</i>				<i>Government</i>			
	<i>Tuition fees collected</i>	<i>PTA levies</i>	<i>PTA salaries</i>	<i>Total</i>	<i>Capitation grant</i>	<i>Salaries</i>	<i>Other</i>	<i>Total</i>
1991	682	7,269	1,547	9,498	68	2,630	908	3,606
1992	1,072	6,749	1,484	9,305	118	2,377	692	3,187
1993	1,069	7,108	1,797	9,974	280	3,496	675	4,451
1994	1,136	7,796	2,507	11,439	352	6,243	990	7,585
1995	1,094	8,000	3,687	12,781	330	7,085	1,139	8,554

Source: School survey.

Table 11.6. Median Parental and Government Contribution to School Income Per Student, 1991–95

(1991 prices in U Sh)

<i>Year</i>	<i>Parents</i>	<i>Government</i>
1991	1,173	1,639
1992	1,631	2,215
1993	1,792	4,179
1994	2,209	4,467
1995	2,291	7,729

Source: School survey.**Table 11.7. Parental and Government Contribution to Total School Income, 1991–95**

(percent)

<i>Year</i>	<i>Parents</i>		<i>Government</i>	
	<i>Mean</i>	<i>Median</i>	<i>Mean</i>	<i>Median</i>
1991	73	42	27	58
1992	74	42	26	58
1993	68	30	32	70
1994	60	33	40	67
1995	60	23	40	77

Source: School survey.

government-aided primary schools. In 1991–92 parental contributions accounted for more than 70 percent of school income on average; by 1995 the share had declined to 60 percent. However, for the median school, parental financing was less important, declining from 42 percent in 1991 to 23 percent in 1995. This indicates a highly skewed distribution of spending.

Without an adequate breakdown of the salary data at the central government level, one of the key questions this study sought to answer was how much of the nonwage expenditure (capitation grants) made available by the central government actually reach the schools. The government's stated policy was to disburse the grant in full to the schools either in cash or in-kind through the district education officers. The capitation grant was set in 1991 at the nominal rate of U Sh 2,500 per child enrolled in grades P1–P4 and U Sh 4,000 per child enrolled in grades P5–P7. These rates remained the same until 1997, although they grossly underestimated the cost of providing scholastic materials and maintaining the physical facilities. Inflation, although moderate since 1993, eroded the real value of the grant. Thus, the real increase in total recurrent expenditure over time (table 11.3) was

not reflected in nonwage spending on primary education. To compensate for the inadequacy of the central government provision for nonwage (and wage) expenses, school administrators resorted to PTA levies.

Table 11.8 indicates the amount of capitation grant disbursed by the central government and the average amount received by the schools (in 1991 prices).⁷ While the central government's contribution in real terms was at its highest in 1991, the schools received on average only 2 percent of this grant. However, even if 1991 and 1992 are viewed as extreme cases, the figures for 1994–95, although higher, are still extremely low. In the best year the schools received, on average, one-fifth of the capitation grant (zero at the median). Recent evidence from a similar school survey shows that the situation has improved greatly since 1995. With increased transparency, 90 percent of the capitation grant is now released to the schools (Republic of Uganda 2000).

Interviews during the 1996 school survey confirmed that local government authorities retained the bulk of the grant. Some districts apparently disbursed the grant on the basis of how many students had paid tuition. The funds intended for children who had enrolled but not paid tuition fees were typically retained by the urban or district councils. This practice certainly hurt poorer communities the most, because in these communities parents are more likely to default on the payment of tuition fees. Some local governments reported that the discrepancy was used to cover the expenses of the district education officer. In some districts the funds retained by the local authorities were spent for purposes unrelated to education. In addition, part of the intended grant apparently remained at the center, as the government budgeted and disbursed the grant on the basis of the 1991 enrollment figures. As enrollment increased over time, the grant per student actually disbursed to the districts certainly decreased.

During the survey period, parent contributions toward financing primary education consisted of (a) tuition fees at the nominal rate of U Sh 2,500 per child in grades P1–P4 and U Sh 4,000 per child in P5–P7 to match the capitation grant paid by the government, (b) PTA levies that varied from district to district and from school to school, and (c) contributions to teacher salaries. Tuition fees collected by the schools were not remitted to the central government. Rather, each district determined how the funds raised should be redistributed among the schools. In some districts, the schools were allowed to retain a certain percentage or a fixed amount of the tuition fee collected per student, with the balance transferred to the district education officer. In other districts the tuition fees collected were all remitted to the district headquarters. Subsequent disbursements to schools, either in cash or in-kind, may or may not have taken place. Collection efficiency of tuition fees was very low in 1991, but has improved since 1992 (table 11.9).

7. The average capitation grant was based on the assumption that 70 percent of students were in grades P1–P4 and 30 percent were in grades P5–P7.

Table 11.8. Average Capitation Grant Per Student, 1991–95
(1991 prices)

Year	Intended grant amount (U Sh)	Schools actually received					
		Mean			Maximum		
		U Sh	Percentage of intended amount	Minimum	Median	U Sh	Percentage of intended amount
1991	3,100	68	2	0	0	2,509	26
1992	1,966	118	9	0	0	1,916	47
1993	1,869	280	28	0	0	1,867	67
1994	1,850	352	27	0	0	1,826	69
1995	1,737	330	26	0	0	1,734	56

Note: 997 observations; 71 observations omitted from the sample as outliers.

Source: School survey.

Table 11.9. Average Tuition Per Student, 1991–95
(1991 prices)

Year	Tuition fees collected (mean)	Tuition fees retained by schools					
		Mean			Maximum		
		U Sh	Percentage of fees collected	Minimum	Median	U Sh	Percentage of fees collected
1991	682	27	4	0	0	256	38
1992	1,072	82	8	0	0	395	37
1993	1,069	97	9	0	0	398	37
1994	1,136	197	17	0	0	605	53
1995	1,094	390	36	0	0	546	50

Source: School survey.

In 1991 schools received, on average, 4 percent of the tuition collected. By 1995 this had improved considerably, but schools still only retained 36 percent of the average tuition fees. Hence, as shown in table 11.9, local government authorities not only retained the bulk of the capitation grant, but also kept a large portion of the tuition fees paid by parents. Variation between districts was also substantial.

Despite anecdotal evidence that teacher salary payments suffered from delays and other problems in the flow of funds, interviews during the survey indicated that government salary payments mostly reached the schools.⁸ Because of the lack of annual disaggregated data at the center, salaries could not be tracked through the system, but the school survey provides other useful information.

Teachers derived salaries from three sources: the government, PTAs, and others such as NGOs (table 11.10). In 1991 and 1992 nearly half of teacher salaries came from sources other than government. From 1993 on, the government contribution rose significantly, thanks to a presidential directive that called for annual salary increases for teachers. Increased budgetary allocations were reflected in higher salary payments at the school level, but this alone is not adequate to determine the extent to which budgetary allocations translated to actual spending. Parental contributions fluctuated from a quarter to a third of the total wage bill during the survey period. Note that the share of total PTA contributions used for teacher salaries increased from 16 percent in 1991 to 29 percent in 1995, despite the quadrupling of government spending on salaries.

Total spending on instructional materials and other nonwage items by schools increased only by 20 percent in real terms between 1991 and 1995, while the equivalent spending on salaries (government and parents combined) tripled during the same period and more than tripled per teacher. Not only did public spending choices favor teacher salaries over nonwage spending, but teachers may have exerted a disproportionate influence over PTAs as well.⁹

However, the starting point was extremely low (U Sh 11,360, or around US\$12 per month, in 1991). This was less than a quarter of what the civil service reform program considered a minimum living wage at the time. Survey interviews confirmed that absenteeism was a serious problem, as teachers were compelled to make a living outside their profession. Although the targeted living wage had not yet been attained by 1995, the situation had improved considerably from the teachers' point of view.

While teacher salaries were given priority over instructional materials and other nonwage items, a major pay increase was perhaps warranted to

8. The only systematic way of misappropriating funds was by having "ghosts" on the payroll. A total of 15,000 ghost teachers (around 20 percent of all teachers) was removed from the payroll in 1993.

9. To some extent, donor funds compensated for slow growth in nonwage spending, but only in some schools.

Table 11.10. Contributions to Teachers' Salaries, 1991–95
(1991 prices)

<i>Year</i>	<i>Government</i>		<i>PTA</i>		<i>Other</i>		<i>Total</i>	
	<i>U Sh (million)</i>	<i>Percent</i>	<i>U Sh (million)</i>	<i>Percent</i>	<i>U Sh (million)</i>	<i>Percent</i>	<i>U Sh (million)</i>	<i>Percent</i>
1991	213.9	51	125.8	30	79.7	19	419.4	100
1992	214.7	52	134.1	33	61.5	15	410.3	100
1993	381.3	59	196.0	30	72.4	11	649.7	100
1994	748.6	66	300.7	26	86.7	8	1,136.0	100
1995	914.6	61	475.9	32	104.7	7	1,495.3	100

Source: School survey.

reduce absenteeism and restore the quality of teaching. Some evidence suggests that this strategy worked, given the finding that enrollment increased by 60 percent. At the same time, a more balanced spending pattern between salaries and instructional and other materials might have produced an even better result.

Regional Differences

As national averages conceal regional variations, it is useful to explore actual spending in the subregions in the survey. Table 11.11 shows government expenditures per student that reached the schools by subregion (in 1991 prices). The western region appears to have the lowest per student public spending at the school level, possibly indicating worse inefficiency in the transfer system between the center and the schools than in other subregions. As schools are not larger in the west than elsewhere, a lower unit cost is not likely to result from a higher student-teacher ratio and a resultant lower wage bill.¹⁰

The opposite is probably true in the north and northeast, where classes are smaller and the per student expenditure is therefore higher. To explore regional differences in efficiency further, the capitation grant is a good proxy, as this was intended to be the same amount per student across the country. When the share of the capitation grant spent on the intended purpose is regressed on a regional dummy variable (using ordinary least squares), only the north (Apac and Gulu districts) entered negatively and highly significantly (at 1 percent). The north is one of the poorest regions in Uganda, as measured by household expenditure, and continues to suffer from conflict.

Parent expenditure per student has a much larger spatial spread than public spending (table 11.12). The level of private spending is the highest in the better-off central region and Kampala, while the three poor northern subregions and the west have extremely low spending levels per student.¹¹

Impact of Decentralization

Before fiscal decentralization, which began gradually in mid-1993, the bulk of public funds came from the central government. The Ministry of Education

10. This appears to be the case in Kampala, where the share of public funding is the smallest and classes are large.

11. The district-level (Spearman rank) correlation coefficient between public spending on primary schools and poverty measured by household expenditure is -0.228 . Poorer districts seem to benefit from a somewhat higher level of public spending per student available to the schools. However, this may also reflect a lower student-teacher ratio, as households in those districts can afford to send fewer children to school. There is a positive correlation (0.56) between household expenditure and private spending on primary education.

Table 11.11. Average Government Contribution Per Student Reaching Schools by Subregion, 1991–95
(1991 prices in U Sh)

<i>Year</i>	<i>Northwest</i>	<i>North</i>	<i>Northeast</i>	<i>East</i>	<i>Central</i>	<i>Kampala</i>	<i>Southwest</i>	<i>West</i>
1991	1,623	4,866	2,599	3,546	5,878	1,067	5,718	1,958
1992	1,772	3,972	2,781	3,315	4,220	2,348	4,392	2,488
1993	3,964	4,664	5,138	4,516	6,122	3,535	6,285	3,307
1994	7,384	7,526	8,405	8,048	10,120	6,438	7,962	6,235
1995	12,811	8,151	7,748	8,179	10,318	8,636	7,300	5,977

Source: School survey.

Table 11.12. Average Parental Contribution Per Student by Subregion, 1991–95
(1991 prices in U Sh)

<i>Year</i>	<i>Northwest</i>	<i>North</i>	<i>Northeast</i>	<i>East</i>	<i>Central</i>	<i>Kampala</i>	<i>Southwest</i>	<i>West</i>
1991	1,345	1,048	839	6,932	27,545	49,084	3,064	1,480
1992	976	991	1,195	4,709	20,134	65,829	3,436	1,559
1993	1,107	1,763	1,175	5,500	22,176	46,170	4,440	1,988
1994	1,880	2,074	1,070	7,196	27,576	41,792	6,053	2,189
1995	2,034	2,277	999	8,522	31,568	37,286	6,520	1,795

Source: School survey.

played a major role in primary education, controlling nearly all the recurrent budget allocations for the sector. The district administrations, however, channeled these funds to schools even before decentralization. Following decentralization, district authorities and the district and urban councils gradually gained control of the funds provided by the central government for primary education. In 1996, estimates indicate that the ministry controlled only about a quarter of the total recurrent spending on primary education.

The standard capitation grant is a good proxy for exploring the impact of decentralization on the flow of public funds to schools, as it was supposed to be the same (nominal) amount per student throughout the study period in all districts. Using ordinary least squares, the share of the capitation grant reaching the schools is regressed on time dummies and a decentralization dummy variable. The latter takes the value one when the district where the school is located was decentralized; otherwise it is zero.¹²

As table 11.13 shows, the input flow at the school level improved at a statistically significant level over time, albeit modestly. The decentralization variable (DECEN) enters significantly negative, indicating that decentralization adversely affected the flow of funds to schools. The schools affected by decentralization received, on average, 9 percentage points less of the intended capitation grant per student than their counterparts in

Table 11.13. Impact of Decentralization on the Flow of Capitation Grants to Schools, 1991–95

<i>Year</i>	<i>Coefficient</i>	<i>t-statistic</i>
1991	0.022	1.204
1992	0.060	3.332
1993	0.149	8.767
1994	0.221	11.617
1995	0.224	12.079
DECEN	–0.093	–3.862
R ²	0.085	n.a.
Number of observations	997	n.a.

n.a. Not applicable.

Note: Ordinary least squares estimation. Dependent variable is the share of the capitation grant that reached the school, 1991–95 are time dummies, and DECEN is a binary variable taking the value one if the school is located in a fiscally decentralized district, zero otherwise.

Source: School survey.

12. For example, schools located in the districts that were decentralized first in mid-1993 take the value one from the beginning of the following school (calendar) year. The second phase of fiscal decentralization occurred in mid-1994 and the last phase was in mid-1995.

nondecentralized districts. Instead of receiving 22 percent, they received 13 percent in 1995. The deterioration in decentralized districts may be temporary, but it serves as a reminder that decentralization could come with an adjustment cost in terms of service delivery.

Health Care and Public Spending

As in primary education, limited official data exist from central government health services at the time of the survey. Contrary to the education sector, however, the health unit survey found little systematic facility-level information on financial flows or outputs, such as the number of inpatients or outpatients. One explanation for such a marked difference in facility-level behavior between the two sectors could be that the PTAs that financed most of the school-level expenditure in 1991–95 demanded basic recordkeeping and accountability, while users in health clinics exerted no such pressure. A long-term relationship between providers and beneficiaries that characterizes primary education—in contrast to health care, where the relationship is typically short and more ad hoc—clearly favors better organization on the demand side.

At the design and pilot stage of the survey, the researchers did not fully anticipate the lack of almost any financial information at the facility level and the heavy reliance on in-kind measures throughout the system. As the data gathering proceeded, any hope of systematic tracking of expenditure on the basis of data from primary health facilities faded. Many of the resources received by health units were in-kind with no value indicated, and hence not easy to compute. Although user fees are collected and retained at the health facility level, records on their use were either not available or patchy. Unlike in primary education where school income and expenditures could be related to pupils enrolled, records on patients were extremely poor and unreliable.¹³

Availability of Data on Health Spending

For the survey period, reliable health spending figures are available only for 1992/93 because of the difficulty of obtaining information about annual donor flows. Public spending was only US\$4.38 per capita (including donor assistance) in 1992/93, while private spending was US\$5.36. Although the level of health spending is low in Uganda, this study attempts to examine the flow of those minimal public funds from the center to service facilities.

13. Based on a cross-section of 61 developing countries, Uganda's health outcomes are worse than expected given its level of overall gross national product (GNP). An infant mortality rate of only 71 (compared with 97) would be predicted for Uganda given its per capita GNP in 1994 (Demery and Dorabawila 1997).

Poor efficacy magnifies the negative impact of a low level of spending on health outcomes.

Recurrent budgetary allocations for health increased 2.5 times between 1991 and 1995 (table 11.14). However, donors finance the bulk of public expenditure on primary health care. According to the data for fiscal year 1992/93, donors financed 77 percent of health spending, while the government's share was only 23 percent (World Bank 1996b). For hospitals, the distribution was reversed, with donors funding 36 percent and the government funding 64 percent. With decentralization, nonwage recurrent expenditure on primary health care became part of the block grant, but drugs and other supplies funded largely by donors continue to be delivered from the center. The central government's main responsibilities were the salaries of health workers. Most primary health workers were central government staff seconded to local authorities; direct hiring by the local authorities was limited. Despite decentralization, this was still the case during the survey period. As in education, data on staff salaries were not disaggregated either by district or health facility for 1991–95. At the district level, locally recruited health workers are paid out of the district's own resources, but this information was patchy. Similarly, donor funding could not be disaggregated either by district or by facility.

As public resources dwindled from the mid-1970s, government health facilities at all levels increasingly resorted to various informal charges for drugs, meals, consultation, treatment, and operations. Attempts were made in 1989 to formulate a national policy on user fees for public health services, but were soon abandoned for another decade. The new national policy on user fees was adopted in 1999. Before then districts theoretically could set user fees for their health services, although in practice, the imposition of charges was left to each facility. The Ministry of Health issued fee-for-service guidelines that allowed up to 50 percent of fees collected to be spent on staff incentives; up to 25 percent on drugs and supplies; and the rest on maintenance, supervision, and outreach.

Table 11.14. Recurrent Budgetary Allocations for Health, 1991–97
(1991 prices)

<i>Year</i>	<i>U Sh (millions)</i>	<i>Index</i>
1991	6,381	100
1992	9,109	143
1993	8,863	139
1994	14,429	226
1995	16,819	264
1996	16,470	258
1997	19,925	312

Note: These are fiscal years.

Source: Ministry of Finance and Economic Planning data.

Qualitative Survey Results

Although the enumerators found little or no reliable quantitative output and financial information at the health facilities they visited, they provided the following qualitative observations of the situation in health care facilities in 1995.

- Drugs were the main nonwage recurrent input into the primary health care delivery system. They are supplied quarterly, directly to the health units from the center. The central delivery system ensures that the drugs reach health units with little or no leakage.
- Clinic compliance to user fee guidelines provided by the Ministry of Health was minimal.
- Salaries for seconded staff generally reached the intended facilities, although remuneration of health workers was low, resulting in unethical conduct that adversely affected delivery of and access to primary health care. Local recruited staff were paid less, and less regularly, which caused additional problems.
- Health workers devoted very little time to the activities of health units.
- Health workers had a high rate of attrition.
- Rural health units did not attract qualified health workers.

While the survey found that in-kind inputs into the health care system provided by donors and the government mostly reach the intended facilities, another study carried out around the same time sheds more light on other problems regarding efficacy of services at the facility level (McPake and others 1999). Researchers studied 12 health units in the Bushenyi and Iganga districts in depth, using focus groups, exit polls, and direct observation, to determine the socioeconomic survival strategies of health workers and their implications for formal health financing policy. One of the findings was that health workers in all but two facilities routinely charged users above the formally agreed levels, and the drugs supplied by donors or the government were routinely used as a source of additional income. The leakage estimate ranges from 40 to 94 percent of the public supply of drugs to the facilities. MCPake and others (1999, pp. 61–62) summarize the findings of their study as follows:

The situation described by the preceding results suggest that almost all elements of the system which were once public have been incorporated into the private business activity of the health workers. More than half the drugs supplied to public health units had become the private property of health workers. The estimated drug leakage rate of the median facility was 78 percent! The result is that very few free services were delivered in the public health facilities, and almost none at all were delivered to the poor.

Little information exists about improvements in the health service in the latter half of the 1990s. Although limited, a recent rapid assessment of data availability for a new public expenditure tracking survey in four districts (Bushenyi, Iganga, Ntungamo, and Tororo) indicated that both operational

efficiency of the health facilities and information on inputs and outputs had improved compared with 1994–96 (World Bank 1999).

Conclusions and Policy Changes

This study was inspired by the observation that officially reported primary enrollments did not improve in the first half of the 1990s, despite substantial increases in budgetary allocations for the education sector. The hypothesis was that without institutional recovery and improvement in accountability, public funds were subject to capture before they reached the schools. A diagnostic survey of 250 schools and 100 health units was carried out in 1996 to measure the actual outputs and public spending at the facility level to proxy public sector efficacy by its ability to translate budgetary allocations into actual spending at the level of service facilities.

From the perspective of institutional recovery and accountability, the survey provided three major findings. First, the behavior of public service providers varies considerably between sectors, depending on the institutional context and incentives faced. Primary schools kept relatively good records on enrollments and financial flows, while health clinics had an almost complete void of information both on outputs, such as inpatients and outpatients, or financial information, such as user fees and cash and in-kind transfers of public resources. This survey and other evidence from Uganda indicates that educational institutions improved faster in funding accountability than health institutions. Such a marked difference could occur because in primary education parents financed most of the public school system. PTAs contributed as much as 73 percent of the total school expenditure in 1991 and 60 percent in 1995, and are likely to insist on accountability and exert pressure on the schools to provide services in return for their contributions. (Parental contributions were 42 percent at the median school in 1991, which indicates a highly skewed spending distribution.) However, parents seemed to have little control over public spending, which was dominated by central and local government bureaucrats. Users of public health clinics were likewise unable to exert much pressure on these services. As shown in chapter 13, Ugandans, including the poor, most often opted for private services.

Second, instead of being almost stagnant as the official data indicated, primary enrollment increased by 60 percent between 1991 and 1995. While the survey results cast serious doubt over the reliability of the officially reported data, they also point to a considerable improvement in the performance of the system at the school level. Increasing enrollment rates seem plausible, given the improvement in Uganda's political and socio-economic conditions.

Third, while the survey results indicate some improvement in input flow—such as in teacher salaries, the main public spending item in education—they also confirm that serious accountability problems remained in 1995. Only 2 percent of public nonwage education spending had reached the schools in 1991, and four years later this share had increased only to about 20 percent.

Although this is a significant improvement, the share remained abysmally low. District authorities captured most of the nonwage public funds intended for schools. Regression analysis also shows that decentralization negatively affected input flow in the delivery system, at least temporarily.

In health care, drugs and medical supplies were transferred in-kind without records of their value, making it impossible to generate systematic quantitative information about public funding reaching the facilities. Qualitative observation during the field survey generally confirmed that drugs and other supplies reached the health units directly from the center. However, a study by McPake and others (1999) suggests that, unlike in education, the leakage occurred at the health unit level, where the staff siphoned off 78 percent of the drugs and supplies to compensate for their low pay. Although not fully comparable, recent evidence suggests some improvement in health facilities since then.

The central government initiated the following immediate measures in 1996 in response to the survey findings to improve information flow and transparency:

- Monthly transfers of public funds for wage and nonwage expenditure to districts are now regularly published in the main newspapers and broadcast by radio.
- All district headquarters and government primary schools are required to maintain public notice boards and post monthly transfers of funds.
- Measures to enhance accountability and dissemination of accounting information were incorporated in the 1997 Local Government Act.
- Districts are required to pay all conditional grants for primary education directly on individual school accounts. School-based procurement also replaced the highly inefficient central supply of construction and other materials.
- A renewed effort is under way to put in place basic budgeting, accounting, and auditing systems for the public sector, including local governments.

The school survey was replicated in 1999, showing that the flow of funds to schools has improved dramatically since 1995. This resulted from the central government's initiative to disseminate information monthly on transfers through newspapers and radio and to insist that all schools post information on the funds released to them (Republic of Uganda 2000). Schools now receive more than 90 percent of the intended capitation, on average, although apparently with considerable delays because of inefficiencies in the districts and the banking system. The median receipts of the capitation grant are also around 90 percent.¹⁴

14. A preliminary analysis of the data shows that considerable variation remains in what individual schools receive per student. In particular, variation can be explained by schools in Kampala having an advantage over rural areas.

Nevertheless, this represents a welcome improvement, particularly as the universal primary education initiative of 1997, covered in chapter 12, has substantially increased resource flows to the districts from their previous levels, including the capitation grant.

Overall, this study demonstrates that improvements in institutions and accountability are much more difficult to achieve than macroeconomic reform. Although improved since the beginning of the 1990s, service delivery continued to suffer from major inefficiencies in the mid-1990s. Compared with the evidence presented in chapter 3 on the adverse effects of cash management of the budget on expenditure programs, it appears that the volatility the "cash flow" system creates for some spending items may be relatively insignificant compared with gross inefficiencies caused by lack of accountability. At the same time, Uganda's experience shows the power of information and transparency—publishing and posting of resource flows—in improving accountability and service delivery.

References

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

Ablo, Emmanuel, and Ritva Reinikka. 1998. "Do Budgets Really Matter? Evidence from Public Spending on Education and Health in Uganda." Policy Research Working Paper no. 1926. World Bank, Development Research Group, Washington, D.C.

Bardhan, Pranab, and Dilip Mookherjee. 1998. "Expenditure Decentralization and the Delivery of Public Services in Developing Countries." Working Paper (November). University of California, Department of Economics, Berkeley.

Demery, Lionel, and Vajeera S. Dorabawila. 1997. "Health Outcomes, Poverty and Health Spending: Uganda in International Perspective." World Bank, Poverty Reduction and Economic Management Network, Washington, D.C. Processed.

Dixit, Avinash K. 1996. *The Making of Economic Policy: A Transaction-Cost Politics Perspective*. Munich Lectures in Economics. Cambridge, Massachusetts: MIT Press.

Filmer, Deon, and Lant Pritchett. 1999. "The Impact of Public Spending on Health: Does Money Matter?" *Social Science and Medicine* 49(10): 1309–23.

McPake, Barbara, Delius Asiimwe, Francis Mwesigye, Matthius Ofumbi, Peter Streefland, and Asaph Turinde. 1999. "The Economic Behaviour of Health Workers in Uganda: Implications for Quality And Accessibility of Public Health Services." *Social Science and Medicine* 49(7): 849–65.

- Pritchett, Lant. 1996. "Mind Your P's and Q's. The Cost of Public Investment is Not the Value of Public Capital." Policy Research Working Paper no. 1660. World Bank, Development Research Group, Washington, D.C.
- Pritchett, Lant, and Deon Filmer. 1997. "What Educational Production Functions Really Show. A Positive Theory of Education Spending." Policy Research Working Paper 1795. World Bank, Development Research Group, Washington, D.C.
- Republic of Uganda. 1990. *The Financial Tracking System for Primary Health Care (PHC) and Primary Education (PE)*. Ministry of Planning and Economic Development, Kampala.
- . 1992. *The Implementation Programme for the Financial Tracking System (FTS) and the Reform of Local Authorities Budget Process*. Ministry of Finance and Economic Planning, Kampala.
- . 2000. "Tracking the Flow of and Accountability for UPE Funds." Report by International Development Consultants, Ltd. Ministry of Education and Sports, Kampala.
- Svensson, Jakob. 1997. "The Control of Public Policy: Electoral Competition, Polarization, and Endogenous Platforms." World Bank, Development Research Group, Washington, D.C. Processed.
- World Bank. 1996a. *Uganda: The Challenge of Growth and Poverty Reduction*. A World Bank Country Study, Washington, D.C.
- . 1996b. "Access to Education and Health Care in Uganda." Eastern Africa Department and Poverty and Social Policy Department, Country Operations Division, Washington, D.C. Processed.
- . 1999. "Rapid Assessment of Data Availability in Health Core Units." With the Makerere Institute of Social Research. Washington, D.C. Processed.

What Can We Expect from Universal Primary Education?

Simon Appleton

President Museveni's 1997 election pledge to provide free primary education catapulted education issues up the policy agenda. Until that point education had arguably been a low and declining priority for the government. In 1987, when the Museveni government had first come to power, it set up the Education Policy Review Commission to report on the state of education. The commission's most notable recommendation was to attain universal primary education by 2000. However, the government was slow to implement the measures and commit the resources needed to meet this goal.

The response to the universal primary education (UPE) initiative of 1997 was strong—leading to a near doubling of officially recorded primary school enrollments—and the government's modest funding increase was insufficient to meet demand. To deal with this dramatic expansion, the Education Sector Investment Program of 1998–2003 envisioned a 50 percent increase in expenditures on primary schools and a doubling of resources to secondary schools.

The apparent about face in 1997 has many possible explanations, including short-term political considerations. The change in policy stance could, however, also reflect a more fundamental shift in thinking about education both as an intrinsically desirable goal (part of human development) and as an investment in economic success (part of human capital). Uganda's

The author is grateful to the Bureau of Statistics for the use of the data and to Marcel Fafchamps, Dominique Guillaume, and Francis Teal for comments. The text has benefited from useful comments by the editors and anonymous reviewers. A section of this chapter draws heavily on the unpublished work of Kim Otteby (1999).

economic recovery has given the government the confidence that resources can be found to meet the large long-term commitment implied by the UPE initiative. Furthermore, rapid economic growth has transferred attention away from purely economic measures of development and toward other indicators (see, for example, the critique of Uganda's success by the United Nations Development Programme [UNDP 1997]). School enrollment is the social indicator perhaps most directly affected by government policy. Education is also instrumental in the attainment of other social development targets, such as health. Apart from the human development aspect, government opinion may have shifted toward education as a productive investment. Before 1997 many officials questioned whether education—primary education, in particular—was productive, especially when compared with investing in physical infrastructure, such as roads.

This chapter focuses on three aspects of the UPE initiative: (a) the implications for the equity of educational access, (b) the likely affect on household income generation, and (c) the implications for school quality and academic performance.

Consider first the equity of educational access. A central part of the argument for UPE is that user charges curtail the enrollment of girls and the offspring of less-educated parents. Perhaps the most remarkable feature of the UPE initiative to date is the particularly large increase in overall enrollments following the removal of fees. Similar enrollment surges occurred as a result of UPE initiatives in Kenya and Tanzania in the 1970s, and more recently in Malawi in 1994, when enrollments rose 50 percent following the abolition of primary school fees (Reddy and Vandermoortele 1996). These increases stand in stark contrast to the assumption by advocates of increased user charges for social services that charges would not greatly reduce, and could increase, enrollment. Support for this assumption comes from conventional cross-sectional estimates—which can often be misleading—that show small price elasticities for education demand (Jimenez 1987). Using data from Uganda before the removal of fees, small—and indeed perverse—estimates of the price elasticities for enrollments are obtained when, in fact, the actual response of enrollments to the abolition of fees was strong.

Increases in educational enrollments, particularly among disadvantaged children, are desirable for many reasons. For a poor country like Uganda, the hope is that educational expansion will increase the productivity of workers and, hence, foster economic growth. The extent to which this hope is likely to be realized is taken up in the section on returns to education. The value of education—primary education, in particular—is largely based on estimates of returns to wage employment. This chapter provides a more comprehensive estimate of the effect of education on household earnings by looking at the effects of education in all income-generating activities: wage employment, farming, and nonfarm self-employment. It also traces the effect of education in reallocating family labor among wage employment, farming, and nonfarm self-employment. This integrated approach provides a more reliable and rather

different picture of the returns to education than the existing studies of either urban wage employment or agricultural production functions.

When assessing the possible income benefits of UPE, we take current associations between education and earnings as our guide. This may be perilous for many reasons; one, in particular, is that UPE may reduce the quality of education and, hence, weaken the economic benefits of schooling. The third section of this chapter explores this issue using information gathered from preliminary research on the impact of UPE in two districts of Uganda. The research corroborates the hypothesized benefits of UPE in terms of enhancing the equity of educational access, but it also documents the deterioration of conventional indicators of school quality, such as student-teacher ratios. We obtain tentative estimates for the effects of school quality on student academic performance by simulating academic testing before and after UPE. Unlike much of the literature on educational production functions, these results show a negative association between student-teacher ratios and academic performance. Consequently, by overstressing educational resources, UPE risks a decline in student academic performance.

Access to Education Prior to the UPE Initiative

This section presents a multivariate model of school enrollment before the UPE initiative that identifies the characteristics of children not attending school. Because the UPE initiative has led to the enrollment of almost all primary school-age children, the analysis will reveal the characteristics of children who will most likely access primary education as a result of the policy change. The research uses data from the 1992 Integrated Household Survey because it was the largest household data set available at the time of writing and is the richest in terms of potential explanatory variables.

Despite evidence that school enrollment increased between the 1992 survey and the UPE initiative, the survey represents the situation before UPE quite well (see chapter 11 in this volume). The sample of school-age children (ages 5 to 14) includes 4,122 who have never been to school, 8,857 who are currently attending school, and 967 who have left school, for a total of 13,946. After weighting the sample by population multipliers in order to yield nationally representative results, 61 percent are in school, 32 percent never enrolled, and 17 percent left school.

A multinomial logit models the probability that a child has a particular educational status (currently attending, never enrolled, or left school).¹ The

1. The logit model is the standard statistical technique for analyzing an unordered discrete variable, although it suffers from the limitation of imposing the "irrelevance of independent alternatives." In other words, the relative probabilities of two outcomes are unaffected by the presence of a third. This assumption is relaxed in the multinomial probit, which is computationally more difficult to estimate.

model can be interpreted as the outcome of a process where the utility from each choice is a linear function of the explanatory variables and a stochastic term. The explanatory variables chosen for the model are personal characteristics (age and sex), parental education; demographic characteristics of the household (size and number of boys and girls), characteristics of the household head (age and sex), dummy variables for piped water and for use of firewood, household income per capita, school fees, distance to schools and district centers, and regional dummy variables.

Table A12.1 presents the results, but the coefficients are hard to interpret. Consequently, table 12.1 presents predicted probabilities from the model, evaluating at the means of the explanatory variables. The baseline figures show that, at the mean of all explanatory variables, a child aged 5–14 has a 69 percent probability of being in school, a 25 percent probability of never having been in school, and a 6 percent probability of having left school.² Naturally, these probabilities are highly age dependent. At five, a child has only a 15 percent chance of being in school. By 10 this chance increases to 82 percent and then decreases with age.³ By 14 the probability of never having attended school falls to 8 percent. Substantial gender inequalities exist. At the mean of the other variables, girls are less likely to be in school, with a predicted probability of 65 percent compared with 73 percent for boys.⁴

Parental education has powerful effects on school enrollment. If both parents have no formal education, the probability of their children never attending school evaluated at the mean of the other explanatory variables is 49 percent (figures not reported in tables). If both parents have postprimary education, the corresponding probability is 5 percent. Each increment in parental education reduces the probability of a child never having been to school. Paternal literacy has a large impact on the probability of enrollment. At the means of other variables, children with illiterate fathers have a 39 percent chance of never having been in school, compared with 26 percent if their fathers are literate. The literacy of mothers appears not to have a marked effect, although some primary schooling does. With the exception of literacy, maternal education generally has stronger effects on school enrollment than paternal education.

Household income per capita raises the probability of attending school. To avoid endogeneity problems, we use only the income of those over 20 years of age. If household incomes are twice the average, the probability of being in school is 79 percent, ten percentage points higher than the baseline. The effect of shortfalls below the mean appears less pronounced: The probability of

2. These probabilities at the mean of the explanatory variables are different from the mean proportions because of the nonlinearity of the logistic model.

3. Figures not reported in table 12.1 but are available from the author on request.

4. For comparative international statistics on gender inequalities in 41 countries, see Filmer (2000).

Table 12.1. Predicted Probabilities from the Logit Model for School Enrollment
(percent)

<i>Category</i>	<i>Never having attended school</i>	<i>Left school</i>	<i>In school</i>
Baseline (mean of all variables)	25	6	69
Boy	22	5	73
Girl	29	6	65
Father uneducated	39	6	56
Father literate	26	9	65
Father some primary	25	7	68
Father full primary	20	4	76
Father postprimary	15	4	81
Mother uneducated	34	6	60
Mother literate	32	8	61
Mother some primary	21	5	74
Mother full primary	14	4	82
Mother postprimary	9	6	85
Male head	26	6	68
Female head	22	6	72
Head aged 33	26	6	68
Head aged 53	25	5	70
Half mean income	29	6	65
Double mean income	16	5	79
No firewood	22	7	70
Use firewood	25	5	69
No piped water	27	4	69
Piped water	25	6	69
Primary school in each village center	22	6	73
Central urban	17	8	75
Central rural	19	6	75
Western rural	23	5	71
Western urban	20	7	73
Eastern rural	26	5	69
Eastern urban	26	6	68
Northern rural	37	5	57
Northern urban	29	6	66

Source: Author's calculations from the 1992 Integrated Household Survey.

being in school if household incomes are half the mean is 65 percent, four percentage points lower than the baseline. The magnitude of these predicted income effects is perhaps smaller than might be expected; however, they are pure income effects. Actual differences in enrollments by income are larger because income differentials are associated with variances in other explanatory variables such as parental education and regional location.

The model makes perverse predictions of the effects of school fees and parent teacher association (PTA) contributions levied by local primary schools.⁵ Such charges predict an increase in the probability of attending school: the coefficients on both the fee and the PTA contribution variables are positive (table A12.1). In table 12.1 we do not report how much abolishing fees is estimated to reduce enrollments, as such estimates are clearly implausible in the light of subsequent events. Class sizes also had positive effects in preliminary regressions. These results presumably reflect endogeneity problems. If demand for education in a locality is high, schools will be able to levy high charges and have large classes. Large classes may also reflect high demand for a particularly high-quality local school. High charges may be a cause of high demand, for example, if they permit an increase in school quality. However, the reverse causality appears more plausible: high demand enables schools to levy high charges. These perverse results are cautionary, given the large response of enrollments when the government abolished charges in 1997. These results show the danger of relying on cross-sectional estimates for policy purposes. An analysis based on the 1992 data would not identify charges as a major constraint to attendance.⁶

Endogeneity problems may also arise with the variables for distance to schools. One might expect schools to be located closer to where demand is high. Unlike endogeneity biases on charges and class sizes, the likely endogeneity bias on distance to school will reinforce the true structural effects. Distance to schools could be associated with low demand either because distance reduces demand or because high demand encourages the establishment of nearby schools.⁷ Consequently, one must be cautious in interpreting the negative effects of distances to primary and secondary schools on the probability of attending school. Only distances to primary schools

5. We could not reject the restriction that fees and PTA charges have equal effects by using a likelihood ratio test and, hence, we imposed these restrictions on the model.

6. A referee queried whether the analysis was set up as a "straw man" and commented that a more nuanced conclusion would be that cross-sectional analysis that does not control for problems of endogenous fees (or school placement) can easily lead to incorrect inference. However, many such cross-sectional analyses exist in the literature, for example, those cited by Jimenez (1987). Such studies were influential in the policy debate about user charges for social services in the 1980s and, indeed, are praised for their rigor even by critics of user charges for basic social services (Reddy and Vandermoortele 1996). The reason why such studies are the norm is that it is very hard to find convincing instruments for user charges, school placement, and school quality in cross-sectional data sets. Only a few studies with longitudinal data have attempted to address the endogeneity of public programs.

7. A reviewer suggested that schools might be placed where they are needed most, biasing the estimated effect of distance to school towards zero. However, it seems more likely that schools in Uganda have been established where there is local demand.

have statistically significant effects. The Ugandan data on distance is limited in that it refers to distance of the school from the center of the village (LC1), not the distance of the child's home from the school. Distances from village centers to primary schools are not great for most communities—one kilometer or less for two-thirds of the children. Having a school in the center of each village is predicted to raise school attendance from 69 to 73 percent.

A number of demographic characteristics of the household significantly affect outcomes. Children from households with female heads are more likely to be in school than are those from households with male heads, after controlling for other characteristics (72 percent compared with 68 percent). The age of the household head has a nonmonotonic effect on school attendance. Up to age 34, the probability of being in school decreases with the age of the household head; thereafter, it increases. The effects are modest: a household head aged 53 (10 years older than the mean) raises the probability of being in school by only 1.5 percentage points. Additional household members increase, not always significantly, the probability of school enrollment, controlling for per capita income, consistent with the presence of economies of scale in household consumption. Extra children cause more of an increase than adults, consistent with children having less costly needs than adults, for example, needing fewer calories.⁸ Girls in the household increase the probability of school enrollment more than boys, because girls' lower enrollment rates, on average, provide less competition for educational funding within the household than boys. The use of firewood and the absence of piped water are hypothesized to increase the demand for child labor. While the absence of piped water and the use of firewood do not materially alter the probability of children attending school, they do raise the probability of not attending school and reduce the probability of dropping out. This finding suggests that they delay school enrollment, but do not prevent it.⁹

The significance of the dummy variables for location affect educational outcomes in ways that cannot be explained in terms of parental education, income, or the included infrastructure variables. However, the model is fairly successful in explaining differences in enrollment rates in terms of observable variables. For example, the actual proportion of children in school is 83

8. In theory, it would be possible to adjust the household income variable to make some allowance for economies of scale. In practice, we have no agreed method of estimating such economies of scale, and different approaches can lead to dramatically varied estimates (see Lanjouw and Ravallion 1995).

9. We could argue that firewood use is endogenous. However, the likely bias would be to exaggerate the negative effect of firewood use on enrollment. Unobservable factors associated with households using an inferior fuel source such as firewood may also be associated with educational disadvantage. Reverse causality—households using firewood because they have children available out of school—would induce the same direction of bias.

percent in central urban areas and 45 percent in northern rural areas. Evaluating at the means of the explanatory variables, the proportions change to 75 and 57 percent, respectively. Thus, just over half of the gap in enrollments between the two areas has been explained in terms of the determinants included in the model. However, northern rural data have particularly atypical educational outcomes after controlling for observable determinants such as education and income. The model shows relatively small differences between other areas after such controls. For example, in the raw data 83 percent of the sample in the central urban region attend school compared with 70 percent of the sample in the central rural area. Nonetheless, in the model, rural and urban areas of the central region are predicted to have the same proportion in school, at the mean of other explanatory variables. The model therefore explains all the mean differences in enrollments between rural and urban areas of the central region in terms of observable determinants, such as parental education and income. The model also predicts small urban-rural differentials—other things being equal—in western and eastern regions. Only the sizable urban-rural differential in the northern region is unexplained by observed household characteristics.

In summary, the multivariate analysis of school enrollment in 1992 identifies inequalities that have disappeared or considerably diminished with UPE. Taken individually and holding other things constant, differences in parental education, gender, household income, and region can by themselves lead to pronounced differences in the probability of attending school. Often such effects will be combined: for example, northern rural households are likely to have below average parental education and household income. Inequalities in education are likely to be of concern for many reasons. The next section focuses on the instrumental economic importance of education.

Returns to Education: Productivity and Labor Allocation Effects

If, as is often claimed, returns to primary education in Africa are high, then that is *prima facie* evidence that market failures—such as credit market imperfections—are preventing the realization of those returns. The size of the economic returns to education thus has some bearing on the efficiency of policies like UPE to expand access and provides evidence on the likely impact of such initiatives on economic growth.

A survey of the literature—mostly conventional studies that measure the effects of education on wage earnings—reports social returns to primary education in Sub-Saharan Africa of 24 percent (Psacharopoulos 1994).¹⁰ Bennell (1996) has questioned these estimates because they are strongly influenced

10. Social returns are 18 percent to secondary education and 11 percent to tertiary education. Private returns are 41 percent to primary education, 27 percent to secondary education, and 28 percent to tertiary education.

by a few studies that used poor data.¹¹ Recent estimates of Mincerian returns to education (that is, wage premiums to a year of education) produced distinctly different results.¹² A study of 2,174 urban wage employees in Uganda in 1992 found Mincerian returns to education of 4 percent at the primary level, 8 percent at the secondary level, and 28 percent at the tertiary level (Appleton, Hoddinott, and Knight 1996).¹³ These Mincerian returns are not comparable to the widely cited rates of return summarized by Psacharopoulos (1994). In particular, they may underestimate returns to primary school because they implicitly assume students forego wages to attend school, and they may overestimate returns to tertiary education as they ignore the direct costs of the education. However, the Mincerian returns do suggest modest gross benefits to primary education. They appear to provide some support for the view expressed by some in the Ugandan government prior to 1997 that students who left primary education had acquired few useful skills, and so no great economic return could be expected from additional expansion of such schooling.

This section, in common with standard microeconomic estimates of rates of return to education, provides estimates of the benefits of education based on cross-sectional partial associations between education and earnings. These associations are unlikely to be a fully reliable guide to real returns. Perhaps the most common concern is that they may be subject to omitted variables bias; that is, educated adults may be more productive for unobserved factors (higher preschool ability, better family background, and the like) rather than because of their schooling. A few studies outside Uganda have attempted to control for such problems by trying to measure preschool ability (Knight and Sabot 1990) or by using difference estimates from samples of twins to remove the effects of family background (Ashenfelter

11. One such study of Uganda in 1966 estimated a 66 percent return to primary education, but relied purely on government wage scales for the educated. As the study had virtually no hard data on incomes of the uneducated, the 66 percent was effectively an assumption rather than an empirical observation (see Knight 1968, for an early critique of the study).

12. Mincerian returns to education are the wage premiums to a year of education (Mincer 1974). They correspond to the private return to education on a number of strong assumptions, notably that (a) there are no pecuniary costs to education, (b) the opportunity cost of education is the wage, and (c) the individual lives forever.

13. These returns show a similar pattern, but at somewhat lower levels than those obtained elsewhere in Sub-Saharan Africa. Since 1980, returns have averaged 5 percent for primary school, 14 percent for secondary school, and 37 percent for university (Appleton 1999). In 1990, a study of 298 employees from Kampala produced different returns: 9 percent for primary education, 3 percent for secondary education, and 11 percent for tertiary education (Bigsten and Kayizzi-Mugerwa 1999). The author was unable to reconcile the two sets of results for Uganda because the data underlying the latter estimates have apparently been lost. Given the difference in sample sizes and representativeness, the 1992 estimates appear more reliable.

and Rouse 1998). These studies suggest that the ability biases are not large. The twin studies—albeit restricted to the United States—find no significant difference in returns to education from conventional estimates. Similarly, Knight and Sabot (1990) did not find a large independent effect of their preschool ability measure in urban wage determination in Kenya and Tanzania in 1980 (see also Glewwe 1996; Moll 1998).

A more serious limitation of cross-sectional estimates is that they provide only a snapshot picture of current returns, when in reality returns to education accrue over decades. Moreover, nonmarginal changes in the provision of education—such as UPE—will reduce the scarcity value of education and lower its returns. For example, the expansion of secondary schooling in Kenya appears to have dramatically lowered conventional estimates of returns to education during the last two decades (Appleton, Bigsten, and Kulundu Manda 1999).¹⁴ If the Kenyan experience is typical, and the verdict is still out on this, it may help reconcile the large social returns based largely on pre-1980s data (Psacharopoulos 1994) with the more modest Mincerian returns found in Sub-Saharan Africa in more recent studies. This caveat must be borne in mind when interpreting the results presented later in this section.

This study goes beyond the conventional approach of estimating the benefits of education in terms of wage earnings. In Uganda and many other developing countries, most workers are self-employed; only a minority of the labor force is in wage employment. In such a context positive correlations between wages and education do not necessarily reflect productivity effects from education. On average, wage employees who are more educated receive higher wages in Uganda as in most other labor markets, but it is less clear whether more education benefits farmers or self-employed workers. Existing estimates of the returns to education in Uganda imply lower rates of return in agriculture than in wage employment.¹⁵ For this reason a broader approach to returns in terms of income-generating activities is taken—wage employment, farming, and nonfarm self-employment—using the household rather than the individual as the unit of analysis. In the case of self-employment, this approach overcomes the problem of assigning individual earnings when more than one member of a household works in a household enterprise.¹⁶ Therefore, individually assigned wage earnings are aggregated

14. Primary returns do not seem to have been affected, although conventionally estimated returns to primary education are of limited relevance in Kenya, because all recent cohorts of urban wage employees have primary education. Returns to tertiary education in Kenya have also not fallen, and may even have risen.

15. Four years of primary education are associated with a 7 percent rise in agricultural productivity (Appleton and Balihuta 1996). This rate of return is typical of developing countries (Phillips 1994).

16. Although the survey reports individual income, it makes a rather unconvincing distinction between unpaid helpers on family enterprises and the self-employed. It also assigns income equally among household members working on an enterprise.

to the household level for ease of comparison with earnings from self-employment and farming.

Reduced Form Estimates of the Return to Education

One simple approach to estimating the returns to education is a reduced form approach. Household income is modeled as a function of the education of adult household members and other exogenous determinants of earnings. The focus is on the household's earned income, the sum of earnings from wage employment, and farming and nonfarm self-employment. The household education measure is the average education of adult nonstudents (students are excluded, as they are unlikely to be contributing significantly to household income), with a distinction between average years of primary education, average years of secondary education, and attendance at university. We also include as an explanatory variable the proportion of nonstudent household adults who went to university (because data on years of university education are not available). The average age of the adults and the proportion of women are included as controls. Other hypothesized determinants of earnings include quantities of the household factors of production: labor (number of adult nonstudents), cultivable land, and productive capital. Although the household's holding of the factors of production could be considered endogenous, these factors are treated as exogenous due to a lack of good instruments. We include controls for whether a woman heads the household, how many years the household has lived in the area, and whether the father of the household head was a farmer.

The coefficient on average years of primary education is 0.043 (see table 12.2). This implies that an extra year of primary education for each nonstudent adult in a household is associated with earned income that is 4.3 percent higher, other things being equal. A year of secondary education brings a greater increment to earnings than a year of primary education. We cannot precisely estimate the increment from a year at university. However, assuming university attendance takes three to four years, the increment per year is larger than that of schooling.

These results would imply that the rate of return is higher for postprimary education if we make the Mincerian assumptions that there are no pecuniary costs to education and that the opportunity costs are foregone adult earnings. These assumptions are not useful, however, when comparing the returns to different levels of education. Pecuniary costs are higher for postprimary education, particularly university education. Opportunity costs are also likely to be higher for postprimary education. Indeed, attending primary school may not lead to a significant loss of earnings—the students may be too young to be generating significant income outside of school. The opportunity costs of education depend partly on the productivity of child labor. Child wages for agricultural work in Uganda are less than half of the adult wage. However, few children work for wages and a more relevant estimate of productivity may be

Table 12.2. Reduced Form Household Earnings Functions with Community-Level Fixed Effects

<i>Variable</i>	<i>Coefficient</i>
<i>Characteristics of household workers</i>	
Average years of primary education	0.043 ^a
Average years of secondary education	0.091 ^a
Average been to university	0.440 ^a
Average age	0.0457 ^a
Average age squared	-0.000591 ^a
Proportion women	0.155 ^a
<i>Factors of production (quantities)</i>	
Log number of household workers	0.489 ^a
Log capital	0.042 ^a
Log cultivable land	0.273 ^a
<i>Other determinants</i>	
Log years resident in location	0.011
Female-headed household	-0.262 ^a
Head's father had nonagricultural work	0.054 ^a

Note: Controls for missing values of land and capital not reported.

a. Significant at the 1 percent level.

Source: Author's calculations from the 1992 Integrated Household Survey.

gained from analysis of the marginal products to family labor.¹⁷ Research extending the analysis of household earnings from agriculture (discussed later) to disaggregate labor into adult and child labor suggests that child labor can be just as productive as adult labor on family farms (Angemi 1999).¹⁸ However, children of primary school age who are not enrolled in school typically do not work full time. Therefore, the household income foregone by those attending school is likely to be substantially less than a full-time wage (or marginal product).¹⁹ For example, in the 1992/93 survey, only 38 percent of children ages 7 to 14 not attending school reported helping with family enterprises (almost exclusively farms) and virtually none worked for wages. Of the third who did work on the farm, the average number of hours worked per week

17. Out of 10,459 children aged 7 to 14 covered by the integrated household survey of 1992/93, only 52 worked for wages and had usable data on wage rates.

18. Ordinary least squares estimates imply that adult labor is approximately 10 percent more productive than child labor. When child labor is instrumented for, it appears twice as productive as adult labor.

19. From a welfare standpoint, labor supply considerations would not matter if one valued the child's leisure at their marginal productivity, but such a valuation is controversial.

was 33. Conversely, 22 percent of children in school helped with household enterprises, working, on average, 16 hours per week. A simple comparison of these statistics implies that school attendance reduces the amount of child labor by only about eight hours per child per week.

This is probably an underestimate, because the study fails to control for age differences between children in and out of school, and does not consider work on nonincome-generating activities, such as domestic work. However, the comparison does suggest that the Mincerian assumption—that the opportunity cost of primary school is a full-time wage (or marginal product)—is inappropriate. Given a typical working week of 40 hours, the Mincerian assumption overstates the opportunity cost of schooling by a factor of five ($40 \div 8$ hours of child labor lost). Conversely, the true monetary returns to primary education may be five times greater than the 4 percent productivity benefit estimated. What this suggests is that although primary education should not be expected to give a large boost to output, nonetheless, it may be an attractive investment, even from a narrowly monetary perspective.²⁰

As expected, all three factors of production—labor, capital, and land—have a significant positive effect on household earned income. A household with more adults is associated with higher earnings, but the increase is not proportional. The elasticity is around 0.5, implying that doubling the number of household adults reduces their average earnings by around a quarter. The stock of productive capital held by the household has a relatively small coefficient. However, the median level of capital is low, relative to median earnings, so the coefficient implies an extremely high rate of return to physical capital.²¹

Holdings of cultivable land have a significant positive association with earnings. Aside from education, a number of other characteristics of household workers affect earnings. An inverse U-shaped relation exists between household earned income and the average age of the adults. The turning point of the relationship occurs at age 39. Up to that point, household earnings rise with the average age of their adults; thereafter, they fall.

We obtain mixed results relating to gender and earnings. Other things being equal, a higher proportion of adult women is associated with higher earnings, but a female household head is associated with 23 percent lower earnings. The latter results echo the findings of an earlier study of female-headed households in Uganda using the same data set (Appleton 1996). Female-headed households as defined in the survey include some *de facto*

20. Further adjustments would be required for the pecuniary costs of primary education and the fact that recipients do not have infinite lives. However, the rate of return is likely to remain reasonable even after these adjustments.

21. Median earnings are U Sh 343,200 per year, and median holdings of productive capital are U Sh 6,200. Together with the coefficient on the log of capital in the reduced form, this implies a 232 percent return to capital ($0.042 \times 343,200/6,200$).

women-headed households that receive substantial remittances, sometimes from migrant husbands. As a group, female-headed households in the survey have lower earned incomes than male-headed households do, although high remittance receipts prevent them from having lower total household income and expenditure. Among the other variables included, there is no effect of length of residence on earnings. Lastly, if the father of the household head is engaged in nonagricultural work, the prediction is that total earnings will be 5 percent higher.

The reduced form results provide a simple overall assessment of how education is associated with higher earnings, controlling for household endowments of factors of production and various characteristics. It does not reveal the channels or mechanisms through which education raises income. One channel is through education raising productivity within particular income-generating activities. Such direct productivity effects can be estimated through earnings (or production) functions for particular activities, for example, wage employment or farming. A second channel is through education, increasing the likelihood of the household engaging in higher return activities or "entry effects," because education is hypothesized to affect the probability of a household entering particular sectors.

In what follows we try to estimate the various effects of education. One motivation is to compare conventional estimates of returns to education based on wage earnings with broader estimates. Do we obtain misleading results by focusing solely on wage earnings? Are returns to education lower in agriculture and nonfarm self-employment than in wage employment? These factors will be important in assessing the benefits of education to children in rural areas where opportunities for wage employment are limited. A second motivation is to assess whether many of the benefits of education come in the form of access to wage employment. For example, take the extreme case where education does not raise returns in either farming or wage employment, but merely allows workers to enter the higher return wage sector. In such a case, the private benefits of education may not lead to corresponding social benefits.²²

Entry Effects

This section decomposes the effect of education in entry effects and direct productivity effects. The decomposition of entry effects identifies three household income-generating activities: wage employment, farm self-employment, and nonfarm self-employment. It is assumed that the income-generating activities for a household depend on the number of adult members, their education, their other characteristics (age and sex), the parental background of the household head, and the region in which the household lives. Adults are

22. Much would depend on whether education increases total employment in the higher-return wage sector or merely rations a given number of jobs.

defined as those over the age of 15 who are not full-time students.²³ We did not include household holdings of land and productive assets, as these are endogenous with respect to the household's engaging in a particular activity. Independent probits are used to model whether a household earns income from a particular activity.²⁴ Table A12.2 reports the full results. Table 12.3 reports some predictions of the model evaluating at the population-weighted mean of the all the explanatory variables.

Table 12.3. Probabilities of Engaging in Income-Generating Activities

<i>Category</i>	<i>Farming</i>	<i>Nonagricultural self-employment</i>	<i>Wage employment</i>
Baseline (mean of all variables)	92	27	33
<i>Characteristics of all adult household members (nonstudents)</i>			
No education	94	23	29
Complete primary	91	33	31
Four years secondary	78	22	60
All men	84	22	53
All women	96	32	19
One adult	85	23	27
Three adults	95	31	38
<i>Occupation of father of household head</i>			
Farmer	94	26	29
Nonagricultural self-employed	91	36	30
Government employee	93	25	39
Private employee	89	27	38
<i>Other variables</i>			
Male headed	92	27	31
Female headed	89	28	38
10 years resident in area	89	28	36
50 years resident in area	95	25	27

Note: Predictions from probit models evaluating at the mean of the explanatory variables. Also controlled for, but not reported, are dummies for location (region by urban-rural), for parental education, and for missing values. Sample size: 9,078.

Source: Author's calculations from the 1992 Integrated Household Survey.

23. One could argue that adult nonstudent members are endogenous in this model. However, we do not have good instruments for educational attendance.

24. The use of independent probits is a simplification. An alternative approach would be to model the choices to enter each activity jointly, for example, using a multinomial logit. Households could be modeled as falling into one of six categories: farm only, nonfarm self-employment only, wage employment only, farm and nonfarm

In Uganda, primary education alone appears to do little to increase access to wage employment. Average primary education of the adults has no significant effect on the probability of receiving income from wage employment. However, primary education significantly reduces the probability of the household receiving any income from farming and increases the probability of receiving income from nonfarm self-employment. The latter effect is large. At the mean of the other explanatory variables, if the household has no adults with primary education, it has only a 22 percent probability of obtaining income from nonfarm self-employment. If all the adults in the household have primary education, the probability of engaging in nonfarm self-employment rises to 33 percent. By contrast, secondary education has powerful effects on the probability of obtaining income from wage employment but reduces the probability of receiving income from nonfarm self-employment and farming. Table 12.3 shows that households where all adults have a secondary education would be twice as likely as uneducated households to receive some wage income, other things being equal.

The other determinants of participation in activities are worth mentioning, although they are not the primary focus of this chapter. For all three activities, the probability of receiving nonfarm earned income rises with the number of workers in the household. This may reflect some benefit in reduced risk from the diversification of income made easier with several workers. Given an underdeveloped land market, there may also be limits to the amount of family labor that can be gainfully employed on a family farm, so that additional workers must look for employment elsewhere. The sex ratio among adults in the household affects participation in different activities. An increase in the proportion of women workers in the household is associated with a rise in the probability of receiving self-employment income, including farming, and a fall in the probability of receiving income from wage employment. Comparing an otherwise average household composed entirely of women with one composed entirely of men, table 12.3 shows that the women-only household is nearly 50 percent more likely to engage in nonfarm self-employment, but only 40 percent as likely to obtain wage income. This may reflect the situation that self-employment is more compatible with child rearing or, alternatively, it may reflect discrimination in employment. Nevertheless, having a female head reduces the probability of receiving income from farming and increases the probability of receiving income from wage employment. This may reflect an endogeneity bias: women may be more able to head a household if employed. Alternatively, problems with women owning land may limit the feasibility of farming in female-headed households. The average age of workers in the household enters as an inverse U-shaped quadratic

self-employment, self-employment and wage employment, and engagement in all three types of activity. We use the independent probit approach for simplicity, because distinguishing between all six categories is not the focus of the chapter.

in all three probits. The turning point of the quadratic for the probit for farming is so high (97 years), however, that age effectively has a monotonic positive effect on the probability of the household farming. The turning points for the quadratics for nonfarm self-employment and wage employment are 35 and 38 years, respectively.

Extended residence in a particular area is positively associated with farming and negatively associated with both nonfarm activities, especially wage-employment.²⁵ The main occupation of the household head's father exerts an independent effect on the activities of the household. If the head's father was self-employed in nonagricultural work, it raises the probability of the household receiving an income from nonagricultural work, other things being equal, and lowers the probability of it engaging in farming. If the household head's father was employed by government or the private sector, the probability of the household's receiving income from wage employment increases.

Productivity Effects

This section models earnings from household activities. Factors of production used to estimate a Cobb-Douglas production function for agriculture include labor, land, and capital.²⁶ The function also controls for the characteristics of the household members working in agriculture and cluster fixed effects.²⁷ Earnings from nonagricultural self-employment are similarly modeled using a production function, in which any land among the business assets of the enterprise is included in capital. We cannot estimate earnings from wage employment as a production function per se, because it must be estimated at the firm level. Instead, we model household earnings from wage employment as a function of labor input and characteristics of the workers.²⁸ The estimates are made after allowing for community-level fixed effects and for the endogeneity of both labor input and the characteristics of the workers. As instruments we use the

25. One could make a strong case for a reverse causation interpretation here. Households are likely to migrate in order to obtain wage employment.

26. We do not include variable inputs such as seeds, fertilizer, and pesticides, because these variables are endogenous, and we lack good household-level instruments for them. Part of the effect of education and other factors may work via use of variable inputs (see Appleton and Balihuta 1996).

27. Given that the sample was drawn from many different areas, there may be differences in location conditions that affect earnings. For example, some clusters may enjoy better agroclimatic conditions for farming; others may enjoy higher demand for nonagricultural labor. One way to control for such differences is to allow for unobserved differences in mean earnings between clusters. These differences are sometimes termed cluster fixed effects.

28. Including enterprise capital may lower the return to education in the earnings function (see Bigsten and others 2000). The private returns to worker education, however, are those estimated without controlling for enterprise capital.

number of adult nonstudents in the household and their characteristics. That is to say, we take the household's endowment of labor and its characteristics as given, but model the allocation across activities as endogenous. In many cases, allowing for endogeneity does not alter the results markedly. Often worker characteristics in the household map almost one-to-one onto worker characteristics for income-generating activities. In general, the qualitative results are fairly robust to controls for community-level fixed effects and for endogeneity.²⁹ As with the reduced form earnings function, treating capital and land as endogenous is not possible in the absence of appropriate instruments. It could be argued that capital and land holdings change slowly and, hence, are less subject to short-run endogeneity problems than, for example, labor allocation. We also make no control for the selectivity of activity choice because we cannot identify *a priori* any factors that may affect choice of activity that may not also influence returns within that activity.³⁰

Table 12.4 estimates the determinants of earnings from each activity for the subsamples receiving any income from such activities. The similarity in the estimated effects of education on returns in all three activities is striking. Each average year of primary schooling of the household workers raises earnings from both farming and wage employment by 4 percent; for secondary schooling, the corresponding increases are approximately 6 percent. If all household workers had been to college, returns to both farming and wage employment would be more than 40 percent higher. The returns to nonfarm self-employment are broadly similar: somewhat larger for secondary schooling and smaller for university. The rough similarity between the effect of education earnings functions for the wage employed and the nonagricultural self-employed has also been found for samples from urban Kenya in 1978 and 1986 (Appleton, Bigsten, and Kulundu Manda 1999). Many other studies, however, have found stronger effects of education on returns within nonfarm activities than from on-farm activities (see, for example, Fafchamps and Quisumbing 1999). Particularly stark is the contrast between the findings of Appleton and

29. Controlling for community-level fixed effects reduces the estimated effect of education in agriculture, increases it in nonfarm self-employment, and has no effect in wage employment. Controlling for the endogeneity of worker education raises the effect of primary schooling in all cases. For secondary education, the effects of controlling for endogeneity are more varied: lowering returns in wage employment, raising them in farming, and having no effect in nonfarm self-employment. Perhaps the most noticeable effect of endogenizing labor and its characteristics is to increase the coefficient on the labor-input variable in all three activities.

30. The occupation and education of the household head are perhaps the most promising instruments for activity choice. We have seen in the previous section that these variables do affect the probability of a household engaging in different activities. However, *a priori*, it is hard to rule out productivity effects. For example, parental education may enhance children's learning in school, while children may become proficient in a trade by learning from their parents.

Table 12.4. Household Earnings Functions with Community-Level Fixed Effects and Endogenous Labor Variables

<i>Category</i>	<i>Farming earnings (log)</i>	<i>Nonagricultural self-employment earnings (log)</i>	<i>Wage employment earnings (log)</i>
<i>Characteristics of household workers</i>			
Average years primary ^	0.038 ^b	0.056 ^b	0.041 ^b
Average years secondary ^	0.058 ^b	0.073 ^b	0.057 ^b
Proportion been to university ^	0.426 ^b	0.278	0.424 ^b
Average age ^	0.0259 ^b	0.0568 ^b	0.0338 ^b
Average age squared ^	-0.000341 ^b	-0.000713 ^b	-0.000476 ^b
Proportion women ^	0.152 ^b	0.314 ^a	0.420 ^a
<i>Factors of production (quantities)</i>			
Log hours of work ^	0.552 ^b	0.673 ^b	0.579 ^b
Log capital	0.091 ^b	0.027 ^a	n.a.
Log cultivable land	0.261 ^b	n.a.	n.a.
<i>Other determinants</i>			
Log age of enterprise	0.031 ^b	(-)	n.a.
Log years resident in location	0.054 ^b	(-)	0.001
Female-headed household	(-)	-0.394 ^b	-0.488 ^b
Head's father had nonagricultural work	(-)	(-)	0.030

n.a. Not applicable.

^ Treated as endogenous.

(-) Not included due to insignificance.

Note: Controls for missing values of land and capital not reported.

a. Significant at the 5 percent level.

b. Significant at the 1 percent level.

Source: Author's calculations from 1992 Integrated Household Survey.

Balihuta (1996) and the crop production functions estimated here, because both were based on the same data set. Appleton and Balihuta discovered a zero effect of secondary education and modest returns to primary education (2.8 percent). This apparent discrepancy is discussed later.

The average age of workers has an inverse U-shape in all earnings functions, with returns peaking shortly after age 35 (38 in farming, 40 in nonfarm self-employment, and 36 in wage employment). Surprisingly, the proportion of women workers positively affects returns, although this finding is one of

the few that is not particularly robust to the estimation method. Without controlling for endogeneity, women appear less productive than men in all three activities. The apparent endogeneity bias suggests that households relying on the labor of women face unobservable factors that are less favorable to generating income. Female-headed households appear to receive much less income, other things being equal, from the nonagricultural activities they engage in. The labor input variable is also fairly sensitive to estimation method, having a markedly lower coefficient when treated as exogenous. Again, this suggests that households work more when unobservables determining income are unfavorable. This may seem counterintuitive; we might expect higher labor input when returns to labor are higher. However, where income and consumption are not separable, the finding may reflect income effects on the supply of family labor.

Of the nonlabor determinants, capital has a rather low earnings elasticity in both agricultural and nonagricultural earnings functions (0.09 and 0.03, respectively). Land has an agricultural earnings elasticity of 0.26. Unlike Benjamin's (1992) findings for Thailand, controlling for community-fixed effects does not noticeably alter the estimated productivity of land. Following Deininger and Okidi (chapter 5 in this volume), we have included variables for the age of the enterprise and years of residence in the location as proxies of informal human capital accumulation in farming. Similar to Deininger and Okidi, both are positive and significant in raising agricultural earnings. These two variables did not, however, significantly affect returns within nonagricultural activities.³¹ We also tried including whether the household head's father had been a farmer. Although this variable is positive and significant in regressions where labor is measured by number of workers, the effect is effectively zero when labor is measured in hours worked. This suggests that the variable works by raising labor input to the farm, rather than by raising total factor productivity.

Putting It All Together

Now that we have estimates on how education affects the type of income-generating activity a household engages in and how it affects returns within these activities, we can use this information to analyze the overall effect of education. We use a method similar to Fafchamps and Quisumbing (1999), who studied rural households in four districts of Pakistan. They looked at direct productivity effects of education in both wages and agriculture, together

31. We first estimated a general model including all explanatory variables. We excluded some variables that were wholly insignificant if the variables were not of great interest a priori. The exclusions did not materially affect the coefficients on the remaining variables.

with the effect of education in reallocating labor between these activities.³² Table 12.5 reports the decompositions of the effects of primary and secondary education. In both cases, we look at the outcome of giving all adults in the household an extra year of schooling. We assume that the models previously estimated would continue to be valid after expanding education, so implicitly we are concerned with a marginal expansion of education. This is a serious limitation to the analysis, because a larger-scale expansion—such as that initiated by UPE—is likely to alter both the probabilities (probits) for participation and returns within activities. However, it is hard to factor in this effect given that our data provides only a snapshot of Uganda in 1992/93.

Consider first the effect of primary education on the probability of households engaging in different income-generating activity (table 12.5, row 2). Primary education reduces the probability of a household receiving income from farming and increases the probability of receiving nonfarm earnings, especially from self-employment. The key point is that the changes in the probabilities do not sum to zero. Primary education increases the probability of a household receiving nonfarm earnings by twice as much as it reduces the probability of receiving earnings from farming. For this reason, the overall entry effects of primary education are positive. These effects are given in row 3, by weighting the marginal effects (row 2) by the average earnings of those engaged in each sector (row 1). Entry effects account for just over one-fifth of the overall return to primary education (row 11). This implies that even if primary schooling had no direct productivity effects, it would raise household earnings by encouraging households to engage in nonfarm self-employment. Surprisingly, the overall entry effects of secondary schooling are less pronounced. It is true that secondary education greatly increases the likelihood of a household receiving wage earnings; however, this is almost fully offset by reductions in the probability of receiving earnings from farming and nonfarm self-employment. There is no support for the hypothesis that much of the return to secondary education in Uganda comes from switching people into wage employment out of other activities.

32. Fafchamps and Quisumbing (1999) found no productivity effects of education in agriculture, but they did find substantial labor allocation effects. In their analysis, the effect of education in reallocating labor from farming into wage employment accounts for about one-quarter of the total effect of education on household earnings. They did not consider the effects of education in determining whether a household receives any income at all from a particular activity. That is to say, they do not allow for the *entry effects* of education laid out in this chapter. Such entry effects may or may not be significant in Pakistan, but they clearly are significant in Uganda. Education has some consequence on earnings by increasing the probability of households obtaining off-farm income. These entry effects are distinct from the effects of education in reallocating labor between activities. Other related studies include Coulombe and McKay (1996) and Vijverberg (1993).

Table 12.5. Decomposing the Effect of Education on Expected Household Earnings

Category	Farming	Nonagricultural self-employment	Wage employment	Total earned income
1 Mean conditional earnings (U Sh)	305,650	419,176	336,277	482,015
2 Effect on probability of receiving income (percent)	p : -0.9 s : -3.6	p : 1.6 s : -2.6	p : 0.4 s : 6.7	n.a.
3 Entry effect (U Sh) = (1) x (2)	p : -2,742 s : -11,113	p : 6,695 s : -10,765	p : 1,453 s : 22,588	p : 5,406 s : 710
4 Mean probability receiving income (percent)	83.26	27.64	33.20	n.a.
5 Productivity effect directly via education (percent)	p : 3.5 s : 4.7	p : 5.1 s : 7.5	p : 4.0 s : 6.1	n.a.
6 Productivity effect via labor supply (percent)	p : -0.7 s : -4.6	p : 1.4 s : 2.2	p : 1.7 s : 3.3	n.a.
7 Productivity effect via other worker characteristics (percent)	p : -0.0 s : -0.3	p : 0.1 s : 0.4	p : 0.2 s : 1.5	n.a.
8 Percent effect on mean conditional earnings: = (5) + (6) + (7)	p : 2.8 s : -0.3	p : 6.7 s : 10.1	p : 5.9 s : 10.9	n.a.
9 Weighted productivity effect (U Sh) = (4) x (8) x (1)	p : 7,042 s : -658	p : 7,724 s : 11,726	p : 6,617 s : 12,132	p : 21,383 s : 23,200
10 Total effect (U Sh) = (3) + (9)	p : 4,300 s : -11,771	p : 14,419 s : 961	p : 8,069 s : 34,719	p : 26,789 s : 23,910
11 Percent total effect = (10)/(1)				p : 5.6 s : 5.0

n.a. Not applicable.

p : Effect of increasing the average amount of primary education held by adult nonstudents in the household by one year

s : Corresponding effect for secondary education.

Source: Author's calculations from 1992 Integrated Household Survey.

Secondary education appears to bring benefits by raising returns within activities rather than by allowing households to enter higher-return activities. The direct productivity effects of education are given in row 5. These effects depend heavily on the educational coefficients estimated in the three earnings functions in table 12.4.³³ However, raising education also has indirect effects on productivity by altering the hours spent in different activities (row 6) and the noneducational characteristics of the workers engaged in different activities (row 7). The latter effects are typically small. One exception is the effect of secondary schooling on the characteristics of wage employees, which is driven by secondary schooling substantially increasing female wage employment. However, the former—labor allocation—effects are substantial. These labor allocation effects broadly mirror the entry effects discussed earlier. Primary education increases the amount of hours a household devotes to off-farm work at the expense of farming. Secondary education increases time spent in wage employment at the expense of both farming and nonagricultural self-employment.³⁴ The distinction between these labor allocation effects and the entry effects is that the labor allocation effects are conditional on the household's activity choice. For example, the negative labor allocation effects of secondary education on farming show that, even if households continue to farm, secondary education will reduce farm earnings by reducing labor input to the farm. Interestingly, this negative labor allocation effect almost cancels out the positive direct effect of secondary education on farm earnings. Consequently, secondary schooling appears to have almost no effect on conditional earnings from agriculture and, in fact, lowers them marginally (see row 8). Conversely, the indirect effect of secondary education in increasing household labor allocated to wage employment amplifies the direct productivity benefits by over 50 percent. Even for primary schooling, the effect on agricultural earnings is only half of the effect on nonfarm earnings. Secondary schooling appears to have substantially larger effects than primary schooling on returns within nonagricultural self-employment and wage employment. These discrepancies are largely attributable to the labor allocation effects of education.

33. Typically, the education of all workers raises the education of workers in a particular activity on an almost one-to-one basis. The direct effect of secondary education on agriculture is the main exception. Increases in the secondary schooling of all household workers is predicted to lead to proportionately smaller increases in the secondary schooling of those household workers allocated to work on the farm.

34. The only difference in the sign of entry and labor allocation effects concerns secondary education and nonfarm self-employment. Secondary education reduces the likelihood of a household engaging in nonfarm self-employment (a negative entry effect). However, if a household does engage in nonfarm self-employment, secondary education increases the amount of labor allocated to it, creating a positive labor allocation effect.

One of the surprising results of the earnings functions in table 12.4 was the finding that education had comparable direct productivity effects in agriculture to those in nonfarm self-employment and wage employment. This is in contrast to most of the literature on the returns to education, which tends to find more modest effects of education on agriculture than on wage employment. For example, on the same data set, Appleton and Balihuta (1996) and table 12.5 report that an extra year of primary education for each farmer raised agricultural production by 2.8 percent and that secondary education appeared to have no effect. The decomposition exercise in table 12.5 is able to explain this apparent contradiction. In particular, we can see that the overall productivity effects of education on agricultural earnings (table 12.5, row 8) are close to those estimated on the same data set by Appleton and Balihuta (1996). Many differences exist between the agricultural earnings function in table 12.4 and the crop production estimated by Appleton and Balihuta (1996). The dependent variable is different (agricultural earnings compared to gross crop output, the functional form is different (Cobb-Douglas compared to translog), the exogeneity assumptions are different (education and worker characteristics are treated as endogenous here and not in Appleton and Balihuta 1996), and some of the determinants are also different. Some of these differences—particularly regarding the dependent variable and endogeneity—do matter for the estimated effects of education. However, perhaps the most important point for the present purposes is that Appleton and Balihuta (1996) measured labor input by number of workers rather than hours of work. Secondary education lowers the amount of hours worked on a farm more than the number of workers. Consequently, when the number of workers is controlled for in a production or earnings function, secondary education appears less directly beneficial than if the number of hours worked is controlled for. In particular, if the agricultural earnings function in table 12.4 is estimated with labor input measured in workers rather than hours, the coefficient on average years of secondary education falls from a highly insignificant 5.6 percent to an insignificant 1.9 percent.³⁵ As most studies of the impact of education on agricultural productivity tend to measure labor input in workers rather than hours, these raise the possibility that the direct productivity effects of education on agriculture have been substantially underestimated.

Examining the combined entry and labor input effects on earnings is interesting because the distinction is somewhat arbitrary (both revolve around the effects of education on labor allocation between activities). At the primary level, the combined effect is substantial and accounts for approximately two-fifths of the total effect of primary schooling on expected household earnings. This is due, in roughly equal parts, to entry and labor allocation effects.

35. Surprisingly the labor-input coefficient is entirely robust to its measurement (remaining at 0.37 under both specifications) as are many other variables. The one exception, whether the household head's father was a farmer, only has an effect when labor input is measured in number of workers, not hours worked.

This implies that studies of the impact of primary education that do not account for these effects—for example, conventional estimates of rates of return based on wage earnings—seriously underestimate the benefits. In contrast to primary schooling, the combined effects are negative and reduce the total effect of secondary education on expected household earnings by one-fifth of what it would be otherwise.³⁶

Effects of UPE on School Quality

Uganda did not experience the postindependence educational expansion characteristic of most Sub-Saharan African countries. Official statistics on school enrollment ratios in Uganda appear particularly problematic, but, as far as we can rely on them, they show no sustained rise in the two decades after independence.³⁷ The gross primary school enrollment ratio in 1980 was 50 percent, effectively the same as in 1960. By contrast, the other Sub-Saharan African countries for which data are available almost doubled their primary school enrollment ratios from 40 to 77 percent.³⁸ The country's poor record on education does not appear to be wholly attributable to the Amin years in the 1970s—there was no sustained rise in enrollments during the 1960s either. After Amin's overthrow, however, Uganda caught up with the rest of the subcontinent, which was entering a period of stagnant enrollment rates, attaining a gross primary enrollment rate of 73 percent in 1985. Thereafter, official enrollment rates did not increase, remaining at 73 percent in 1995. Secondary enrollment rates rose slightly from 1960 to 1980 (from 3 to 5 percent). Rates then doubled to 10 percent in 1985, but in 1995 only stood at 12 percent.

Consequently, in terms of official statistics, the first decade of the Museveni government appears to have achieved little in terms of school enrollment,

36. We notice that the total estimated effect of education—particularly secondary education—is somewhat lower using this structural approach than when using the reduced form model reported in table 12.3. This seems to be due to a violation of the assumption of log-normality of the error terms in earnings functions. In particular, if the earnings functions are estimated using a linear, rather than log-linear, functional form, the correspondence between the structural and reduced form estimates of the education is mathematically exact.

37. The 1992 integrated household survey implied much higher enrollment figures than those officially reported, with the gross primary enrollment ratio being estimated at 93 percent compared with an official figure of 73 percent (World Bank 1996). A survey of 250 government schools in 19 districts in 1996 implied a 60 percent increase in primary enrollments between 1991 and 1995, while official enrollment rates were stagnant (chapter 11 in this volume). Even the 73 percent official gross primary enrollment ratio is hard to reconcile with the reported doubling of primary school enrollments during UPE.

38. Sub-Saharan African figures are the cross-country average from 39 states, including South Africa (World Bank 1998).

especially at the primary level.³⁹ However, these quantitative indicators may provide an incomplete picture. It is widely argued that the educational system in Uganda had a high reputation for quality at independence, but this was destroyed during the chaos of the 1970s, partly through decaying school infrastructure and partly through the exile of many well-educated Ugandans. The first decade of the Museveni government had seen a period of educational reconstruction that partially restored the quality of services.

The situation changed dramatically during the campaign for 1996 elections, when the incumbent, President Museveni, promised to provide free primary education to four children in every family. Although the government of Uganda had long declared the attainment of universal primary education a policy goal (for example, in the 1992 "White Paper on Education"), this promise was the first significant step toward attaining that goal. Following his re-election, President Museveni addressed the nation in December 1996 and announced that he would implement his election promise starting in January 1997. The initial public response to this initiative was impressive, with primary school enrollment rising from 2.9 million in 1996 to 5.3 million in 1997. The key element of the initiative has been the abolition of tuition and PTA fees (some discretion still exists in urban schools that continue to levy fees). These fees had assumed increasing importance in the 1970s and 1980s as state funding of education declined. By 1991 parental contributions to primary schools constituted 70 percent of total funding (43 percent at the median, see chapter 11 in this volume). Equity aspects of the initiative include a 1:1 gender balance requirement when identifying the four children per household to benefit from free education and funding the education of all orphans.

The main concern about UPE is that it is likely to lead to deterioration in the quality of education provided. At least in the short term, government educational expenditures will not be able to rise sufficiently both to offset the abolition of PTA fees and the consequent expansion of student numbers. Although it is rather early to evaluate the effects of UPE in Uganda, some interesting exploratory evidence is provided by a study of 22 primary schools in Mukono and Kampala districts in 1998 (Otteby 1999). Otteby's study focused on three dimensions of the impact of UPE: (a) the composition of the student intake, (b) school quality, and (c) academic performance.⁴⁰

39. Figures on tertiary enrollment rates are incomplete but show a much greater proportionate expansion: from 0.1 percent in 1965 to 0.8 percent in 1985 and 1.5 percent in 1994.

40. The Uganda National Examination Board (1999) carried out a post-UPE testing of learning outcomes in mathematics and English using the same test administered in 1996. These data, when analyzed, will provide a more definite picture of the impact on learning and school quality.

How Has UPE Affected the Composition of the Student Intake?

In both the Mukono and Kampala schools, a large increase in enrollments followed UPE: 110 percent in rural schools and 30 percent in urban schools. Surprisingly, enrollment of boys increased more than that of girls—partly due to higher re-entry of boys at the third year (P3) and above. At the lower grades (P1 and P2), the proportion of girls increased following UPE. Otteby (1999) used an indirect approach to assess how UPE had changed the composition of the school intake in other dimensions. She sampled 20 second-year (P2) students and 20 fifth-year (P5) students from each school. The P2 cohort was selected to reflect a post-UPE intake, because most additional enrollments following UPE were concentrated in the lower year groups. By contrast, students in the P5 year group had entered school prior to UPE. (Some students may have re-entered P5 following UPE.) A comparison of the characteristics of P2 and P5 students in 1998 should, therefore, shed some light on how UPE has changed the composition of the student intake. The material wealth of students' parents was calculated using a 12-point scale measure of housing quality and possession of consumer durables. The average wealth of those in P2 and P5 grades in urban schools—both averaging about eight on the scale—was not markedly different. However, in rural areas, the P5 cohort averaged more than five on the wealth scale, whereas P2 cohort averaged four. Moreover, in rural areas, those in P2 included students with low parental wealth (two points on the scale), whereas the P5 group had no similarly disadvantaged students. Likewise, the proportion assigned only three or four points on the wealth scale in P2 was almost double that in P5.

How Has UPE Affected School Quality?

Otteby (1999) inquired about school quality before and after UPE. The average student–teacher ratio in rural schools after UPE rose from 30 to 51, and in urban schools the student–teacher ratio rose from 50 to 66. However, actual class sizes were typically much larger than student–teacher ratios calculated at the school level. For example, in urban schools, the student–teacher ratio for those in P2 rose from 41 to 77, while the average class size increased from 96 to 136. The increase in student numbers exacerbated an existing shortage of chairs and desks. In the rural schools visited, half the sample had no chairs for students before or after UPE. Before UPE 10 percent of rural schools had enough chairs; after UPE none of them did. In urban schools visited, the proportion reporting sufficient chairs fell from 70 percent before UPE to 31 percent after. The number of textbooks per student did not decline; indeed, the number increased slightly in the sample schools because of a USAID project. However, national statistics imply that this finding is atypical.

How Has UPE Affected Student Performance?

Comparable test scores for pre- and post-UPE student cohorts were not available. Nevertheless, Otteby (1999) tentatively estimated the likely impact of UPE on average student performance.

As a first step, current (post-UPE) P2 students were tested in mathematics and English. They also took a test on nonverbal reasoning designed to be independent of schooling (Raven, Raven, and Court 1991). Performance in the mathematics and English tests were then modeled as a function of nonverbal reasoning and indicators of school quality. These models (or educational production functions), used in the final analysis were parsimonious. The statistically significant variables were retained only after a stepwise elimination of other variables from a more general specification. In the final educational production functions, performance in English and mathematics depended on three explanatory variables. Academic performance depended positively on nonverbal reasoning, negatively on the student-teacher ratio, and positively on indicators of school quality (school facilities in the case of English, textbook-student ratios in the case of mathematics). Performance in the tests of nonverbal reasoning, in turn, was modeled as a positive function of parental wealth and education.

The most important finding was the negative relationship between student-teacher ratios and performance in both English and mathematics. The finding is noteworthy given the possible positive endogeneity bias of good schools being oversubscribed and the observation that better-funded urban schools have larger classes than rural schools. This finding contradicts most of the literature on educational production functions, which more often than not finds class size to be insignificant (Fuller 1987; Hanushek 1986). However, nearly all the existing literature relates to class sizes below fifty and provides little guidance on what happens when class sizes rise to the high levels now observed in Uganda. Otteby (1999) used the estimated educational production functions to simulate the impact of academic performance on the rise in student-teacher ratios after UPE. Consider, for example, the estimated impact of a rise in student-teacher ratios from 41 to 77 as was observed in P2 in urban schools. If this rise had not occurred, the predicted average test scores would be 11 percent higher in mathematics and 6 percent higher in English. Clearly, these are substantial effects and cause for concern.

Otteby's (1999) educational production functions were used to predict how P5 students would have scored if, pre-UPE, they had sat for the same mathematics and English tests in P2. The purpose of this simulation is to gauge what is likely to happen to average academic performance as a result of UPE. Clearly, prior to UPE students are likely to have scored better in the tests than the current P2s. This is partly because of the increasing student-teacher ratios noted earlier. However, a decline in average academic performance is also likely for "compositional" reasons. For example, UPE

has increased enrollment in rural areas more than in urban areas, and rural students tend to do not as well academically in Uganda. Moreover, even within rural and urban areas, we have seen that UPE has led to greater educational access for poorer students, who again tend to perform less well on average. Taking all these factors into account, Otteby (1999) predicts that, had she been able to test the P5 students when they were in P2, their scores would have averaged 10.1 in English and 7.5 in mathematics. The actual test scores of the post-UPE cohort currently in P2 averaged 8 in English and 6.6 in mathematics. Consequently, this simulation predicts that UPE will lead to a fall in mean academic performance of 21 percent in English and 11 percent in mathematics.

Changes in the mean parental background of the pupils account for a relatively small part of these simulated declines: 11 percent in English and 5 percent in mathematics. Much more important is the fact that, after UPE, a higher proportion of students will come from schools with low indicators of school quality. Inferior school facilities account for 70 percent of the predicted decline in performance in English. In mathematics, 77 percent of the fall is due to a rise in the student-teacher ratio. In English, the rise in the student-teacher ratio accounts for 20 percent of the predicted fall in performance. These results imply that UPE will lead to a fall in mean academic performance, primarily through a worsening of school quality (student-teacher ratios and school facilities).

The analysis of the effects of UPE on quality is indicative; such a small sample is not nationally representative. The simulation of the likely effects of UPE on average performance requires a number of strong assumptions.⁴¹ Nonetheless, the analysis does suggest what casual reasoning would imply: that UPE is likely to lead to an observed fall in average academic performance. Most of this fall will be compositional. The typical student will come from a less advantaged background. More importantly, the expansion in student numbers will be disproportionately concentrated in already disadvantaged rural schools. Arguably, these compositional effects are not a cause for concern; if average performance falls after UPE only because of these effects, no student will be worse off. However, the estimated educational production functions also imply that by increasing student-teacher ratios in individual schools, UPE is likely to lead to substantial falls in academic performance.

41. These assumptions include the following: that primary school performance in general can be captured by testing those in P2; that the cross-sectional estimates of the parameters of the educational production function are unbiased; that UPE has not led to a "structural break" in the educational production function; that the characteristics of P5 students and their schools provide a good estimate of what the characteristics of P2 students would have been without UPE; and that UPE has not altered the unobservable characteristics of students and schools.

Summary and Conclusions

Although the data used here to model determinants of educational attainment and returns to education come from the 1992 Integrated Household Survey and were collected prior to the UPE initiative of 1997, they still provide useful insights into its likely effects. The data show that before UPE, particular types of children were less likely to attend school: girls, children from households with poorly educated parents; children from extremely poor families; and children from certain regions, such as rural northern areas. To the extent that UPE is successful, children with these types of characteristics will be able to benefit from education.

Assessing UPE's impact on economic efficiency is much harder than inferring its equity effects. Analysis of the determinants of household earnings suggests that for each year of education, earnings increase by about 4 percent. This is a modest benefit, although it may still imply a high rate of return if the opportunity costs of attending primary school are low. The most surprising finding of the analysis is that education has similar proportional productive benefits in all three income-generating activities: farming, nonfarm self-employment, and wage employment. This is what one might expect if human capital were allocated efficiently across activities. However, it does run contrary to the common belief—and much supporting evidence—that education is rewarded more in wage employment and brings only small returns in farming. We suggest that the relatively small returns to education conventionally found in agricultural production functions may partly arise from a failure to control properly for the input of labor to farming. The results of the study imply that education may bring tangible benefits to the poor in Uganda, who typically are not wage earners.

Estimates of the extent to which education brings returns by reallocating labor rather than by direct productivity benefits were rather surprising. One would expect a principal indirect benefit of secondary education to be increased access to wage employment. However, in our decompositions this benefit was wholly offset by the loss of income associated with withdrawal from farming and nonfarm self-employment. Indeed, the estimates for the combined entry effect and labor allocation effects of secondary education were mildly negative. By contrast, an important channel through which primary education appears to benefit households is in encouraging entry to nonfarm income-generating activities and reallocating labor out of farming.

The efficiency effects of the UPE initiative will depend partly on how it alters the quality of education. Exploratory research of two districts in Uganda implies that average academic performance may fall sharply under UPE. Much of this will be purely compositional, however, as more students from disadvantaged backgrounds are now enrolling, and they are enrolling disproportionately in lower performing rural schools. Nonetheless, other grounds for concern exist. Although most studies of educational production functions imply no adverse effects of class sizes on academic performance, the exploratory research reported here suggests that this generalization may not remain valid

in the context of the extremely large class sizes apparent in post-UPE Uganda. Higher class sizes and generally stretched resources are likely to reduce the amount children learn at school. The challenge of the UPE initiative is to combat these potentially adverse consequences.

Annex 12.1. Models

Table A12.1. Multinomial Logit Model for School Attendance for Children Ages 5–14, 1992

Category	<i>Dropped out of school</i>		<i>In school</i>	
	<i>Coefficient</i>	<i>t-ratio</i>	<i>Coefficient</i>	<i>t-ratio</i>
Constant	2.9767	1.32	0.9710	0.45
Female	–0.0110	–0.12	–0.3704	–6.57
Father literate	0.8339	2.53	0.5708	2.34
Father some primary	–0.3098	–0.95	0.0461	0.19
Father full primary	–0.1627	–1.43	0.3362	5.18
Father postprimary	0.1328	0.76	0.3151	3.20
Mother literate	0.2880	0.81	0.0695	0.28
Mother some primary	0.0353	0.10	0.6133	2.49
Mother full primary	0.1645	1.02	0.5189	5.78
Mother postprimary	0.7170	2.63	0.4498	2.58
Female head	0.1384	1.49	0.1672	2.89
Age of head	–0.0419	–2.45	–0.0206	–1.79
Age head squared	0.0005	2.98	0.0003	2.48
Log income	–0.8789	–2.20	–0.5861	–1.54
Log income squared	0.0489	2.69	0.0475	2.81
Number of boys	0.0387	1.49	0.0524	3.35
Number of girls	–0.0616	–1.43	–0.0199	–0.77
Firewood	–0.1144	–2.49	0.0480	1.76
Piped water	–0.3890	–2.79	–0.1099	–1.23
Fees	0.3423	2.44	0.0628	0.73
PTA charges	0.0146	2.16	0.0105	2.18
Distance to primary school	–0.0819	–3.59	–0.1331	–9.50
Distance to secondary school	–0.0018	–1.01	–0.0009	–1.06
Distance to district administration	–0.0026	–1.94	–0.0014	–1.89
Central urban	0.8995	3.79	0.9110	5.94
Central rural	0.7606	5.08	0.9196	10.01
Western rural	0.4489	3.25	0.6694	8.31
Western urban	0.7565	3.51	0.7394	5.42
Eastern rural	0.3167	2.34	0.4948	6.29
Eastern urban	0.3569	1.72	0.4066	3.21
Northern urban	0.1418	0.75	0.3140	2.90

PTA Parent teacher association.

Note: Yearly dummies for age included in model but not reported in table.

Source: Author's calculations from 1992 Integrated Household Survey.

Table A12.2. Probit Models for Engaging in an Income-Generating Activity

<i>Category</i>	<i>Farming</i>	<i>Nonagricultural self-employment</i>	<i>Wage employment</i>
Intercept	-1.779 ^b	-1.033 ^b	0.298 ^a
<i>Characteristics of adult household members (nonstudents)</i>			
Average years primary	-0.036 ^b	0.048 ^b	0.012
Average years secondary	-0.145 ^b	-0.077 ^b	0.185 ^b
Average been to university	-0.065 ^b	-0.276	0.665
Average age	0.00979 ^b	0.0261 ^b	0.0257 ^b
Average age squared	-0.0000504 ^b	-0.000374 ^b	-0.000339 ^b
Proportion women	0.731 ^b	0.301 ^b	-0.939 ^b
Log Number (lnL)	0.544 ^b	0.220 ^b	0.271 ^b
<i>Head's father</i>			
Nonagricultural self-employed	-0.189 ^b	0.273 ^b	0.030
Government employee	-0.022	-0.033	0.285 ^b
Private employee	-0.286 ^b	0.010	0.251 ^b
<i>Other variables</i>			
Female headed	-0.191 ^b	0.017	0.194 ^b
Log years resident in area	0.291 ^b	-0.031 ^a	-0.170 ^b

Note: Also controlled for, but not reported, are dummies for location (region by urban-rural), for parental education, and for missing values. Sample size is 9,078.

a. Significant at the 5 percent level.

b. Significant at the 1 percent level.

Source: Author's calculations from the 1992 Integrated Household Survey.

References

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

Angemi, Diego. 1999. "Child Labor: Insights from an Agricultural Household Model." Unpublished MSc dissertation, University of Oxford, United Kingdom.

Appleton, Simon. 1996. "Woman-Headed Households and Household Welfare: An Empirical Deconstruction." *World Development* 24(12): 1811-27.

_____. 1999. "Education and Health at the Household Level in Sub-Saharan Africa." Paper prepared for the African Economic Research

Consortium collaborative research project on explaining African economic growth performance. Centre for the Study of African Economies, University of Oxford. Processed.

- Appleton, Simon, and Arsene Balihuta. 1996. "Education and Agricultural Productivity in Uganda." *Journal of International Development* 8(3): 415–44.
- Appleton, Simon, Arne Bigsten, and Damiano Kulundu Manda. 1999. "Have Returns to Education Changed over Time? Evidence from Kenya, 1978–1995." Centre for the Study of African Economies Working Paper no. 99.6. University of Oxford, Department of Economics, Oxford, United Kingdom.
- Appleton, Simon, John Hoddinott, and John Knight. 1996. "Primary Education as an Input to Postprimary Education: A Neglected Benefit." *Oxford Bulletin of Economics and Statistics* 58(S1): 211–19.
- Ashenfelter, Orley, and Cecilia Rouse. 1998. "Income, Schooling and Ability: Evidence from a New Sample of Identical Twins." *The Quarterly Journal of Economics* CXIII(1): 253–84.
- Benjamin, Dwayne 1992. "Household Composition, Labor Markets, and Labor Demand: Testing for Separation in Agricultural Household Models." *Econometrica* 60(2): 287–322.
- Bennell, Paul. 1996. "Rates of Return to Education: Does the Conventional Pattern Prevail in Sub-Saharan Africa?" *World Development* 24(January): 183–99.
- Bigsten, Arne, and Steve Kayizzi-Mugerwa. 1999. *Crisis, Adjustment and Growth in Uganda: A Study of Adaptation in an African Economy*. New York: St. Martin's Press.
- Bigsten Arne, Paul Collier, Stefan Dercon, Marcel Fafchamps, Bernard Gauthier, J. W. Gunning, A. Isaksson, Abena Oduro, Remco Oostendorp, Catherine Pattillo, Mans Soderbom, Francis Teal, Albert Zeufack, and Simon Appleton. 2000. "Rates of Return on Human and Non-Human Capital in Africa's Manufacturing Sector." *Economic Development and Cultural Change* 48(4): 801–827.
- Coulombe, Harold, and Andrew McKay. 1996. "Modeling the Determinants of Poverty in Mauritania." *World Development* 24(6):1015–32.
- Fafchamps, Marcel, and Agnes Quisumbing. 1999. "Human Capital, Productivity, and Labor Allocation in Rural Pakistan." *Journal of Human Resources* 34(2):369–406.
- Filmer, Deon. 2000. "The Structure of Social Disparities in Education: Gender and Wealth." Policy Research Working Paper no. 2268. World Bank, Development Research Group, Washington, D.C.

- Fuller, Bruce. 1987. "What Factors Raise Achievement in the Third World?" *Review of Educational Research* 57(3): 255–92.
- Glewwe, Paul. 1996. "The Relevance of Standard Estimates of Rates of Return to Schooling for Education Policy: A Critical Assessment." *Journal of Development Economics* 51(2): 267–90.
- Hanushek, Eric. 1986. "The Economics of Schooling: Production and Efficiency in Public Schools." *Journal of Economic Literature* 24(3): 1141–77.
- Jimenez, Emmanuel. 1987. *Pricing Policy in the Social Sector: Cost Recovery for Education and Health in Developing Countries*. Baltimore, Maryland: The Johns Hopkins University Press.
- Knight, John. 1968. "Earnings, Employment, Education, and Income Distribution in Uganda." *Bulletin of the Oxford University Institute of Economics and Statistics* 30(4): 192–205.
- Knight, John, and Richard Sabot. 1990. *Education, Productivity, and Inequality: The East African Natural Experiment*. Oxford, U.K.: Oxford University Press.
- Lanjouw, Peter, and Martin Ravallion. 1995. "Poverty and Household Size." *Economic Journal* 105(November): 1415–34.
- Mincer, Jacob. 1974. *Schooling, Experience, and Earnings*. New York: Columbia University Press.
- Moll, Peter. 1998. "Primary Schooling, Cognitive Skills, and Wages in South Africa." *Economica* 65(May): 211–90.
- Otteby, Kim. 1999. "The Effects of Universal Primary Education in Uganda." Unpublished undergraduate dissertation, University of Oxford, United Kingdom.
- Phillips, Joseph M. 1994. "Farmer Education and Farm E: A Meta-Analysis." *Economic Development and Cultural Change* 43(October): 149–65.
- Psacharopoulos, George. 1994. "Returns to Investment in Education: a Global Update." *World Development* 22(9): 1325–44.
- Raven, J., J. C. Raven, and J. H. Court. 1991. *Manual for Raven's Progressive Matrices and Vocabulary Scales*. Oxford, U.K.: Psychologists Press.
- Reddy, Sanjay, and Jan Vandermoortele. 1996. "User Financing of Basic Social Services." United Nations Children's Fund: New York.
- Rosenzweig, Mark, and Kenneth Wolpin. 1986. "Evaluating the Effects of Optimally Distributed Public Programs." *American Economic Review* 76(3): 470–87.
- Uganda National Examination Board. 1999. "National Assessment of Progress in Education: Report on the Results of Mathematics and English Assessments in 1999." Kampala: UNEB.

- UNDP (United Nations Development Programme). 1997. *Uganda Human Development Report*. Kampala.
- Vijverberg, Wim. 1993. "Educational Investments and Returns for Women and Men in Côte d'Ivoire." *Journal of Human Resources* 2(4): 933-74.
- World Bank. 1996. "Access to Education and Health in Uganda." World Bank, Africa Region, Poverty and Social Policy Department and Macroeconomics 2, Washington, D.C. Processed.
- _____. 1998. *World Bank Development Indicators*. New York: Oxford University Press.

Combating Illness

Paul Hutchinson

Until the 1970s, Uganda's health sector was considered to be one of the best in Africa. Steady improvements had been seen in most health indicators, and access to care was relatively high. However, from the early 1970s through the mid-1980s, the country's internal turmoil severely limited access to health services and interrupted basic infrastructure development, and the level of health spending fell dramatically. Health represented 5.3 percent of central government expenditures in 1972, but only 2.4 percent in 1986 (World Bank 1988). By 1986 health expenditures were only 6 percent of their 1970 levels (Macrae, Zwi, and Gilson 1996).

Since 1986 the health sector has undergone a process of rebuilding and renovating health infrastructure. Most health indicators, except those related to HIV/AIDS, have been improving, due in part to economic growth and liberalization and to greater availability of health services. While still high relative to industrial countries, infant mortality decreased from 119 to 97 deaths per 1,000 births in only a seven-year period from 1988. Use of contraception has tripled; total fertility continues to decline; knowledge and awareness of HIV/AIDS is now almost universal; and sexual behavior is changing, particularly among young people (Republic of Uganda 1995; Shuey and others 1999). Health spending now represents 7 percent of total public expenditures, one of the highest proportions in Africa (Hay 1998; Republic of Uganda 2000). Even so, the health sector has faced many obstacles since 1986.

The AIDS epidemic, which emerged in Uganda at about the time the country began its recovery, added another burden to the health system. Currently, an estimated 1 million Ugandans are infected with HIV. Cumulative AIDS deaths are nearly 2 million, 10 percent of the current population (UNAIDS and WHO 2000). Overall HIV prevalence may be in the 6 to 7 percent range, down from 9 to 12 percent in the early 1990s (Goliber 1999; UNAIDS and

WHO 2000). The effect on health indicators is considerable; life expectancy at birth declined from approximately 54 years in the late 1970s to approximately 43 in 1995 (figure A13.1) (World Bank 1979, 1986, 1992, 1997b). Scarce public resources that could have been used to restore the health sector or meet other health needs have been used to address the AIDS epidemic.

Many health problems that have historically plagued Uganda continue to limit the development of human capital. Malaria, although generally receiving less attention and fewer public funds than HIV/AIDS, is a leading cause of morbidity and mortality (Hutchinson 1999c). Maternal and child health has improved slowly, although both infant and maternal mortality remains high. Child nutrition is poor, contributing to a variety of other childhood ailments (Republic of Uganda 1995). Beginning in 1996, the steady improvements in immunization coverage appear to have dramatically reversed, affected both by decentralization and shifting international donor priorities (DeRoeck and Levin 1998; UNEPI 1999).

Despite measurable improvements, the available health services are still inadequate to meet the needs of the population. The capital investments of the past decade, which have increased the population's proximity to health facilities, have not corresponded to improvements in the quality and availability of recurrent inputs. As a result, use of the public sector for curative care has remained remarkably constant since the late 1980s. Many government health units are faced with a situation of unused physical capacity, lack of trained staff, and supply shortages (Okello and others 1998). The poor and nonpoor alike tend to prefer curative care from nongovernmental organizations (NGOs) and private providers over supposedly less expensive government care, although government health units outnumber all other providers roughly two and a half to one. As demonstrated in chapter 11 in this volume, the quality of services at government health units suffers from a poor incentive structure and a lack of accountability for inputs (Hutchinson 1999b; Republic of Uganda 1997c).

The government's ongoing health sector reform has attempted to address some of the major weaknesses. Since 1993 the health sector has been undergoing a process of decentralizing responsibility for provision of health services from the central Ministry of Health to the 45 district governments. The impact of decentralization on health service delivery and health outcomes is not yet clear. While decentralization has reportedly increased public participation in the health sector, new problems have arisen. The decline in childhood immunization coverage demonstrates the difficulties of incorporating formerly vertical programs into a decentralized system, particularly if local priorities differ from national ones.

Health care financing has focused mainly on generating additional revenue from user fees. While official policy changed only in 1999, government health facilities have been charging fees for most curative care and other health services since the late 1980s. However, few instances of user fee revenue going to improve the quality and availability of services are

apparent. Several studies have examined the extent of informal charges for services at government facilities, finding that they present yet another factor inhibiting the use of government health services (Jitta 1996; McPake and others 1999; Mwesigye 1996). Health insurance is almost nonexistent, consisting of a few pilot schemes based at individual health facilities or high-end plans for wealthier individuals in Kampala.

The remainder of this chapter is organized as follows. The first section looks at changes that have occurred in health policy and access to services since the 1960s, while the next section describes the current health situation, including the effects of some of the major health problems in Uganda: AIDS, malaria, childhood nutrition, and reproductive health. The third section analyzes the demand for health services and the relative importance of factors such as proximity, price, and quality. The chapter concludes with a discussion of some proposed actions to address the health sector's problems in the future and an assessment of their likelihood of success.

Health Policy and Access to Services

Since 1986 the health sector has mostly focused on rebuilding the public sector health infrastructure and restoring basic health programs. An important aspect of rebuilding has been decentralizing control over many health resources and responsibilities to the district level. This process is incomplete.

At independence in 1962, the health system was largely focused on curative care. During the 1960s efforts were concentrated on improving primary-level care. By the 1970s, Uganda had a highly developed network of primary-level care, secondary hospitals, and referral hospitals. Medical personnel were highly trained, and the quality of medical care was higher than elsewhere in Africa (Barton and Wamai 1994).

During the 1970s the health sector almost entirely collapsed. A large proportion of hospitals and health centers were destroyed. The burden of medical care fell on the NGOs and missionary health care providers. Many of the trained medical personnel left government employment, and many simply left the country. The consequences of the collapse were dramatic. At the start of the 1970s, immunizations reached 70 percent of children; by the early 1980s, immunizations had dropped to 15 to 25 percent of children (Barton and Wamai 1994).

The rebuilding of the health infrastructure since 1986 has significantly increased the population's proximity to health units (tables 13.1 and A13.1). A 1996 health inventory (Republic of Uganda 1997c) concluded that only 49 percent of the population were within five kilometers of a health unit offering basic curative and preventive care. The 1995 Uganda Demographic and Health Survey (DHS) (Republic of Uganda 1995) concluded that 48 percent of currently married women lived within five kilometers of a facility offering prenatal care; 54 percent lived within one hour's travel time. Expansion in the private sector has also been considerable, though official estimates significantly underestimate the total numbers of private providers.

Table 13.1. Number and Types of Health Facilities, Selected Years

<i>Type</i>	1965	1979	1975	1980	1988	1992	1996	<i>Percentage change</i>	
								1979–88	1988–96
Hospitals	50	62	69	76	81	95	98	31	21
Health centers	20	46	74	91	122	196	223	165	83
Dispensary and maternity units	55	65	60	80	110	129	124	69	13
Maternity units	17	20	16	20	36	13	367	80	919
Dispensaries	83	103	92	88	160	258	603	55	277
Subdispensaries	77	110	211	293	392	649	57	256	–85
Aid posts	0	0	0	0	160	98	33		–79
Total	302	406	522	648	1,061	1,438	1,505	161	42

Note: Includes government and NGO facilities.

Source: Republic of Uganda (1997c).

The increase in the number of health facilities has not been met by a corresponding increase in the number of trained medical personnel (table 13.2). Even now, many medical students leave the country after completing their education to work in neighboring countries where salaries have generally been higher. As a result, while the total number of medical personnel has increased since 1972, it has not kept pace with population growth. In 1996, one medical person was available for every 2,346 people. In 1972 one medical person was available for half that many people. The overall number of doctors in the country has actually declined by 18 percent (Republic of Uganda 1993, 1997c).

The distribution of medical personnel is uneven. While 90 percent of the population live in rural areas, most of the doctors are concentrated in a few urban areas. In 1991 Jinja, Kampala, and Mbale, with only 5 percent of the country's population, accounted for nearly 60 percent of the country's doctors. Eighteen of the then 39 districts had no more than five doctors. Countrywide, there were 27,000 people per physician. Five districts had more than 100,000 people per physician (World Bank 1993). In 1996, 45 percent of government health employees worked in hospitals (Republic of Uganda 1997c). This staffing distribution affects utilization patterns. Many individuals bypass lower-level facilities to use hospitals instead. A recent study found that only 15 percent of hospital attendees had been referred from lower-level facilities (Okello and others 1998).

The quality of available health personnel is also cause for concern. Only 33 percent of established health positions are currently filled by qualified staff. The remaining positions are filled by unqualified nursing aides or are left vacant. A government ban on recruitment has contributed to the insufficient numbers of trained medical personnel, as have problems with timely payment of salaries and poor attitudes toward health workers by district leaders (Republic of Uganda 2000).

As with most government sectors, the Ministry of Health has been decentralizing selected health sector functions and responsibilities to the offices of the district director of health services and the district health teams. Decentralization means that districts are now the providers of health services and are responsible for supervising district health units below the hospital level, deciding how to allocate resources in the district health budget and implementing many public health activities. The District Service Commission is responsible for hiring and firing health personnel in the district. In several districts, the health budget planning process involves considerable input from communities via subcounty health committees. The central ministry retains responsibility for making policies, setting standards, and providing technical assistance.

The rationale for nationwide decentralization is largely political: to improve the quality of governance and representative democracy. In the health sector, rationales include (a) improving allocative efficiency by placing decisionmaking and planning closer to the direct users, thereby better matching the supply of health services to health needs; (b) improving technical

Table 13.2. Staffing Ratios, 1972 and 1996

<i>Cadre</i>	1972 (population = 10,634,000)		1996 (population = 19,500,000)		Percentage change between 1972 and 1996	
	<i>Number of staff</i>	<i>Ratio of staff:population</i>	<i>Number of staff</i>	<i>Ratio of staff:population</i>	<i>Number of staff</i>	<i>Ratio of staff:population</i>
Doctors	1,171	1:9,081	964	1:20,228	-18	-123
Nurses	3,877	1:2,743	4,059	1:4,804	5	-75
Midwives	1,793	1:5,931	2,624	1:7,431	46	-95
Medical assistants	435	1:24,446	664	1:29,367	53	-20
Total	7,276	1:1,462	8,311	1:2,346	14	82

Source: Republic of Uganda (1993, 1997c).

efficiency and the quality of health services by increasing local accountability; and (c) improving the sustainability of health projects and initiatives by increasing community participation in health activities and health planning (Okuonzi and Lubanga 1997).

Decentralization is still in an intermediate stage in which problems could reasonably be expected. Financial management systems have had to be developed at the district level to ensure accountability and functional capacity for implementation. Some progress has been made, but districts still have limited control over funding and depend on external sources for most health expenditures. Of nonhousehold health spending, the central government and donors finance at least 60 to 70 percent of district health activities (Hutchinson 1999a).

Even with the limited resources available to districts, district planners have shown a tendency to prefer activities inconsistent with the Ministry of Health strategy, in particular, constructing new health facilities rather than providing needed public health activities. Central government concern over undesirable resource allocation patterns led to the establishment of a conditional grant for primary health care in 1997/98. However, even the central ministry has tied much of this funding to upgrading health centers so that they can provide more extensive curative care (Hutchinson 1999a).

User fees at health facilities are intended to provide additional resources at the local level for improving the quality and availability of health services and providing a sense of community ownership. User fees are now charged for most services at government health facilities, with exemptions for children, for the poor, and for most preventive care. The effects of user fees on actual use have been inadequately studied. Most studies have performed before and after comparisons, concluding that any decline in utilization represented a deterioration in welfare (Asiimwe and others 1996; Hansen 1995; Mwesigye 1996). Other studies, with insufficient sample sizes, have found no significant decrease in utilization, but overuse by staff and families. One report concluded that the "most outstanding reason for the decline of the rate of utilization of government health facilities is not the introduction of user charges but rather the poor quality of services rendered by those facilities as compared to non-governmental organization (NGO) facilities" (Jitta 1996, p. 42).

The low quality of government health services has been widely documented. It is reported that while the physical structures exist for providing curative services, the actual capacity at health units varies considerably. Often staff are not present or critical supplies are only sporadically available (McPake and others 1999; Olsen and others 1997). One of the most frequent complaints is the lack of drug availability, which is believed to be associated with misappropriation by health workers (Cockcroft 1996). McPake and others (1999) found that, on average, 78 percent of drugs and supplies disappeared from the health units in the mid-1990s. A pilot service delivery survey found that one of the "main problems identified with the services were lack of drugs and poor access to facilities. People resented having to pay for poor service without drugs

available" (Cockcroft 1996, p. 6). Other studies (Asiimwe and others 1996; Olsen and others 1997) found that staff were present at health units only 30 percent of the time. Although limited, recent survey evidence shows some improvement in the staffing situation in the late 1990s (World Bank 1999a).

The poor accountability for inputs is reflected in the costs of providing services. Basic services at government facilities have been found to be at least 1.5 times as costly to provide as similar services at NGO facilities (Republic of Uganda 1997a). The principal accountability measure for improving quality and efficiency of the health unit level—the establishment of health unit management committees (HUMCs) made up of community leaders—has not been consistently successful. By establishing HUMCs at all health units, decentralization was intended to improve community oversight of health unit activities, accountability of personnel, revenue collection, and ultimately the quality of services offered. Instead, official user fee collections are low, probably underreported, and generally have had little impact on service quality. The HUMCs appear to benefit a few local elites, who use them for consolidation of power, access to free health services, and appropriation of drugs and user fee revenue via "sitting allowances" (payments for attending meetings). A study of 12 government facilities in Bushenyi and Iganga districts in 1994–96 showed that HUMCs had had little positive impact and found that little contact existed between HUMCs and communities (Asiimwe and others 1996).

The evidence on user fee collection and HUMCs has not been uniformly discouraging. In districts and health units in which training of health workers and HUMCs has occurred, a greater proportion of user fee revenue appears to be allocated to improving quality. In Kabale district, for example, 43 percent of user fee revenue is allocated toward improving and providing basic health services; only 13 percent is allocated toward staff salary allowances. Overall, however, user fee revenue still constitutes less than 10 percent of health units' recurrent budgets (Republic of Uganda 1995/96a).

Another factor limiting the progress of decentralization is simply the lack of qualified personnel for undertaking important health activities. Personnel issues were cited in a survey of district directors of health services as the most important impediments to implementation of activities, surpassing concerns over funding. The survey also found that decentralization had led to conflicts between health planners and local politicians regarding health sector priorities. However, the district directors noted that local ownership of health plans and greater flexibility of planning—two of the major objectives of decentralization—had significantly contributed to overall health sector performance (Hutchinson 1999a).

Burden of Disease

As noted earlier, malaria and AIDS are believed to be the leading causes of death. Burden of disease studies conducted nationally in 1995 and in 13 districts in 1996 ranked major illnesses by discounted life years (DLYs) lost due

to mortality.¹ The most common identifiable cause of lowered life expectancy was malaria (table 13.3). AIDS ranked lower, though it was certainly underestimated because estimates were based on hospital patient registers, which often do not list AIDS as the cause of death. Common and generally preventable childhood illnesses such as diarrheal diseases and measles contributed significantly to mortality. Little information on causes of death is available from earlier periods.

AIDS

AIDS in Uganda is both one of the worst cases and one of the best in the developing world. The human toll has been staggering, estimated at nearly 2 million cumulative deaths since the start of the epidemic, almost 10 percent of the country's adult population in 1998 (UNAIDS and WHO 1999).

Table 13.3. DLYs Lost due to Mortality, Selected Causes of Death, 1995 and 1996

<i>Disease</i>	<i>National analysis, 1995</i>	<i>District analysis, 1996</i>
Malaria	15.4	23.4
Other diseases	22.7	19.0
Diarrhea	8.4	12.7
Pneumonia/acute respiratory illnesses	10.5	9.7
AIDS	9.1	9.6
Measles	4.2	5.7
Tuberculosis	4.1	5.1
Perinatal	18.4	4.8
Malnutrition	2.6	3.4
Maternal diseases	2.0	2.5
Trauma	0.7	1.6
Cardiovascular diseases	1.9	0.8
Dysentery	n.a.	0.7
Tetanus	n.a.	0.5

n.a. Not applicable. No values for these diseases were collected.

Source: Republic of Uganda (1996, 1998).

1. DLYs due to premature mortality for each illness are calculated by subtracting the average age of death for individuals dying from a specific disease condition from the average length of life of an individual using a Western life table. A discount factor was used to value years of life far in the future differently from years in the near future. Deaths from diseases that tend to occur at younger ages would therefore tend to involve greater loss of DLYs than deaths from diseases that occur later in the life cycle.

However, the response by the government, donors, and NGOs has significantly affected the progression of the disease. Beginning early in the epidemic, necessary programs for epidemiological surveillance, control of blood supply, education and counseling, and control of sexually transmitted infections were established (World Bank 1999b).

The number of infected individuals is difficult to estimate. Most individuals are never tested and many never come in contact with the health system. Estimates in 1999 put the number of living infected individuals at approximately 820,000 people out of a population of 20 million. In 1999 the adult prevalence rate was estimated at 8.3 percent, down from nearly 10 percent in 1997 (UNAIDS and WHO 2000). Exact numbers are difficult to calculate (Hunter and Fall 1998). As a result of the epidemic, other diseases, such as tuberculosis, have reemerged as serious health problems (Wabwire-Mangen and Maina 1999).

While a huge number of Uganda's population is HIV positive, the rate of new HIV infections is believed to be declining (Opio and others 1996). In 1985, 11 percent of prenatal clinic attendees in Kampala were HIV positive, increasing to 31 percent in 1990. By 1996, HIV prevalence in a similar sample of pregnant women had decreased to 15 percent (figure A13.2) (Republic of Uganda 1992, 1994, 1997b; UNAIDS and WHO 1999). By contrast, sample data from the Ugandan military show no such decrease, with rates climbing from 16 percent in major urban areas in 1992 to 26.7 percent in 1995 (George and others 1998; Mugerwa and others 1994; Mugenyi and others 1995, 1996). The large decrease for the sample of pregnant women is believed to be due to massive efforts at educating the population about prevention of transmission, as well as the natural progression of the epidemic. Recent successes in preventing transmission from infected mothers to their babies in controlled trials may provide a low-cost means to further reduce transmission (Guay and others 1999). Extrapolating trends in HIV prevalence to the population at large, however, is difficult.

The economic impact of HIV/AIDS is considerable. In addition to the psychological and emotional costs of losing a family member, households must face the direct costs of treatment, the value of lost work time from illness or lower productivity while working, and the loss of income earners. Spending on the treatment of HIV/AIDS-related illnesses, as well as significant burial costs, means that households must supplement their resources or reallocate funds from other priorities such as school fees for children, farm or business inputs, or other medical expenses.

Unlike many other diseases, the impact of HIV/AIDS is much larger in the income-earning age group. For most Ugandans engaged in agriculture, the most common coping strategies include reallocating household labor, taking children out of school, diversifying household agricultural production and income activities, and decreasing the amount of land cultivated (Mutungadura, Mukurazita, and Jackson 1999). Households may have to draw on personal savings, sell assets, or borrow money. They may try to supplement their household earnings with alternative activities: selling firewood, brewed millet beer,

livestock, or handicrafts; building fences; tailoring; or other petty trade. In some cases, overall food consumption may decrease (Barnett and others 1995; Topouzis 1994). For households with meager incomes, HIV/AIDS represents an additional burden that may propel these households further into disadvantaged economic circumstances.

Furthermore, women are 1.3 times more likely to be infected than men. The loss of female household members, generally the principal caretakers of children, has significant effects on the development of children in a household. Some children may be forced to withdraw from school to care for other family members and to assist in work activities (Armstrong 1995). Many children are sent to live with relatives, where they may be accorded fewer resources than relatives' own children (Barnett and others 1995).

The evidence indicates that HIV/AIDS has most significantly affected the professional class of workers, at least at the outset of the epidemic, who are based predominantly in urban areas. A national serosurvey in 1987/88 of 3,426 adults in three regions of Uganda found that the proportion infected was highest among professional and other urban-based workers. From an economic standpoint, the loss of these individuals represents a substantial loss of human capital investment by firms and educational institutions. Businesses will face the additional costs of hiring and training new workers to replace workers who have died prematurely (Armstrong 1995).

In the health sector, AIDS has significantly affected the allocation of public health resources, taking resources that might otherwise have been used to address other health problems. District annual work plans indicate that average spending on HIV/AIDS, tuberculosis, and prevention and treatment of sexually transmitted infections is approximately 5 to 10 percent of the entire district health budget. This amounts to between US\$0.50 to almost US\$1 per person (Hutchinson 1999a). AIDS was the second leading cause of inpatient mortality at the hospital level in 1990. Seventy percent of medical ward patients tested HIV-positive; a higher percentage of infected people could be found in tuberculosis wards. Uganda spent approximately US\$2 per capita to address the AIDS epidemic in 1996 (table A13.2). Armstrong (1995) estimates that the resources used to treat only 35 percent of AIDS patients could have been used to immunize one-third of infants or treat 2.5 million cases of malaria. While the AIDS epidemic has probably increased the total quantity of resources going to the health sector, it certainly has also shifted already inadequate resources away from the treatment of other health problems.

Uganda has achieved tremendous success in the fight against AIDS, at least relative to other countries in similar circumstances. The government's openness in addressing AIDS is the largest contributing factor, making earlier interventions possible. This is reflected in many indicators of individual behavior that can reduce the risk of contracting HIV: the average age for first-time sex has increased, the percentage of teenagers having sex has decreased (Shuey and others 1999), and condom usage has increased (Republic

of Uganda 1995). Although more people are reportedly choosing only one sexual partner, women are still limited in their ability to control their HIV status by their inability to control male behavior (McGrath and others 1991).

A longitudinal community-based, closed, cohort study from 1987–94 found substantial behavioral changes. For example, the proportion of males who had ever used condoms increased from 6.9 to 35.3 percent. At the same time, the proportion of individuals with more than two sex partners in six months decreased from 26.5 to 17.1 percent, and the prevalence of sexually transmitted infections fell by nearly half (Konde-Lule, Tumwesigye, and Lubanga 1997). However, consistent use of condoms is still low. In 1989, hardly any women reported regular use of condoms; by 1995, only 1.5 percent of women—but 15.4 percent of sexually active, unmarried women—were regularly using condoms. Nearly a third of sexually active, unmarried men regularly used condoms (Kaijuka and others 1989; Republic of Uganda 1995).

Malaria

Despite the tremendous impact of HIV / AIDS, malaria is the most significant cause of mortality and morbidity. The situation has been aggravated by the low level of malaria control infrastructure, the result of both local politics and global trends in malaria control. The political problems of the 1970s disrupted and dismantled much of the public health infrastructure in Uganda, while international malaria efforts reflected growing disillusionment regarding the general belief of the time that the costs of malaria control were too great given the level of benefits attainable (Hutchinson 1999c).

The current situation stems from years of absence of coordinated malaria control efforts by the government and donors. The levels of mortality and morbidity are aggravated by a variety of factors, including poor diagnostic capacity, inadequate case management, delayed or improper treatment by households, and scarce public funding for malaria control. Knowledge of the causes of malaria, its symptoms, and proper treatment is low among the population. According to the few studies that have been conducted, resistance to chloroquine and other drugs is fairly low, and although some evidence suggests that resistance is increasing, the reported high percentage of treatment failure is probably due to improper dosing or poor-quality drugs. Aggravating the situation, Ugandans rarely use protective measures such as mosquito nets (Kilian 1995; Langi and others 1994).

In economic terms, malaria is costly to households not just because of treatment expenses, but also because it lowers work productivity and contributes to loss of labor time for those who are sick and their caretakers. The impact differs from that of AIDS because of the age distribution of the disease; malaria predominantly afflicts children. Few studies in Uganda have examined the economic impact of malaria on specific income groups. Baseline data—for example, on public attitudes toward the disease, vector densities,

and drug resistance—are scarce. Only a handful of districts have benefited from extensive research (Hutchinson 1999c).

Many of the activities for an effective malaria control program fall under the category of public goods, implying that government involvement is likely to be the only means by which control activities will be undertaken. Vector control benefits, through localized spraying and other means, are not easily excluded from those individuals unwilling to pay for them. Such free riding behavior makes private provision unlikely. Also, the government has a strong role to play in disease surveillance and research, particularly on monitoring the efficacy of frontline drugs for dealing with malaria. Resistance to chloroquine and other drugs is inevitable and the government must implement a program to advise on when and how to switch standard treatment guidelines.

Maternal and Child Health

The situation regarding maternal health in Uganda has changed only slightly since the 1960s. Fertility in Uganda remains high: approximately 6.9 births per woman, almost identical to 1969 levels. A small decrease from a high of 7.4 births per woman has been noted in the past 10 years due to increased use of contraceptives, lower fertility preferences, and a variety of other factors. HIV/AIDS has likely contributed to reduced total fertility because it encourages fewer sexual contacts, promotes increased use of barrier protection mechanisms, and leads to shorter life spans.

Maternal mortality also remains high relative to industrial countries, estimated at more than 500 deaths per 100,000 live births. Some of the reasons for the high maternal mortality include poor maternal nutrition, short birth intervals, early age at first birth, and lack of trained assistance at birth. Most women, almost 64 percent, deliver infants at home, generally without trained assistance. However, nearly all women visit a health facility at least once for prenatal care (Republic of Uganda 1995). One study found that women attend prenatal care clinics for several reasons: to receive a tetanus toxoid injection, to check on the health of the baby, and to receive a prenatal care card. Women believe that prenatal care cards increase the ease of admittance to facilities for delivery and lessen the likelihood of abuse by health workers (Amooti-Kaguna and Nuwaha 2000).

Some improvement has been noted in recent years, particularly in the proportion of births assisted by traditional birth attendants. The proportion of births with trained staff, however, has not improved (Kaijuka and others 1989; Republic of Uganda 1995). The government has exerted considerable effort in improving the training and supervision of traditional birth attendants, who are now provided with delivery kits and supervised by the district director of health services (Amooti-Kaguna and Nuwaha 2000). The principal alternative, increasing the proportion of births in modern health facilities, is likely to be relatively costly, requiring significant upgrading of health facilities. At present, this solution may not be a high priority for public sector funds because of the

relative rarity of maternal deaths, the myriad of other health problems facing the country, and the potential to improve maternal health through other means.

Other indicators of reproductive health have shown some improvement, benefiting from greater availability of services and considerable health education. One-third of women and more than half of men had heard a family planning message in the six months before the DHS in 1995. Use of contraceptives increased from 5 to 15 percent from 1988 to 1995, up from nearly nonexistent levels in the 1970s. Most women receive at least one tetanus toxoid injection during their pregnancies.

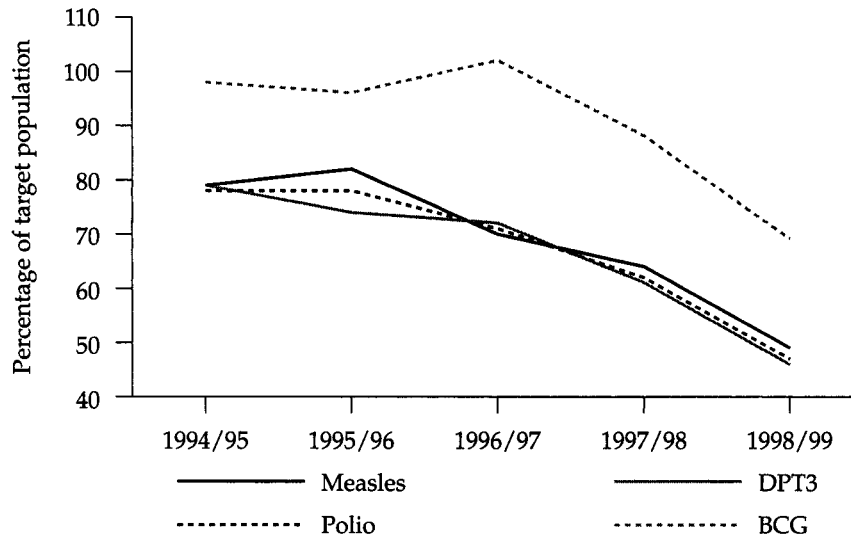
With the exception of nutritional status, children's health has been improving over time. In addition to the infant mortality decrease, under-five mortality has decreased from 180 to 147 per 1,000 births from 1988 to 1995. More than 90 percent of children are breastfed (Republic of Uganda 1995). The reasons for the improvements in children's health are likely due to improvements in vaccination coverage, at least until recently, and improvements in household welfare from growth in the economy. However, tracing the direct causes through the available data would be a huge task.

Despite the improvements, a high and increasing level of illness exists among children. In 1996/97, nearly half of children under age one and one-third of children aged two to five were reported to be ill in the 30 days prior to the survey (table A13.3). This is up from 35 and 21 percent, respectively, for these age groups in 1992/93. HIV/AIDS has probably contributed to this rise, as well as changes in perceptions of illness. The 1996/97 household survey found that 17 percent of children had experienced diarrhea in the preceding two weeks.² Of these, 27 percent were given no treatment.

Furthermore, several recent trends exist that are disturbing and threaten to jeopardize the gains made in children's health. In particular, recent data indicate a significant decline in routine immunization coverage (figure 13.1). The principal cause is believed to be the dissolution of the vertical program for immunizations and the subsequent lack of funding for vaccination outreaches. Until 1997, vaccinators were paid primarily by the United Nations Children's Fund. However, this practice stopped in 1997, and many districts did not allocate funds from other sources to pay vaccinators (Bukonya 1998). The corresponding declines in routine coverage, aside from immunizations from national immunization days, are dramatic. After following rising trends until 1996, measles vaccination coverage dropped from 82 to 49 percent through 1999; DPT (diphtheria-tetanus-pertussis) vaccinations decreased from 74 to 46 percent; BCG (tuberculosis) vaccinations decreased from 96 to 69 percent, and tetanus toxoid vaccinations for pregnant women decreased from 72 to 38 percent.

2. The government intended to carry out the fourth monitoring survey (MS-4) in 1996/97, but its implementation was postponed until 1997/98. As most publications by the Bureau of Statistics in this survey refer to 1996/97, this chapter uses the period 1996/97 when referring to MS-4.

Figure 13.1. Immunization Coverage of Children Aged 12–24 Months, 1994/95–1998/99



Source: UNEPI (1999).

Nutrition

Nutritional outcomes for children are perhaps not improving as rapidly as would be expected when Uganda's decade-long economic progress is considered. The 1998 *Human Development Report* by the United Nations Development Programme found that the percentage of underweight children under age five was the same in 1975—28 percent—as it was in the early 1990s. Since 1988/89, a slight decrease in chronic undernutrition resulting in low height-for-age was found, from 43 percent to 39 percent. Other indicators worsened. Acute undernutrition increased slightly, from 1.9 to 5.1 percent, and low weight-for-age increased from 23 to 25 percent (Republic of Uganda 1995). These findings are surprising because nutritional inputs are more likely to be a function of household income than available medical inputs.

Several reasons account for the apparent lack of improvement in nutritional outcomes: suboptimal breastfeeding and infant weaning practices; high incidence of infectious diseases, which reduce food absorption; low levels of maternal education; and poverty (World Bank 1997a). As noted earlier, reporting of illness has increased in all age groups—nearly 50 percent of children under age one were reported to have been ill in the 30 days preceding the 1997 survey, but only 35 percent of children were declared ill during the same interval in 1992. The increasing incidence of illness may contribute to worsening nutritional indicators for children.

By most indicators, breastfeeding practices have continued to improve, but alone may provide an incomplete picture of changes in child nutrition. Breastfeeding, which benefits both mother and child, is an almost universal practice for all income groups, those at all levels of maternal education, urban and rural residents, and both sexes of children. The proportion of children up to age three who are breastfed was higher in 1995 than in 1988/89. The median duration that a child is breastfed was approximately 20 months in 1995, one month longer than in 1988/89. Infant formula and bottles are used infrequently, and supplementation of breast milk with other food occurs relatively late (Republic of Uganda 1995).

The government has articulated a plan for addressing problems of poor child nutrition and development through the 1993 Uganda Programme of Action for Children and codified by a Child Bill of Rights. Several development projects contain nutrition components, including district-level activities on iodine deficiency control, provision of vitamin A, parental awareness of child development, and community mobilization.

Orphanhood

In recent years, AIDS has significantly contributed to the number of orphans in the country. According to the 1969 national census, 3.6 percent of children under 20 had lost their mothers, and 6.6 percent had lost their fathers (no data were collected on how many lost both parents). By 1991, the national census showed that orphanhood had risen substantially: 4.1 percent had lost their mothers and 10 percent had lost their fathers (UNAIDS and WHO 1999). The 1995 DHS indicated that 5.3 percent of children had lost their mothers, 10.4 percent had lost their fathers, and 13.5 percent had lost at least one parent (Gregson, Zaba, and Garnett 1999).

Considerable variance is apparent in estimates of the absolute number of orphans. Differences are due primarily to different assumptions about population growth and fertility, HIV/AIDS prevalence and incidence rates, the probability of vertical transmission, and behavioral responses to the epidemic. By the mid-1980s, the number of orphans in the country was believed to be almost 1 million, due largely to the years of civil war. In 1991 the national census indicated that there were probably just over 1 million orphans under the age of 18, 11.6 percent of the under-18 population. By 1998 the total number of orphans in the country had risen to approximately 1.5 million. Others estimate that the total number of orphans was even higher: approximately 2.2 million in 1995 (Hunter and Fall 1998).

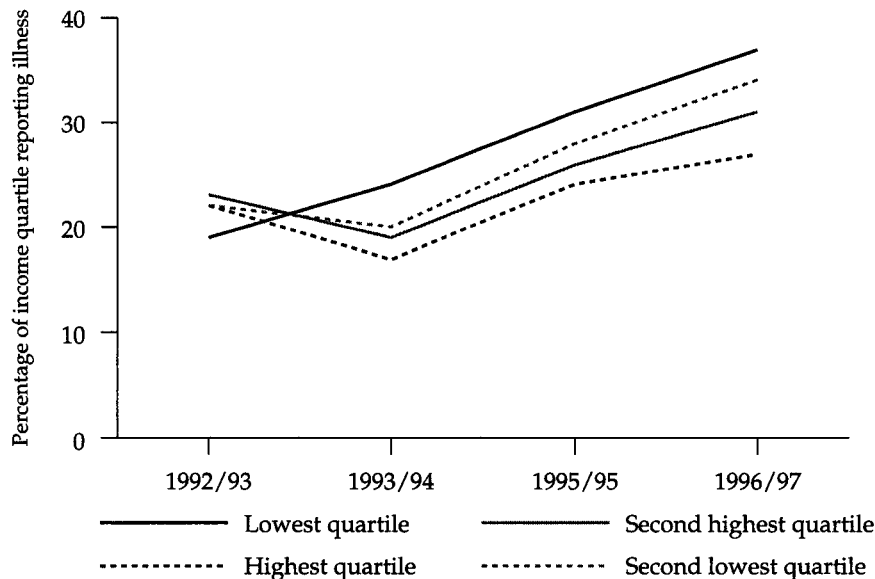
The estimated impact of AIDS on orphanhood also varies considerably. UNAIDS and WHO (1999) estimate that the number of children who had lost their mothers or both parents due to AIDS was 1.1 million at the end of 1997. Other sources estimate considerably lower numbers of AIDS orphans, around 670,000 in 2000 (Goliber 1999). Some researchers estimate that the number of AIDS orphans will peak in 2001 (Goliber 1999); others predict a peak around 2010 (Hunter and Fall 1998).

Demand for Curative and Preventive Services

The many changes in the health sector during the past decade have impacted the availability of health services and individuals' use of preventive and curative care. This section uses data from multiple waves of national household and community surveys from 1992/93 through 1996/97 to evaluate the relative effects of the demand-side and supply-side factors (see appendix A at the end of the book).

Without a doubt, the health system is still struggling to meet the basic health needs of the Ugandan population. Some evidence indicates that reporting of illness has been increasing over time, particularly among the poor.³ Data from national household surveys indicate that the proportion of individuals in the lowest income quartile reporting illness in the past 30 days nearly doubled from 1992/93 to 1996/97 as suggested earlier, from 19 to 36 percent (figure 13.2). In contrast, the proportion of individuals in the highest

Figure 13.2. Percentage of Income Quartile Reporting Illness in the Past 30 Days, 1992/93 and 1997/98



Source: Republic of Uganda (1992/93, 1993/94, 1995/96b, 1996/97).

3. In most surveys from developing countries, wealthier individuals are more likely to report illness than the poor. This is linked to different perceptions of illness: as incomes increase, individuals revise what they consider to be an acceptable level of health and develop a greater awareness of health conditions that can be treated (Akin, Guilkey, and Denton 1995; Akin and others 1998).

income quartile reporting illness increased from 22 to 26 percent. The reasons for the increase in reporting are not immediately clear, particularly with regard to the AIDS epidemic.

The demand for health services is a function of many factors: ill health and perceived need, the time and monetary costs of seeking care, the quality of available services, and the availability of alternatives. As mentioned, the extensive rebuilding and reconstruction of health facilities in recent years have significantly increased physical access to health services. However, variations in quality mean that government services are often underused, even by the poor for whom the services may be free.

Health services are available from several providers: the government, NGOs, and private providers. The distinction between the government and private sectors is often blurred. Many private practitioners are also public sector employees, providing services within government clinics or using government resources in private clinics. Traditional healers also play a role in providing care, but their contributions are often underreported in formal surveys (McPake and others 1999).

The government, private, and NGO sectors provide roughly equal portions of health care. The government is the most significant provider of immunizations, modern delivery, and reproductive health care, but provides only a small portion of curative care. More than 60 percent of immunizations occur in government health units, and another 17 percent occur in government outreaches (Hutchinson 1999b). The government provides for nearly half of the minority of women who use modern contraception, slightly more than private medical sources (Republic of Uganda 1995). The 1996 pilot service delivery survey found that the government provided 43 percent of all health services, the private sector provided 35 percent, and traditional doctors and healers provided 9 percent (Cockcroft 1996). This study refers to health service contacts for any type of care, including curative, immunizations, and family planning.

However, for curative care government health units treat only 20 to 25 percent of ill individuals. Data from five different household surveys from 1989 through 1997 indicate that individuals who report illness are more likely to use private and NGO health care providers and even more likely to choose self-medication over government health care services (table 13.4). The differences are even greater in urban areas where more treatment options generally exist. The Ministry of Health cites several reasons why people are less likely to choose government facilities than private and NGO providers: the government facilities have lesser availability of drugs, equipment, and materials; lack of incentives for staff to provide adequate treatment and diagnoses; less convenient opening hours; greater staff absenteeism and lack of staff on post, even though government staff are generally better paid than NGO staff; and inappropriate staff attitudes (Republic of Uganda 1998).

Evidence from Uganda indicates that the poor are less likely to use all health services than the nonpoor, even when such services are free (figure

Table 13.4. Use of Curative Services, 1989, 1992/93–1996/97
(percent)

<i>Type of care</i>	1989 FHHBS	1992/93	1993/94	1995/96	1996/97
Self-medication	35.5	46.9	41.0	38.7	44.8
Government	21.8	18.5	18.6	24.3	20.9
Private/NGO	29.1	32.5	38.0	35.5	31.5
Traditional	13.3	2.0	2.4	1.2	2.9
Total	99.7	100.0	100.0	100.0	100.0

Note: Totals may have been rounded to 100 percent.

Source: Family household health and budget survey (FHHBS) data from Barton and Bagenda (1993, p. 76); national household surveys.

A13.3). Compared with the nonpoor, children in low-income households are less likely to be fully immunized, women are less likely to use pre- and postnatal care, and household members of all ages are less likely to use modern curative care. The reasons are examined more fully in the econometric estimations.

In general, the health needs of the poor are likely to be greater than the health needs of the nonpoor. They are more likely to face adverse circumstances—poor sanitation, lack of clean water, poor working and living environments—thereby increasing the likelihood of ill health relative to the nonpoor. At the same time, the poor are less likely to have the resources to address their greater health needs. Uganda's poor spend roughly a quarter to a half less than the nonpoor on health services (table A13.4). On the one hand, this may be an indication of a well-functioning system of exemptions and waivers that allows the poor to use services they might otherwise not be able to afford. On the other hand, it may indicate that the poor do not have the resources needed to acquire sufficient health services to meet their needs.

Utilization patterns show that health service quality is an important factor for both the poor and nonpoor. Both groups are more likely to use private and NGO providers, where quality is generally higher, than government providers for curative care. For the poor, the gap has been shrinking in recent years. However, the proportion of the poor who chose not to seek formal treatment or to self-treat doubled from 1992/93 to 1996/97, from 7 to 15 percent, reaching a high of 25 percent in 1995/96.

Accessibility is also an important determinant of service use. Individuals who live farther from health units are less likely to seek care because of the time costs involved. However, the effects of proximity can be easily overstated. For instance, 65 percent of ill individuals in 1993/94 and 64 percent in 1995/96 used a modern health care provider if they lived within one kilometer of a health unit. However, a significant proportion of those living at a considerable distance (10 to 15 kilometers) also used a health unit when ill: 46 percent in 1993/94 and 56 percent in 1995/96. In general, for every additional kilometer

in distance, the likelihood of use dropped by just under 1 percent. More important, roughly one-third of ill individuals do not use services even though they live within one kilometer of a functioning health unit. For these individuals, other factors must be at work.

Econometric Analysis

Because multiple factors determine the use of health services, it is vital for policymakers to have an assessment of the relative importance of each factor. For instance, how important is it for individuals to be close to a facility if drugs are not available or staff are seldom present? If user fees are charged to improve the quality of available services, will they significantly reduce utilization by some groups more than others? How important is household income in determining whether an ill household member is taken for curative care?

To examine simultaneously the importance of multiple factors on the demand for a variety of health goods and services, econometric estimations of the demand for curative care, prenatal care, and immunization coverage were performed. Data were pooled from the 1993/94, 1995/96, and 1996/97 national household and community surveys (see appendix A at the end of the book). Individuals were linked with the specific health facilities serving the areas where they live to determine which factors most affect the likelihood of use.⁴

The dependent variables include (a) reporting of illness and use of any modern curative care,⁵ (b) completion of DPT vaccinations, and (c) prenatal care with trained health staff. Full DPT vaccination was used as the

4. Although community surveys were conducted in 1992/93, coding errors made the ability to link community variables with specific households impossible. In 1994/95, the household survey did not contain questions on health behaviors, and therefore no estimations were made based on health facility characteristics.

5. The dependent variable for use of curative care is a dichotomous variable for whether an ill individual used a modern health care provider, defined as a government or private/NGO provider. Use of a modern health care provider was defined relative to the alternatives: no treatment or self-treatment, pharmacy, or traditional healer. Combining the government and private/NGO providers into a single category was necessary because most of the sample had access to only one type of facility. A dummy variable for whether the available facility is government owned was included in the estimations to test whether characteristics of these facilities, other than those explicitly included in the model, affected the likelihood that individuals will use modern curative care. In 1992/93, 1993/94, and 1996/97 individuals were allowed to record only one type of curative treatment. In 1995/96, individuals were allowed to report two, including the most recent. A composite variable on choice of care for 1995/96 was used for comparison with the earlier years. Choice of care was considered to be the first action taken by an individual, unless "no care" or "self-treatment" was indicated. In those cases, the second choice of care, as long as it was not also "no care" or "self-treatment," was considered the first choice of care.

measure of immunization behavior because it requires multiple visits to health care providers at 6, 10, and 14 weeks of age, and therefore reflects a greater commitment to the child's health by parents or guardians. Questions on prenatal care and vaccination coverage for infants were not asked in the 1993/94 survey. The pooled sample sizes were 14,569 for children aged 0–5 years (of which 5,110 were reported to be ill in the 30 days preceding the survey), 3,265 for children aged 0–1 years, and 2,247 for pregnant women aged 12–45.

Individual-level exogenous variables include income, gender, residence in a rural area, and level of education. For children, mother's age and education are included. In all estimations, individuals are linked with the principal facility serving the community.⁶

Facility characteristics include staffing variables (presence of doctors, number of nurses and support staff), availability of drugs and supplies (functioning cold chain, malaria drugs, antibiotics, oral rehydration salts, bandages, sterilization equipment, syringes), hours open per week, physical appearance of the facility, prices (basic consultation, malaria drugs, antibiotics), and distance from the community. In the final estimations, only a subset of facility characteristics was included to avoid problems of multicollinearity.

For all estimations of health care demand, simple probits are used in which the dependent variables are the probability that an individual will use the specific health service (curative, immunization, and prenatal care) at a modern health care provider relative to not using the service. The same method is used to estimate the determinants of reporting illness. Huber-White standard errors are used in all estimations to control for enumeration-area cluster effects.

Illness and Demand for Curative Care (Children Aged Birth to Five Years)

The estimations of the factors associated with reporting illness and use of curative care reveal much about the relationships between income, access, and facility characteristics on the demand for care (table A13.5).

6. To create the dependent variables based on the characteristics of health facilities (that is, use of modern curative services, prenatal care, and so forth) each enumeration area, or area in which the survey was conducted, in the household survey was linked with the modern health facilities listed in the community survey. One community survey was completed for each survey enumeration area. For each enumeration area, up to two facilities could be listed by community leaders. For this analysis and following procedures used elsewhere (Akin, Guilkey, and Denton 1995; Akin and others 1998), the facility that was closest in distance was considered the principal facility serving the community. In cases in which facilities were equidistant from the community, a facility was selected at random.

INCOME. Children in the lowest income quartile are considerably less likely to receive modern curative care when ill than children in all other income quartiles, even when controlling for other factors such as mother's education and physical distance to facilities. This result may indicate that exemption mechanisms are not functioning properly, preventing children in the most vulnerable households from receiving care. It may also be linked to the quality of treatment that the poor receive at facilities—often longer waiting times and less courteous service—relative to the nonpoor. Children in poor households are somewhat more likely to be reported as ill. The latter result is also reflected in the hygiene variables—type of toilet and main source of water—that tend to be associated with income. Children in households without a flush toilet or pit latrine are more likely to be reported as ill than are children in households where the main source of water is a borehole.

MOTHER'S CHARACTERISTICS. Children whose mothers are older are less likely to be reported ill and less likely to be taken for curative care. This is most likely a reflection of maternal experience. Older mothers may be more aware of health practices that prevent illness and are also more likely to know when care is necessary. Mother's education is positively associated with both reporting of illness and use of modern curative care.

FACILITY CHARACTERISTICS. Price, distance, and government ownership all decrease the likelihood that the nearest modern facility will be used for curative care when ill. Greater availability of childhood vaccines, an indicator of facility quality, increases the likelihood that a facility will be used. Other facility characteristics are not statistically significant, but may be correlated with the variable on government ownership. The result for government ownership supports the data presented earlier that individuals prefer private and NGO health care providers over government providers.

YEAR. As shown earlier, reporting of illness appears to be increasing over time, while use of curative care when ill appears to be decreasing. Relative to 1993/94, the 1995/96 and 1996/97 surveys show that children are more likely to be reported as ill but less likely to receive modern curative care. The reasons for these trends need to be examined more closely.

SIMULATED IMPACTS OF POLICY VARIABLES. Using the coefficients from the estimation of the demand for curative care, it is possible to simulate the impacts of changes in important facility characteristics such as price, distance, and availability of supplies, or individual characteristics such as a mother's education or age, on the probability that an ill individual will use a modern health care provider. For example, independent variables are moved by one standard deviation from their mean to simulate equivalent-sized changes.

The simulations indicate the importance of quality characteristics, income, and price but reveal the lesser importance of distance (table A13.6). For example, if all health facilities had vaccines for basic childhood illnesses, utilization would increase by 3.7 percent, the largest impact of any of the simulations. A one standard deviation increase in price has a 50 percent greater effect on utilization than a one standard deviation increase in distance from the facility; that is, a 2.8 percent decrease in the probability of usage occurs if price is increased from U Sh 266 on average to U Sh 623. In contrast, a 1.9 percent decrease in usage occurs if the mean distance is increased by one standard deviation.

Household factors also have significant impacts on utilization. If all mothers completed primary school, utilization would be predicted to increase by 1.6 percent. If every child were in a household in the highest-income quartile, utilization would increase by 4.1 percent, approximately the same effect as ensuring universal vaccine availability.

The Demand for Prenatal Care and Childhood Immunizations

To further examine the various factors affecting the demand for health services, probit estimations of the demand for two preventive services are provided: DPT immunizations for children aged birth to age five and use of prenatal care (table A13.7). The main difference between preventive services and curative care is that the former are generally free at government facilities. As a result, price and income should not be as important in the preventive estimations as in the estimations regarding curative care.

The results largely confirm those reflecting the demand for curative care estimations. Income is an important determinant of both DPT coverage and use of prenatal care, but not at the same levels of statistical significance as for curative care treatment. Notably, pregnant women are more likely to use prenatal care if the price of a basic consultation is higher; because these services are generally free, price may be a reflection of higher quality. Again, government ownership is negatively associated with use, though only for prenatal care and at a lower level of statistical significance than in the previous estimations. Distance is important only for DPT coverage. Quality indicators—presence of at least one doctor and a functioning cold chain—are associated with higher likelihood of use. More educated mothers are more likely to have their children vaccinated and to use prenatal care.

Orphanhood and the Demand for Health Services

Orphanhood can have an impact on child welfare in a variety of ways. First, orphans likely will have lost either a significant income earner or a significant caregiver. Losing an income earner means that there are likely to be fewer resources for household priorities, including school fees and medical care.

For curative care, differences in the likelihood of receiving treatment from a modern health care provider are dramatic (table A13.8). Ill children with two parents are almost twice as likely to receive curative care than ill children with neither parent alive. For other welfare indicators—immunization coverage and school enrollment—the differences are less apparent until econometric estimations are performed to simultaneously control for a variety of factors.

The importance of parents is supported by probit estimations of the determinants of curative care use, full immunization coverage, and current school enrollment (table A13.9). Data show that several household status factors are important elements of social service use. All other things being equal, children who have lost their mothers are significantly less likely to be fully immunized or to receive curative care when ill, and children who have lost both parents are significantly less likely to be enrolled in school. Again, the level of education of the adult females in the household—whether the child's mother or guardian—significantly influences child well-being. Because orphanhood is projected to increase (Hunter and Fall 1998), substantial differences in well-being between orphaned and nonorphaned children provide considerable cause for concern.

Conclusions and the Way Forward

Uganda has made great strides in addressing its many health problems over the past 10 years, but the continuing presence, and in some cases worsening, of these problems is a reflection of the long road that the country has had to travel. To be overly critical of the current situation is to fail to recognize the enormity of the task that the country has faced.

The main issues in the health sector currently center on poor technical efficiency at government facilities, lack of technical capacity at the district level, and incentives in the current decentralized system toward declining availability of primary health care services. The evidence to date from a variety of sources in Uganda lends itself to making some important conclusions and recommendations for improving health sector reform.

First, the government should remain committed to providing or financing services that are public goods in nature—health education, clean water, adequate sanitation, infectious disease control, and so forth—that are unlikely to be provided privately. This is both equity enhancing and cost-efficient, by shifting resources from high-level curative services that favor urban areas and relatively wealthier individuals, to rural and relatively poorer households. This commitment is already demonstrated by the focus under the decentralized system of providing an essential package of health services, of which the principal components are public health activities. This package addresses much of the disease burden of the country, which results from preventable diseases and conditions. The government's success in this area is evident from the high rates of immunizations, at least until recently. One public health problem that has received scant attention in the past two decades has been malaria.

Second, the government should continue to expand the available resources for health activities through the development of alternative financing mechanisms such as user fees, insurance, and prepayment schemes. Even with additional resources from debt relief, the financial burden on the government will remain large. Most government health facilities charge user fees, with exemptions in place for the poor. In NGO facilities, which are often located in remote rural areas, user fees cover one-third to one-half of recurrent costs. In government facilities, they cover 5 percent or less (Okello and others 1998). Insurance and prepayment schemes can protect households from the financial risks of catastrophic illness. Insurance will also reduce the burden on the government of subsidizing expensive curative care. This burden is likely to increase as Uganda experiences the demographic transition from a population in which the principal causes of death are from preventable diseases to a population increasingly faced with diseases of aging. Virtually no developing country can support highly subsidized tertiary curative care without developing insurance systems (World Bank 1987). Furthermore, insurance allows prices to be set commensurate with actual costs. This will increase transparency and ensure that resources are allocated more efficiently. The development of insurance coverage for government and formal sector employees, where administrative costs are likely to be lower at first, could go a long way toward providing additional resources for the government and a basis for extending such coverage to the wider population.

Third, it is important to recognize that the government is already not the principal provider of curative care. That NGOs can provide higher-quality services at lower cost is indicative of serious problems of accountability and poor incentive structures at government facilities. This result is borne out by the econometric estimations presented in this chapter; quality indicators appear to be at least as important as distance and price in determining whether individuals will use available health services. The inability of the government to provide high-quality services and to ensure functioning safety nets for the poorest results in many vulnerable groups receiving inadequate care. Econometric estimations also show that the poor are considerably less likely to use all forms of preventive and curative care, even when factors such as education and access are controlled for.

Other mechanisms to improve quality and accountability could also be tried. The poor might be better served if the government subsidized their care at private and NGO facilities. Alternatively, innovative public and private mixes of curative care delivery, ones in which health units have incentives to provide quality care to generate revenue and in which incentives exist for efficient use of resources, could be a focus of government efforts. Greater piloting of autonomy mechanisms and contracted services could be tried. Many of these activities are already under way, particularly innovative public collaboration with NGOs and private facilities (Republic of Uganda 2000).

Fourth, decentralization is unlikely to be a panacea that will cure all the ills of the health sector. In practice, decentralization of production or delivery of certain public goods may lead to efficiency losses if it results in an

undersupply of public goods or ignores economies of scale, with subsequent higher unit costs. There is some evidence that the former is occurring. Movements toward decentralization should be selective in the functions and responsibilities affected; resource allocation decisions for publicly-provided private goods may be suited for decentralization to the lowest (health unit) levels, while decisions regarding highly public goods, particularly those benefiting the entire country, may be better suited to higher levels.

Fifth, the capacity of health personnel for carrying out health activities appears to be one of the fundamental impediments to implementation of activities at the district level. Considerable training has been ongoing, but this process will require a longer period to complete. Such investments in human capital require distinguishing between the short run and the long run; greater responsibility at the local level will build capacity and greater availability of services in the long run, but may lead to lesser availability in the short run. Such a reduction appears to have occurred with childhood immunizations.

Recently the government started looking into the possibility of using a sectorwide approach for health, including systematic consultation with donor agencies. The government sees the sectorwide approach as a promising means of addressing some important problems, such as the need to increase coordination of donor-funded activities. At present, the donors have largely divided the country up and work only in their selected districts. This has resulted in unevenness in district coverage.

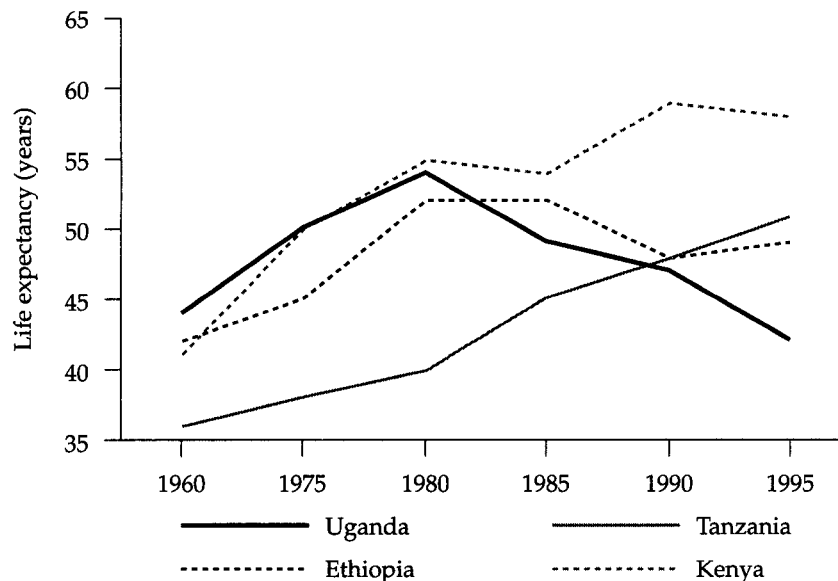
Several important elements must be addressed in the context of a sectorwide approach. Performance monitoring must be an essential element (Cassels 1997), but it has not been well developed to date. Financial and management audits should occur more regularly, and the information systems needed to monitor changes in health status and the delivery of health services (for example, inpatient and outpatient visits) are still being developed. The health management information system collects data on morbidity, family planning, and immunizations at government facilities. This system is not yet fully in place in all districts. Reporting has been voluntary, and participation has been low. Moreover, even when the system becomes fully operational, it will not cover outcomes at NGO and private treatment facilities, which account for the majority of health outcomes.

The national malaria control program must be rebuilt in the context of Uganda's decentralized system of health services. In the current setup, planners determine health priorities and how to allocate resources in their local districts, while the central Ministry of Health is supposed to provide technical assistance, set standards, and develop policy. In rebuilding the national program, health officials will have to strengthen the central malaria control unit's ability to offer technical assistance to districts, conduct policy research, and access international information on progress in malaria control. There is already evidence of renewed efforts against malaria at both the central and district levels, but greater coordination, more resources, and technical assistance are sorely needed (Hutchinson 1999c).

The direction of the AIDS epidemic is still a matter of considerable debate. While behavioral change has been noted, the impact of the epidemic will certainly be felt for at least the next 10 to 20 years. One area that has recently become a point of contention in the health sector is access to the HIV/AIDS antiretroviral treatments widely available in industrial countries. With the possible exception of programs to prevent transmission from infected mothers to unborn children (Marseille and others 1999), the case for public sector financing of the initiative is not strong. The costs per person for the drugs relative to the benefits far exceed the cost-benefit ratio for treatment of other preventable illnesses and conditions. While highly unfortunate, allocation of extremely scarce public sector resources to infected individuals for treatment of a condition that may not be ameliorated may represent a low priority. Public sector involvement should focus mainly on preventing transmission from infected individuals to uninfected individuals, particularly through cost-effective interventions such as health education to limit sexual contact or use of barrier protection mechanisms. Tough decisions are certainly required by public sector planners.

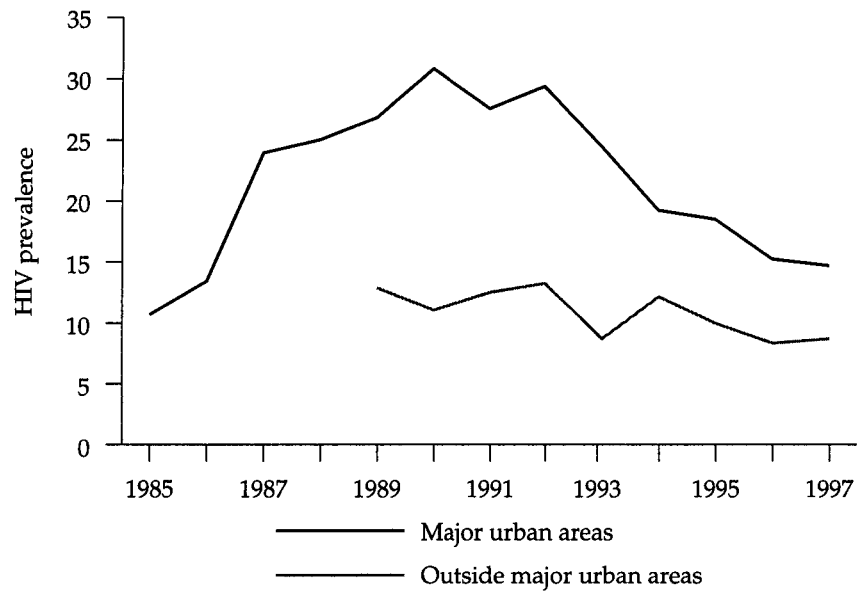
Annex 13.1. Data and Estimation Results

Figure A13.1. Life Expectancy at Birth for Selected East African Countries, 1960–95



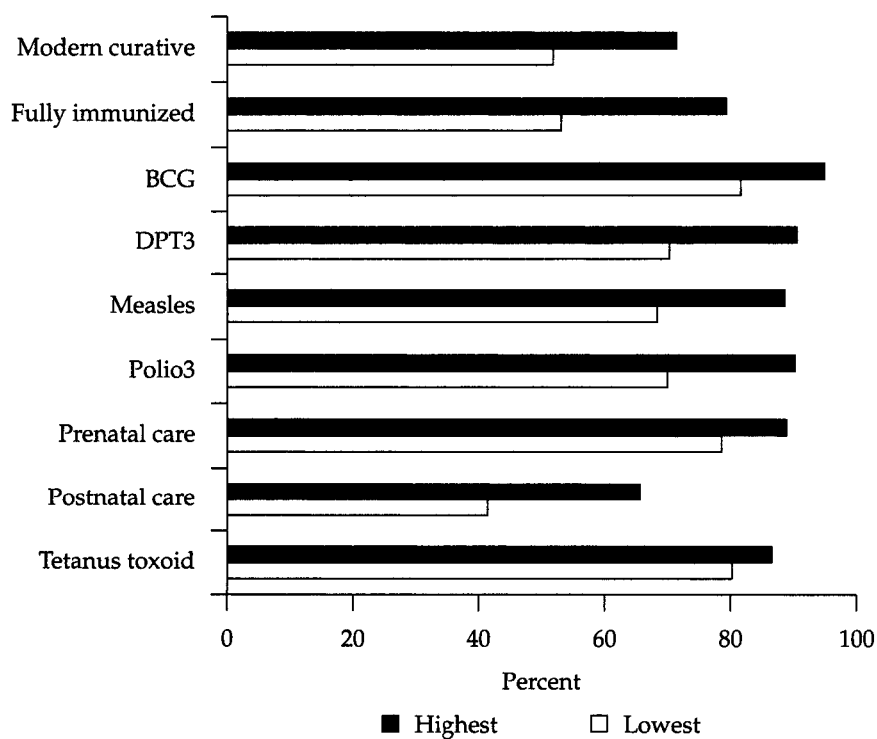
Source: World Bank (1979, 1986, 1992, 1997b).

Figure A13.2. HIV Prevalence in Women Attending Prenatal Clinics, 1985-97



Source: UNAIDS and WHO (1999).

Figure A13.3. Percentage of Lowest- and Highest-Income Quartiles Using Curative and Preventive Care, 1995/96



Note: Immunization data are for children aged 12–18 months. Tetanus toxoid vaccination refers to whether a woman reports receiving one or more tetanus toxoid vaccinations during the most recent pregnancy.

Source: National household survey 1995/96.

Table A13.1. Numbers of Health Units, 1986 and 1996

Type	1986			1996			
	Government	NGO	Total	Government	NGO	Private	Total
<i>Hospitals</i>							
Number	46.0	33.0	79.0	55.0	39.0	4.0	98.0
Percent	5.8	24.4	8.5	5.1	10.2	10.8	6.5
<i>Health centers</i>							
Number	102.0	5.0	107.0	158.0	61.0	4.0	223.0
Percent	12.9	3.7	11.6	14.6	15.9	10.8	14.8
<i>Dispensary and below</i>							
Number	643.0	97.0	740.0	872.0	283.0	29.0	1,184.0
Percent	81.3	71.9	79.9	80.4	73.9	78.4	78.7
<i>Total</i>							
Number	791.0	135.0	926.0	1,085.0	383.0	37.0	1,505.0
Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Government health units outnumber NGO health units by approximately two and a half. Half of government health units are subdispensaries, compared with only 30 percent of NGO facilities.

Source: Republic of Uganda (1987, p. A53; 1997c).

Table A13.2. HIV/AIDS Funding, 1996
(US\$)

<i>Source</i>	<i>Funding</i>	<i>Funds per capita^a</i>	<i>Funds per HIV positive individual^b</i>
International donors	35,043,490	1.69	37.68
National government	2,540,000	0.12	2.73
Total	37,583,490	1.81	40.41

a. Based on a 1996 population of 20,791,000.

b. Based on an estimate of the number of people living with HIV / AIDS of 930,000.

Source: UNAIDS and WHO (1999).

Table A13.3. Reporting of Illness among Children, 30 Days Prior to Survey, 1992/93–1996/97
(percent)

<i>Age group</i>	<i>1992/93</i>	<i>1993/94</i>	<i>1995/96</i>	<i>1996/97</i>
0–1	35	38	43	49
2–5	21	24	33	36
6–15	15	14	19	23

Note: Data for 1994/95 were not available.

Source: Republic of Uganda (1992/93, 1993/94, 1995/96b, 1996/97).

Table A13.4. Annual Per Capita Household Medical Expenditure by Income Quartile, 1992/93–1995/96
(constant dollars, US\$1= U Sh 1,100)

<i>Income quartile</i>	<i>1992/93</i>	<i>1993/94</i>	<i>1994/95</i>	<i>1995/96</i>
Lowest	5.77	3.92	5.55	4.85
Second lowest	5.54	7.55	7.20	7.48
Second highest	7.27	10.18	12.89	9.30
Highest	11.02	12.07	19.04	15.37
Average	6.98	6.81	8.71	7.70

Source: National household surveys 1992–97.

Table A13.5. Probit Estimations of Illness and Use of Modern Curative Care

<i>Independent variables</i>	<i>Illness</i>		<i>Modern curative care</i>	
	<i>Coefficient</i>	<i>Z</i>	<i>Coefficient</i>	<i>Z</i>
Age 2–5 years (omitted = 0–1 year)	–0.289	–12.707	–0.180	–4.856
Female	–0.017	–0.771	0.063	1.670
Mother's age	–0.006	–3.078	–0.007	–2.210
Mother's education	0.003	1.893	0.005	2.098
<i>Income quartile (omitted = lowest quartile)</i>				
Second lowest	–0.029	–0.712	0.199	3.199
Second highest	–0.032	–0.753	0.160	2.454
Highest	–0.076	–1.592	0.227	2.976
Rural residence	–0.036	–1.015	–0.108	–1.641
<i>Water source (omitted = piped in dwelling)</i>				
Borehole	0.089	1.809	n.a.	n.a.
Natural source	–0.030	–0.450	n.a.	n.a.
<i>Toilet (omitted = flush)</i>				
Pit latrine	0.017	0.270	n.a.	n.a.
Other	0.148	1.970	n.a.	n.a.
<i>Facility characteristics</i>				
Distance from community	n.a.	n.a.	–0.005	–1.339
Government ownership	n.a.	n.a.	–0.118	–2.057
Price of basic consultation	n.a.	n.a.	0.000	–2.180
Have any doctors	n.a.	n.a.	0.063	0.955
Number of support staff	n.a.	n.a.	0.000	–0.681
Availability of vaccines	n.a.	n.a.	0.038	1.844
Physical appearance	n.a.	n.a.	–0.015	–0.653
<i>Year (omitted=1993/94)</i>				
1995/96	0.144	3.413	–0.078	–1.022
1996/97	0.297	6.818	–0.323	–4.265
Intercept	–0.246	–2.584	0.839	5.365
Number of observations	14,591	n.a.	5,110	n.a.
Wald chi-squared statistic	288	n.a.	96.96	n.a.
Log likelihood	–9,268.624	n.a.	–3,114.11	n.a.

n.a. Not applicable.

Note: The dependent variable “illness” is a dichotomous variable for whether or not an individual reported illness. The dependent variable “modern curative care” is a dichotomous variable for whether or not an ill individual used a modern health care provider.

Source: National household surveys 1993/94, 1995/96b, 1996/97.

Table A13.6. Simulations Using Probit Results for Use of Modern Curative Care

<i>Simulation</i>	<i>Predicted probability</i>	<i>Percentage change</i>	<i>Type of change</i>
Baseline	0.684		
<i>Facility characteristics</i>			
Increase price by 1 standard deviation	0.665	-2.8	By U Sh 357 from U Sh 266
If all facilities were government owned	0.671	-1.9	From 67 percent of facilities
If distance increased by 1 standard deviation	0.674	-1.5	By 5.8 km from mean of 3.7 km
If everyone was within 5 km	0.686	0.4	Mean reduced to 2.45 km from 3.7 km
If all facilities had doctors	0.695	1.5	From 53 percent of facilities
If all facilities had vaccines	0.710	3.7	From 50 percent of facilities
<i>Individual and household characteristics</i>			
If all mothers had 1 more year of education	0.686	0.3	From mean of 3 years of primary school
If all mothers finished primary	0.695	1.6	From 59 percent completing primary
If mother's education level increased by 1 standard deviation	0.705	3.0	By 7 years of schooling
If all mothers finished secondary	0.721	5.3	From 11 percent completing secondary
If all individuals were in highest income quartile	0.712	4.1	From 23.6 percent in highest income quartile
If average mother's age increased by 1 standard deviation	0.667	-2.5	By 6.9 years from 27.9 years

Source: National household surveys 1993/94, 1995/96b, 1996/97.

Table A13.7. Probit Estimations of Use of Preventive Services, 1995/96 and 1997/98

<i>Independent variable</i>	<i>Full DPT coverage, children 0–1 years</i>		<i>Prenatal care, women 12–45 years</i>	
	<i>Coefficient</i>	<i>Z</i>	<i>Coefficient</i>	<i>Z</i>
<i>Individual characteristics</i>				
Age (omitted = 0 years)	1.683	22.130	n.a.	n.a.
Woman's age (omitted = 12–17 years)				
18–25 years	n.a.	n.a.	0.297	1.325
26–30 years	n.a.	n.a.	0.377	1.605
31–35 years	n.a.	n.a.	0.620	2.418
36–45 years	n.a.	n.a.	0.180	0.700
Female	–0.024	–0.351	n.a.	n.a.
Mother's age	–0.005	–0.966	n.a.	n.a.
Mother's education	0.009	2.534	n.a.	n.a.
Education	n.a.	n.a.	0.010	1.820
<i>Income quartile (omitted = lowest)</i>				
Second lowest	0.056	0.588	0.092	0.749
Second highest	0.194	2.018	0.246	1.985
Highest	0.174	1.499	0.209	1.398
Rural residence	–0.143	–1.285	–0.121	–0.677
<i>Facility characteristics</i>				
Distance from community	–0.014	–2.486	0.014	0.187
Government ownership	0.017	0.192	–0.175	–1.653
Price of basic consultation	0.074	0.797	0.362	1.915
Have at least one doctor	0.177	1.952	0.102	1.086
Number of support staff	0.081	0.412	–0.047	–1.426
Functioning cold chain	0.044	1.043	0.118	1.891
Facility appearance	–0.024	–0.741	–0.042	–0.923
1996/97 (omitted = 1995/96)	0.280	2.158	0.146	1.148
Intercept	–1.362	–4.308	0.605	1.774
Observations	3,265	n.a.	2,247	n.a.
Wald chi-squared	621.890	n.a.	31.640	n.a.

n.a. Not applicable.

Source: National household surveys 1995/96b, 1996/97.

Table A13.8. Orphanhood and Indicators of Child Welfare, 1995/96
(percent)

<i>Orphanhood</i>	<i>Curative care</i>	<i>Full immunization coverage</i>	<i>Current school enrollment</i>
Both parents alive	63	64	82
Only father alive	54	67	75
Only mother alive	57	60	77
None alive	37	57	75
Don't know	30	61	55
Average	62	64	81
Age group	Under 12	1 to 4 years	9 to 14 years

Source: National household survey 1995/96b.

Table A13.9. Probit Estimations of Use of Social Services by Children, 1995/96

Independent variables	Curative care		Full immunization		School enrollment	
	Coefficient	Z	Coefficient	Z	Coefficient	Z
Age						
0-1 years	0.353	5.112	-0.618	-15.305	n.a.	n.a.
2-5 years	0.173	2.858	n.a.	n.a.	n.a.	n.a.
6-9 years					-0.579	-13.275
Female	0.054	1.042	-0.005	-0.128	-0.093	-2.254
Mother's age	-0.004	-1.291	-0.007	-2.793	n.a.	n.a.
Mother's education	0.004	1.452	0.006	2.741	n.a.	n.a.
Head of household is female	n.a.	n.a.	n.a.	n.a.	0.149	2.918
Highest education of any female household member	n.a.	n.a.	n.a.	n.a.	0.019	9.147
Orphanhood status (omitted = both parents alive)						
Father dead	0.095	0.913	-0.056	-0.596	-0.081	-1.168
Mother dead	-0.302	-1.704	-0.327	-1.842	-0.055	-0.540
Both parents dead	-0.281	-1.303	-0.222	-1.035	-0.260	-2.272
Don't know if parents are dead	n.a.	n.a.	n.a.	n.a.	0.070	0.244
Income quartile (omitted = lowest)						
Second lowest	0.214	3.160	0.298	6.009	0.377	6.778
Second highest	0.148	1.945	0.308	5.721	0.466	7.765
Highest	0.398	4.660	0.409	6.329	0.805	10.699
Rural residence	-0.109	-1.064	-0.133	-1.905	-0.023	-0.473
Male agricultural wage	n.a.	n.a.	n.a.	n.a.	0.000	2.807
Female agricultural wage	n.a.	n.a.	n.a.	n.a.	0.000	0.382

(table continues on following page)

Table A13.9 continued

<i>Independent variables</i>	<i>Curative care</i>		<i>Full immunization</i>		<i>School enrollment</i>	
	<i>Coefficient</i>	<i>Z</i>	<i>Coefficient</i>	<i>Z</i>	<i>Coefficient</i>	<i>Z</i>
<i>Facility characteristics</i>						
Distance from community	-0.006	-1.262	-0.003	-0.945	n.a.	n.a.
Government ownership	-0.138	-2.191	-0.010	-0.229	n.a.	n.a.
Have at least one doctor	-0.148	-2.000	0.086	1.656	n.a.	n.a.
Price of basic consultation	0.000	2.133	0.000	-1.154	n.a.	n.a.
Number of support staff	0.001	0.702	0.002	2.028	n.a.	n.a.
Have inpatient	0.230	3.886	0.087	1.997	n.a.	n.a.
Have cold chain	0.051	1.312	-0.033	-1.158	n.a.	n.a.
<i>School availability</i>						
Number of schools in village	n.a.	n.a.	n.a.	n.a.	0.063	2.365
Distance to school	n.a.	n.a.	n.a.	n.a.	-0.006	-1.598
Intercept	0.071	0.393	0.070	0.565	0.082	0.943
Number of observations		2,623		4,821		4,844
Log likelihood		-1,630.44		-3,092.90		-2,459.81
Age group		12 and under		5 and under		6 to 12 years

n.a. Not applicable.

Source: National household survey data.

References

- The word "processed" describes informally reproduced works that may not be commonly available through library systems.
- Akin, John S., David K. Guilkey, and E. Hazel Denton. 1995. "Quality of Services and Demand for Health Care in Nigeria: A Multinomial Probit Estimation." *Social Science and Medicine* 40(11): 1527-37.
- Akin, John S., David K. Guilkey, Paul Hutchinson, and M. McIntosh. 1998. "Price Elasticities of Demand for Curative Health Care with Control for Sample Selectivity on Endogenous Illness: An Analysis for Sri Lanka." *Health Economics* 7(6): 509-31.
- Amooti-Kaguna, B., and F. Nuwaha. 2000. "Factors Influencing Choice of Delivery Sites in Rakai District of Uganda." *Social Science and Medicine* 50(2): 203-13.
- Armstrong, Jill. 1995. *Uganda's AIDS Crisis: Its Implications for Development*. Discussion Paper no. 298. Washington, D.C.: World Bank.
- Asiimwe, Delius, Francis Mwesigye, Barbara McPake, and Peter Striefland. 1996. "Informal Markets and Formal Health Financing Policy." Makerere Institute of Social Research, Kampala; Uganda Ministry of Health, Entebbe; London School of Hygiene and Tropical Medicine, London; and Royal Tropical Institute, Amsterdam.
- Barnett, Tony, J. Tumushabe, G. Bantebya, R. S. Ssebuliba, J. Gnasongwa, D. Kapinga, M. Ndelike, M. Drinkwater, G. Mitti, and M. Haslwimmer. 1995. "The Social and Economic Impact of HIV/AIDS on Farming Systems and Livelihoods in Rural Africa: Some Experience and Lessons from Uganda, Tanzania, and Zambia." *Journal of International Development* 7(1): 163-76.
- Barton, Thomas G., and Danstan Bagenda. 1993. "Family Household Spending Patterns for Health Care." National Council for Children and the United Nations Children's Fund, Kampala. Processed.
- Barton, Thomas G., and Gimono Wamai. 1994. *Equity and Vulnerability: A Situation Analysis of Women, Adolescents and Children in Uganda*. Kampala: National Council for Children and the United Nations Children's Fund.
- Bukenya, Gilbert B. 1998. "Knowledge, Attitudes and Practice Study on Immunisation Services in Uganda." Health Management Consult Uganda, Kampala.
- Cassels, Andrew. 1997. "A Guide to Sector-Wide Approaches for Health Development: Concepts, Issues, and Working Arrangements." World Health Organization, Geneva. Processed.

- Cockcroft, A. 1996. "Performance and Perceptions of Health and Agricultural Services in Uganda: A Report Based on Findings of the Baseline Services Delivery Survey." World Bank; Community Information, Empowerment, Transparency International; and World Bank Institute, Washington, D.C.
- DeRoeck, D., and A. Levin. 1998. "Review of Financing of Immunization Programs in Developing and Transitional Countries." Special Initiatives Report no. 12. Partnerships for Health Reform, ABT Associates, Inc., Bethesda, Maryland.
- George, K., D. L. Hom, J. McGrath, J. L. Johnson, P. N. Mugenyi, R. D. Mugerwa, and J. J. Ellner. 1998. "Risk for HIV-1 Seroconversion in the Ugandan People's Defense Forces." Paper read at the 12th World AIDS Conference, June 28–July 3, Geneva.
- Goliber, T. 1999. "Exploring the Implications of the HIV/AIDS Epidemic for Educational Planning in Selected African Countries: The Demographic Question." The Futures Group International, Washington, D.C.
- Gregson, S., B. Zaba, and G. Garnett. 1999. "Low Fertility in Women with HIV and the Impact of the Epidemic on Orphanhood and Early Childhood Mortality in Sub-Saharan Africa." *AIDS* 13 (supplement A): S249–S257.
- Guay, L., P. Musoke, T. Fleming, Danstan Bagenda, M. Allen, C. Nakabiito, S. Joseph, P. Bakaki, C. Ducar, M. Deseyve, L. Emel, M. Mrochnick, M. G. Fowler, L. Mofenson, P. Miotti, K. Dransfield, D. Bray, F. Mmiro, and J. B. Jackson. 1999. "Intrapartum and Neonatal Single-Dose Nevirapene Compared with Zidovudine for Prevention of Mother-to-Child Transmission of HIV-1 in Kampala, Uganda: HIVNET 012 Randomised Trial." *The Lancet* 354(9181): 795–802.
- Hansen, A. B. E. 1995. "Cost-Sharing Initiatives in Tororo District: A Study of User Charges for Health Services in Uganda." Report no. 14. Diploma of Medical Science Thesis, University of Aarhus, Department of Epidemiology and Social Medicine, Denmark.
- Hay, Roger. 1998. "Health Services in Uganda." Report to the Africa Region, Macroeconomics 2, World Bank, Washington, D.C. Processed.
- Hunter, Susan, and D. Fall. 1998. "Integrated District Planning for Vulnerable Children in Uganda: Is it Enough?" Report of a Uganda Site Visit by Children in Especially Difficult Circumstances team from the United Nations Children's Fund. New York. Processed.
- Hutchinson, Paul. 1999a. "Decentralization of Health Services in Uganda: Moving Towards Improved Delivery of Services." In *Health Care in Uganda: Selected Issues*. Discussion Paper no. 404. Washington, D.C.: World Bank.

- . 1999b. "Equity of Access to Health Services in Uganda: The Effects of Income, Gender, Proximity to Services, and Quality of Care." In *Health Care in Uganda: Selected Issues*. Discussion Paper no. 404. Washington, D.C.: World Bank.
- . 1999c. "Malaria: A Priority Health Problem." In *Health Care in Uganda: Selected Issues*. Discussion Paper no. 404. Washington, D.C.: World Bank.
- Jitta, J. 1996. "Evaluation of User Charges in Uganda." Makerere University, Child Health and Development Centre, Kampala. Processed.
- Kaijuka, E. M., E. Z. A. Kaija, A. R. Cross, and E. Loaiza. 1989. *Uganda Demographic and Health Survey 1988/1989*. Ugandan Ministry of Health and Institute for Resource Development and Macro Systems, Inc., Columbia, Maryland.
- Kilian, A. H. D., ed. 1995. "Summary of the Meeting on Malaria Control in Kabarole and Bundibugyo Districts, Western Uganda." Meeting report. Ministry of Health and Deutsche Gesellschaft für Technische Zusammenarbeit, March 14-15, Fort Portal, Uganda.
- Konde-Lule, J. K., M. N. Tumwesigye, R. G. Lubanga. 1997. "Trends in Attitudes and Behaviour Relevant to AIDS in Ugandan Community." *East African Medical Journal* 74(7): 406-10.
- Langi, P., O. Lalobo, B. Mpeka, and G. Mpigika. 1994. "Malaria Situation Analysis in Apac, Kampala and Rukungiri Districts, Uganda." Ministry of Health and the United Nations Children's Fund, Entebbe.
- Macrae, J., A. Zwi, and L. Gilson. 1996. "A Triple Burden for Health Sector Reform: 'Post'-Conflict Rehabilitation in Uganda." *Social Science and Medicine* 42(7): 1095-1108.
- Marseille, E., J. G. Kahn, F. Mmiro, L. Guay, P. Musoke, M. G. Fowler, and J. B. Jackson. 1999. "Cost Effectiveness of Single-Dose Nevirapene Regimen for Mothers and Babies to Decrease Vertical HIV-1 Transmission in Sub-Saharan Africa." *The Lancet* 354(9181): 803-09.
- McGrath, J. W., C. B. Rwabukwali, D. A. Schumann, C. Carroll-Pankhurst, and J. Marks. 1991. "'Zero-Grazing' and 'Loving Carefully,' Baganda Women's Response to AIDS." Paper presented at the 50th Meeting of the Society for Applied Anthropology, March, Charleston, South Carolina. Processed.
- McPake, Barbara, Delius Asiimwe, Francis Mweisigye, Matthius Ofumbi, Peter Striefland, and Asaph Turinde. 1999. "The Economic Behaviour of Health Workers in Uganda: Implications for Quality and Accessibility of Public Health Services." *Social Science and Medicine* 49(7): 849-65.

- Mugerwa, R. D., M. J. Mugerwa, E. Muhumuza, A. Musinguzi, B. Mbonye, D. L. Hom, C. Day-Lally, M. Vjecha, and J. Ellner. 1994. "Correlates of HIV 1 Infection Rates in Military Recruits in Uganda." Poster P.C. 0344 presented at the 10th International Conference on AIDS, August 7-12, Yokohama, Japan.
- Mugenyi, P. N., R. Mugerwa, A. Loughlin, J. L. Johnson, D. L. Hom, R. Byaruhanga, R. Katongole-Mbidde, and J. J. Ellner. 1995. "WHO Seroincidence Study in Preparation for HIV 1 Vaccine Trials in Uganda." Paper presented at the Ninth International Conference on AIDS and STDs in Africa, December 10-14, Kampala.
- Mugenyi, P. N., D. Hom, A. Loughlin, J. L. Johnson, J. McGrath, K. George, G. Svilar, R. D. Mugerwa, and J. J. Ellner. 1996. "HIV 1 Seroprevalence, Incidence and Risk Behavior in the Ugandan Military." Poster no. Mo.C.1483 presented at the Eleventh International Conference on AIDS, July 7-14, Vancouver, Canada.
- Mutungadura, G., D. Mukurazita, and H. Jackson. 1999. "A Review of Household and Community Responses to the HIV/AIDS Epidemic in the Rural Areas of Sub-Saharan Africa." UNAIDS Best Practice Collection. Joint United Nations Programme on HIV/AIDS, Geneva.
- Mwesigye, Francis. 1996. "Effects of User Charges on Quality of Curative Services in Rural Health Units in Uganda." Ministry of Health, Health Planning Department, Entebbe.
- Okello, D. O., R. Lubanga, D. Guwatudde, and A. Sebina-Zziwa. 1998. "The Challenge to Restoring Basic Health Care in Uganda." *Social Science and Medicine* 46(1): 13-21.
- Okuonzi, S. A., and F. X. K. Lubanga. 1997. "Decentralization and Health Systems Change in Uganda." Ministry of Health, Entebbe, and Ministry of Local Government, Kampala.
- Olsen, I. T., Dr. Olico-Okui, L. Atuyambe, and J. Konde-Lule. 1997. "Sustainability of Health Structures and Systems in Sub-Saharan Africa: Uganda Case Study." United Nations Children's Fund, New York. Processed.
- Opio, A. A., G. Asimwe-Okiror, J. Musinguzi, and E. Madraa. 1996. "A Report on Declining Trends in HIV Infection Rates in Sentinel Surveillance Sites in Uganda." Ministry of Health, STD/AIDS Control Programme, Entebbe.
- Republic of Uganda. 1987. "Background to the Budget 1987/88." Ministry of Finance, Entebbe.
- _____. 1992. "Surveillance of HIV and AIDS in Uganda: Annual Report 1992." Ministry of Health, AIDS Control Programme, Entebbe.

- _____. 1992/93. "Integrated Household Survey 1992." Ministry of Planning and Economic Development, Statistics Department, Entebbe.
- _____. 1993. "Inventory of Health Services in Uganda for the Year 1993." Ministry of Health, Entebbe
- _____. 1993/94. "Social Dimensions of Adjustment Monitoring Survey 1993." Ministry of Finance and Economic Planning, Statistics Department, Entebbe.
- _____. 1994. "HIV/AIDS Surveillance Report." Ministry of Health, STD/AIDS Control Programme, Entebbe.
- _____. 1995. *Uganda Demographic and Health Survey 1995*. Ministry of Finance and Economic Planning, Statistics Department, Entebbe, and Macro International, Calverton, Maryland.
- _____. 1995/96a. "Health Management Information System." Data collected from Mukono and Kabale District Medical Offices. Ministry of Health, Entebbe. Processed.
- _____. 1995/96b. "Uganda National Household Survey 1995-96." Ministry of Finance and Economic Planning, Statistics Department, Entebbe.
- _____. 1996/97. "Uganda National Household Survey 1996/97." Ministry of Planning and Economic Development, Statistics Department, Entebbe.
- _____. 1996. "Burden of Disease, Cost-Effective Analysis, and Five-Year Projections in 13 Districts of Uganda." Epidemiology Unit, Communicable Disease Control, Planning Unit, Entebbe.
- _____. 1997a. (February). "Health Expenditure in Uganda." Ministry of Health, Entebbe. Processed.
- _____. 1997b. (March). "HIV/AIDS Surveillance Report." STD/AIDS Control Programme, Ministry of Health, Entebbe. Processed.
- _____. 1997c. "Inventory of Health Services in Uganda for the Year, 1996." Ministry of Health, Entebbe. Processed.
- _____. 1998. "Health Policy Paper, Version XVII." Ministry of Health, Entebbe. Processed.
- _____. 2000. "Health Sector Strategic Plan." Ministry of Health, Entebbe, Uganda. Processed.
- Shuey, D. A., B. B. Babishangire, S. Omiat, and H. Bagarukayo. 1999. "Increased Sexual Abstinence among In-School Adolescents as a Result of School Health Education in Soroti District, Uganda." *Health Education Research* 14(3): 411-19.
- Topouzis, D. 1994. "Uganda The Socio-economic Impact of HIV/AIDS on Rural Families with an Emphasis on Youth." Consultant's report. Food and Agriculture Organization of the United Nations, Rome.

- UNAIDS (Joint United Nations Programme on HIV / AIDS) and WHO (World Health Organization). 1999. *Epidemiological Fact Sheet on HIV/AIDS and Sexually Transmitted Infections*. <http://www.unaids.org/hivaidsinfo/documents.html>
- _____. 2000. *Epidemiological Fact Sheet on HIV/AIDS and Sexually Transmitted Infections*. <http://www.unaids.org/hivaidsinfo/documents.html>
- United Nations Development Programme. 1998. *Human Development Report 1998*. New York: Oxford University Press.
- UNEPI (Uganda National Expanded Programme on Immunisations). 1999. "Immunization Coverage for Children Ages 12–24 Months, 1994–1997." Entebbe.
- Wabwire-Mangen, Fred, and Gakenia Wamuyu Maina. 1999. "Endemic, Emerging and Re-emerging Communicable Diseases in Uganda." *Development* 42(4): 134–37.
- World Bank. 1979. *World Development Report 1979*. Washington, D.C.: World Bank.
- _____. 1986. *World Development Report 1986: The Hesitant Recovery and Prospects for Sustained Growth, Trade and Pricing Policies in World Agriculture, World Development Indicators*. New York: Oxford University Press.
- _____. 1987. *Financing Health Services in Developing Countries: An Agenda for Reform*. World Bank Policy Study. Population, Health and Nutrition Department, Policy and Research Division, Washington, D.C.
- _____. 1988. *World Development Report 1988: Opportunity and Risks in Managing the World Economy, Public Finance in Development, World Development Indicators*. New York: Oxford University Press.
- _____. 1992. *World Development Report 1992: Development and the Environment*. New York: Oxford University Press.
- _____. 1993. *Uganda Social Sectors*. World Bank Country Study. Washington, D.C.
- _____. 1997a. "Uganda Nutrition and Early Childhood Development Project." Project Appraisal Background Document. Africa Region, Human Resources, Department, Washington, D.C.
- _____. 1997b. *World Development Report 1997: The State in a Changing World*. New York: Oxford University Press.
- _____. 1999a. "Rapid Assessment of Data Availability in Health Care Units." In collaboration with Makerere Institute of Social Research, Kampala. Processed.
- _____. 1999b. "Uganda: The Sexually Transmitted Infections Project." *Africa Region Findings* no. 127. Washington, D.C. Available on <http://www.worldbank.org/afr/findings/english/find127.htm>

Part V

Sustainability and Lessons

Beyond Recovery

Paul Collier and Ritva Reinikka

As we argued in the introduction to this volume, Uganda's performance on the three elementary aspects of government behavior was remarkable during the 1990s. First, the government provided a reasonable level of internal peace where previously had been large-scale violence. Second, it rescinded predatory taxation by removing a massive implicit tax on exports. Third, it provided the public good of a currency, the value of which did not dramatically erode. While these three achievements may sound modest, the difficulty of attaining them was considerable. Each of them took a triumph of government leadership against the weight of past behavior and the conduct of neighboring countries.

Securing internal peace required both economic reforms, which reduced the financial viability of rebel organizations, and political reforms, which gave potential rebel leaders a role within the regime. Rescinding predatory taxation required the dismantling of both foreign exchange controls and crop marketing monopolies, behind each of which were powerful rent-seeking beneficiaries. Providing a sound currency required the transformation of a chaotic pattern of public spending into one in which aggregate expenditures could not significantly exceed revenues. The implementation of all three of these revolutionary changes within a decade was a remarkable political and technocratic achievement.

Of course, internal security, the absence of predatory taxation, and the provision of a sound currency are woefully insufficient for prosperity. However, the National Resistance Movement inherited such a desperate economy that these three changes were sufficient to propel Uganda into a phase during which the growth rate was among the highest in the world. By 2000, the country has approximately recovered the per capita income level that the

economy experienced when achieving independence in 1962, but it has not yet reached the peak level of 1970.

Unfortunately, even this recovered level is so low that almost half the population lives in poverty. The evidence from agricultural households and industrial firms shows why Ugandans remained poor. At every turn, the typical economic activity was handicapped by the weakness of other public and private activities. Farmers faced food markets in which transaction costs were often prohibitive. Manufacturers faced a hopelessly erratic electricity supply. The sick faced health care that was sparse, predatory, and of poor quality. Children attended schools in which learning even the basic skills was a major accomplishment. Underlying these problems were an inherited lack of investment and an inherited pattern of opportunistic behavior that spanned the public-private divide.

The cumulative effects of public underinvestment showed up predominantly in infrastructure and education. For example, transaction costs were high in food markets because there were few roads, and electricity was erratic because no new power station had been built for more than 30 years. The cumulative effects of low private investment were perhaps even more pervasive. For example, the rural network of shops and banks was minimal. However, because they were interdependent, the returns on any single investment were depressed by the lack of other investment. Therefore, despite these chronic shortages of capital, the incentive to invest was not particularly high.

In the public sector, the inherited norm of opportunism shackled the ability to deliver reasonable services. Public sector behavior that received the most attention in terms of reform and most affected those economic agents best able to stand up for themselves, namely, tax collection from large firms, produced mixed results. Corrupt public officials in the tax administration and elsewhere target for extortion those firms that are making investments, so that corruption becomes like an erratic investment tax. As a result, corruption was more than three times as damaging to investment than the underlying corporate taxation received by the government. In those parts of the public sector to which less reforming attention has been given and with economic agents less capable of standing up for themselves, corrupt behavior reached debilitating proportions. For example, in the mid-1990s, 78 percent of the medical supplies sent to public health clinics were expropriated by the health workers who were supposed to dispense them to patients.

In the private sector, the inherited norm of opportunism was most debilitating for the banking system. Accountants could not be trusted to produce honest audits, so profit statements were unreliable as a guide to lending, and the legal system could not be trusted to let banks foreclose on assets pledged as collateral. As a result, loan default rates were extraordinarily high, so even with very wide interest rate spreads and limited lending, banks were at risk of failure.

The challenge to which the Ugandan government rose so successfully during the 1990s was that of recovery; today it faces a quite different set of challenges. The achieved agenda can be characterized as peace and prices; the forthcoming agenda is investment and behavioral change. However, this generalized summary fails to acknowledge that the Ugandan government has already embarked upon an agenda beyond recovery and that its performance has demonstrated that it can attain the new objectives as effectively as it attained the old ones.

Both public and private investment is recovering. The major public investment initiative is probably that in primary education. The recent implementation of free primary education has increased net enrollment rates to nearly 100 percent. Earlier in this volume it was shown that primary education substantially raises incomes regardless of the sector in which people are employed. The expansion in enrollment has benefited predominantly the poorest households, and so is a particularly well-targeted public investment in poverty reduction. The major private investment initiatives are in industries that were, until recently, reserved for the public sector: electricity and telephones. The entry of private capital into electricity generation has been dramatic: a hydropower project that will constitute the largest single private investment ever undertaken in East Africa is about to be launched. Thus, a landlocked, postconflict economy without significant mineral deposits or tourism opportunities is leapfrogging its neighboring countries, which have none of these disadvantages.

The entry of private capital into telecommunications has been no less dramatic. Two private companies offer mobile phone systems that function across most of Uganda. At present, these mobile phones provide any village in most of Uganda with better access to telecommunications than is available in Nairobi, Kenya. As expected with electricity, private participation in telecommunications has enabled Uganda to leapfrog the neighboring Kenya in this sector.

One measure of the climate for private investment is the risk ratings as constructed through a poll of international investor opinion by the magazine *Institutional Investor*. This is not an accurate assessment of the true climate. As Ul Haque, Nelson, and Mathieson (2000) show, these ratings are systematically biased against Africa. Nevertheless, they are probably an accurate assessment of investor opinion, which is important. As of 1992, the risk rating for Uganda was only 5 on a scale of 0–100, which was the lowest rating of the 25 African countries the magazine included. It was one of the worst ratings in the world. By 2000 the rating had improved to 23. In the process, Uganda had again leapfrogged many African countries. For example, Uganda is almost at par with Kenya and Zimbabwe, which evidently have superior infrastructure and do not have a similar legacy of conflict. Although the rating is about half that normally associated with emerging economies, the improvement demonstrated that a major impact is possible in less than a decade. Thus aiming for ratings in the emerging economy range (mid-40s) by

2010 is a reasonable target. Closer scrutiny of the ratings suggests that confidence would have been substantially higher but for the recent war in the Democratic Republic of Congo.

The government has also embarked upon the difficult task of inducing behavioral change. Within the public sector the primary target of reform has been tax collection. The strategy adopted was to create a new institution, the Uganda Revenue Authority. This strategy deserves commendation. It enables a coordinated change in expectations of behavior at the level of a single institution, without having to coordinate behavior change across the public sector as a whole. The evidence of continued severe corruption in tax collection points not necessarily to an error of strategy, but to the difficulty of achieving the goals.

A more successful reform has been the scrutiny of public service delivery to primary schools. As discussed earlier in this volume, in 1995 only 20 percent of the money released by the Ministry of Finance for nonsalary uses in primary schools was actually reaching the schools. By 1999 it had risen to more than 90 percent. This remarkable achievement was accomplished mainly by sharing the information on expenditures with the local population. Civil society thus became the power disciplining the civil service. This surely gives some guidance about how public service delivery can be improved in the future: pressure from users is probably more effective than centralized administrative scrutiny of expenditures.

The anticorruption drive, which has included measurement of perceived corruption for each public institution, a prominent police inquiry, and active press coverage, again demonstrates an effective government initiative. Many corrupt officials or politicians have recently been removed from office, but their prosecution and recovery of misused public funds tend to be delayed or unaccomplished. This is partly because capacity and financial resources are extremely limited. Recognizing this, the government's strategy is to catch a few "big fish" to signal strongly the change in attitudes toward corruption. However, there is more to the fight against corruption than just the lack of capacity or funds. For example, a few top officials who were removed because of mismanagement and corruption—but not prosecuted and imprisoned—are actively seeking elected public office with considerable popular support. Undoubtedly, behavioral change will be difficult and time consuming to accomplish.

Studies presented in this volume demonstrate that household characteristics, such as educational attainment and asset ownership, appear to have been more important factors for income growth and market participation than location-specific characteristics, such as availability of roads, telephones, or credit. This finding has clear policy implications. While road construction remains a public expenditure priority, social services are increasingly gaining importance. Sector programs are being developed in health and education to eliminate duplications by various donor agencies.

There is a clear recognition that public spending needs to be translated into services that, in turn, need to be produced in a more cost-efficient manner. Where public action is hard to achieve, there is a larger role for the private sector in service provision. Increased transparency and involvement of groups outside the government in public policy and service delivery are promising developments. A major improvement is required in health services, in part, to cope with the HIV/AIDS pandemic.

Uganda's transformation into a modern economy will require both rural development as well as a shift from agriculture to industry and services. This shift is not yet occurring and is not likely to occur without strong growth and investment in the firm sector. This requires increasingly business-friendly public policy as well as considerably more efficient public infrastructure and other services.

The sectoral change in the economy to date has reflected recovery rather than transformation. The sectors that have expanded most rapidly have been government services and construction; however, in each case this reflects the extraordinarily low levels that had been reached by the mid-1980s. Government services have expanded as a share of gross domestic product (GDP) because tax revenue has approximately doubled as a share of GDP from the previous extremely low level of 5 percent. Similarly, foreign aid has allowed an additional increase in government services. Construction has expanded rapidly because of the recovery of investment from similarly low levels. Each case of increased share can be seen as a consequence of economic recovery: tax revenue and investment are simply disproportionately sensitive. Within agriculture, the restoration of peace has induced a gradual return to the market, and the removal of predatory taxation has induced the recovery of export crops, notably coffee. Within manufacturing, the restoration of peace and the provision of a stable currency have enabled the recovery of the basic activities that normally serve local demand.

All these recovery processes can be expected to continue. After all, the economy has not as yet recovered the peak reached in 1970; thus, considerable scope remains for further recovery-based growth. However, over the next decade Uganda can be expected gradually to exhaust the opportunities for growth through recovery. The growth path could simply continue where it had left off in the early 1970s: further expansion in coffee and other primary commodity exports and further growth in manufacturing for local demand. However, it is worth speculating upon other scenarios for sector growth, partly because continued growth based upon primary commodity exports and manufactures for the local market may be neither desirable nor plausible.

Continued dependence upon a few primary commodity exports is probably undesirable because evidence suggests that such dependence tends to be associated with volatility, poor governance, and civil conflict. The scope for manufacturing growth is surely limited because Uganda is landlocked and adjacent to a coastal economy with a much larger manufacturing sector that is

now integrating into a free trade area. Being landlocked, Uganda is unlikely to be competitive in world markets for manufactures. Having recently joined a free trade area, which includes the industrial agglomeration of Nairobi, Uganda is likely to lose manufacturing market share within the region, as experienced in other such arrangements (World Bank 2000). Ugandan manufacturing may become the main agglomeration for the emerging geopolitical market of Uganda, the Democratic Republic of Congo, and Rwanda. However, transport costs are high within this region and incomes are low, so this agglomeration is unlikely to constitute a major market for Ugandan-produced manufactures.

Because Uganda is likely to continue to have a relatively small exposure to world trade, the core of its growth strategy need not be export oriented. The main nontraded good is food. Ugandan food production, and indeed, agriculture more generally, probably has considerable scope for intensification. To date, agricultural recovery has not been knowledge intensive. While agricultural research has improved productivity elsewhere in the world, this research has yet to be applied in Uganda, and the locally-based research effort has still not been rebuilt. Food production is the major sector of the economy and is disproportionately important for the livelihoods of the poor. Hence, harnessing the stock of unutilized opportunities for productivity growth may sustain growth for many years.

In the long run, much of Uganda's trade is likely to be regional. As discussed earlier, regional integration is unlikely to offer many opportunities to Uganda for manufacturing, but it is likely to offer opportunities in two other sectors: food and services. Uganda is already competitive in regional food markets but has been hit by periodic Kenyan import restrictions. If regional integration can curtail such behavior, a pattern of regional trade in which food is exported in return for manufactures seems likely. A second opportunity for exports is as the regional center for the provision of the service industries. The twin pillars of the 21st century service economy appear to be good telecommunications and good tertiary education. In each of these sectors Uganda has reasonable prospects of becoming the regional leader. In telecommunications, it is already ahead in mobile phone provision because its land-based telephone network is significantly deficient. In tertiary education it simply has to recover the leadership position that Makerere University held until around 1970. Recent reforms in the financing of the university, making it both better financed and much more responsive to student demand, suggest that this is feasible. Several private universities have also sprung up recently.

In international export markets, Uganda is potentially competitive in those products that are sufficiently valuable or perishable to warrant air freighting or can be transported electronically. Here the constraint upon exporting is not geography, but the physical and institutional supporting infrastructure. If, for example, Uganda is to succeed as a fish exporter, it will need both good refrigeration facilities and trustworthy mechanisms of scrutiny and enforcement of health standards. Perhaps the horticulture export industry of

Kenya and the data processing export industry of Bangalore, India, offer feasible models for new export sectors.

This agenda for sectoral growth—intensification of agriculture, service exports to the region, and new agro-based international exports—calls for improvements in institutions and infrastructure. The transactions needed for coffee exporting are much less complex than the transactions needed for the transmission of agricultural advice, for cross-border trade in services, and for the export of goods highly sensitive to quality and time. The graduation to more complex transactions places greater demands upon the institutions and the professions needed for a market economy. Similarly, coffee exporting is relatively undemanding of infrastructure: the high value-to-weight and durability of coffee make exporting viable even with poor roads. Regional and domestic trade in food is much more sensitive to transport costs, while exports of horticulture and services are even more dependent upon infrastructure.

To conclude, during the 1990s Uganda grew rapidly by harnessing the opportunities for recovery. The recovery was achieved by a remarkable effort of government renewal. Overcoming enormous difficulties, the government supplied peace and a stable currency, and ended the predatory taxation of exports. We have suggested that as Uganda is now approaching its previous economic peak, the opportunities for recovery are diminishing. The recipe of peace and prices, which has been sufficient for recovery and is surely necessary for continued rapid growth, may now be insufficient. Sustaining rapid growth will require a higher rate of investment. In turn, the opportunities for increased investment may depend upon broadening from the coffee-manufacturing economic core of the 1990s recovery. We have suggested that food-services-horticulture may become the growth axis for the economy. However, this transformation would need a second wave of government renewal, commensurate with that already achieved. The new economic axis would require complex transactions, much more intensive in information and much more dependent upon infrastructure, than the existing economy and will require a much better level of government service delivery. We have summarized this next phase as investment and behavioral change. As indicated earlier, the government has already embarked on this second phase with early signs of success.

Was the sequence of peace and prices followed by investment and behavioral change appropriate? We think that in Uganda's circumstances it was. The National Resistance Movement government inherited a society in which improvements in service delivery would inevitably take a long time, while there were huge opportunities for rapid poverty reduction through ending predatory taxation, providing a stable currency, and achieving peace. In the process of achieving these limited but important objectives, the government has acquired the competence, the mandate, and the confidence to tackle the more difficult tasks it now faces.

References

- Haque, Nadeem Ul, Mark Nelson, and Donald J. Mathieson. 2000. "Rating Africa: The Economic and Political Content of Risk Indicators." In Paul Collier and Catherine Pattillo, eds., *Investment and Risk in Africa*. London: Macmillan.
- Institutional Investor, Inc. *Institutional Investor*. Various years. New York.
- World Bank. 2000. "Trade Blocs." Policy Research Report. Washington, D.C.

Appendixes

Appendix A

Household Surveys

The government of Uganda began monitoring living standards through the integrated household survey in 1992. This was a large survey, both in the size of the sample (10,000 households) and the number of topics addressed (consumption, income, employment, health, education, time use, fertility, and so on). A particularly notable feature of the survey was the large number of communities covered: 1,000 enumeration areas were surveyed. The community survey portion of the questionnaire covered related topics, including local markets; demographics; infrastructure; credit; and social infrastructure related to education, health, and other social services.

Each year thereafter there has been a monitoring survey covering around 5,000 households and a shortened questionnaire that focuses mainly on consumption information. The data from four monitoring surveys (MS-1, MS-2, MS-3, and MS-4) are now available. The monitoring surveys were primarily designed to provide information on changes in poverty over time measured by private household consumption.

All five surveys relied on similar sampling procedures and questionnaires. A number of surveys included a socioeconomic survey of households, a community survey, and a household enterprise survey (see table A1).

The 1999/2000 Uganda national household survey was completed in late 2000. It has the goal of providing a comprehensive update on living conditions in Uganda that could form a basis for policymaking in a framework of increased decentralization and of guiding policy in rural areas and the agriculture sector, where previously coverage has been limited and has suffered from major shortcomings.

This survey contains a number of innovative features. Global positioning system receivers were used to record the spatial coordinates of all households included in the survey. This will facilitate linking the household

Table A1. Summary Information on the Household Surveys in 1992/93–1997/98

<i>Item</i>	<i>Integrated household survey, IHS</i>	<i>First monitoring survey, MS-1</i>	<i>Second monitoring survey, MS-2</i>	<i>Third monitoring survey, MS-3</i>	<i>Fourth monitoring survey, MS-4</i>
Duration	Feb. 1992 to Mar. 1993	Aug. 1993 to Feb. 1994	Jul. 1994 to Mar. 1995	Sep. 1995 to Jun. 1996	Mar. 1997 to Feb. 1998
Sample size (usable observations)	9,924	5,038	4,910	5,435	6,494
Major omissions in geographic coverage			Omitted Kitgum district	Omitted Kitgum district	Omitted Gulu, Kasese, Kitgum, Bundibugyo
Minor differences in geographic coverage	Omitted some rural areas of Kabale district		Omitted parts of Kasese, Kisoro, Kotido, Moroto		
Intended panel feature	Base round	Half of the sample intended to be from same enumeration areas and of these half intended to be same households	As MS-1	As MS-2	No panel element
Nonstandard features of household questionnaire	Covers many topics, such as anthropometrics			Some qualitative measures of poverty	Some qualitative measures of poverty

(table continues on following page)

Table A1 continued

<i>Item</i>	<i>Integrated household survey, IHS</i>	<i>First monitoring survey, MS-1</i>	<i>Second monitoring survey, MS-2</i>	<i>Third monitoring survey, MS-3</i>	<i>Fourth monitoring survey, MS-4</i>
Other questionnaires	Household enterprise questionnaires; community questionnaires	Household enterprise questionnaires; community questionnaires		Crop questionnaire; community questionnaire	Labor force questionnaire

Note: The government's intention was to carry out the fourth monitoring survey (MS-4) in 1996/97, hence most printed material available on this survey refers to 1996/97. However, the actual implementation of MS-4 was postponed until 1997/98.

Source: Uganda Bureau of Statistics.

survey information to spatial information from digital maps on infrastructure, vegetation, and soil fertility. It could also be used to draw subsamples that might be of special interest for reinterviews in the future. Furthermore, in addition to including a panel element of about 1,250 households that were interviewed already in 1992, the survey also contains a number of retrospective questions, at the household as well as at the community level, that would permit identifying changes and households' responses to them. At the household level changes in asset endowments, household composition (including deaths), and other shocks are the most prominent. At the community level, information is obtained on changes in productive structure, access to infrastructure, and civil strife.

Appendix B

The Uganda Enterprise Survey

A private enterprise survey for Uganda was carried out between February and June 1998 jointly by the World Bank and the Ugandan Private Sector Foundation. The survey design benefited from the Regional Project for Enterprise Development model, particularly the Ghana and Zimbabwe surveys, but was more limited in scope (Biggs and Srivastava 1996). The Uganda survey focused mostly on physical investment, exports, infrastructure services, taxation, policy credibility, regulation, and corruption. However, the survey in Uganda covered a wider range of industrial sectors than the Regional Project for Enterprise Development. Apart from manufacturing, which was divided into agroprocessing and other manufacturing, the survey included firms representing tourism, commercial agriculture, and construction, as these sectors were expected to have substantial growth potential.

Data were collected for 1995–97. Because the survey required confidential information—such as firms’ costs, sales, and tax payments—interviews were carried out by the Uganda Manufacturers Association to obtain maximum cooperation of the firms. Enumerator training was emphasized, and a questionnaire was carefully piloted beforehand. In addition to quantitative data, the survey also collected information on firms’ perceptions on various constraints to investment. The latter component was modeled on a similar survey carried out in 1994 by the World Bank, allowing an examination of dynamics of the business environment and constraints, as perceived by the private sector (World Bank 1994a).¹

1. A separate foreign investor survey has also been conducted twice by the World Bank, first in 1994 and then in 1999, to collect information on foreign firms’ perceptions

The latest complete industrial census in Uganda dates back to 1989. An updated industrial census was carried out in 1996, but it included only 8 out of the 39 districts in existence at that time. Despite its limited geographical coverage, the districts included in the 1996 update represented 80 percent of value added in the private industrial sector and 70 percent of employment according to the 1989 census. It was thus decided to base the sampling frame of the survey on the 1996 update instead of the complete but much older census, particularly as the number of new enterprises had increased dramatically in the past decade. Based on the 1996 update, 37 percent of the active firms were established since 1990. Although the district of Mbarara was not included in the census update, it was added to the survey because of its importance as a regional business center today.

The firm survey was confined to five sectors—commercial agriculture (includes fishing), agroprocessing, other manufacturing, construction, and tourism. Table B1 shows the distribution of establishments and employment by firm size and sector in the 1996 updated industrial census. Firm size was

Table B1. Private Sector Enterprises Based on the 1996 Updated Industrial Census

Category	Enterprises		Employment	
	Number	Share (percent)	Number	Share (percent)
<i>By firm size</i>				
Small (5–20)	1,957	79.8	16,893	24.9
Medium (21–100)	405	16.5	16,980	25.0
Large (> 100)	89	3.6	34,048	50.1
Total	2,451	100.0	67,921	100.0
<i>By sector</i>				
Five chosen sectors	1,282	52.3	52,535	77.3
Mining	17	0.7	1,024	1.5
Wholesale and retail	753	30.7	9,565	14.1
Transport	94	3.8	1,796	2.6
Financial intermediation	23	0.9	344	0.5
Business activities	98	4.0	1,861	2.7
Other	184	7.5	796	1.2
Total	2,451	100.0	67,921	100.0

Source: Uganda Bureau of Statistics data.

on Uganda's strengths and weaknesses as a place to invest. Representatives of enterprises from Africa, Asia, Europe, and North America and were interviewed (World Bank 1994b, 1999).

defined by employment. Neither the update nor the 1989 census included firms with less than five employees, so the initial size breakdown was small (5 to 20 employees), medium (21 to 100 employees), large (101 to 500 employees), and very large (more than 500 employees). Subsequently, large and very large firms were treated as one group. The five sectors selected for the survey cover 52 percent of all enterprises included in the census update and almost 80 percent of employment.

Table B2 shows the distribution of establishments and employment within the five selected industrial sectors by firm size and sector. The within sector distribution of employment shows large variations across sectors. Most of the employment within commercial agriculture and construction is concentrated in two to three very large firms, while most of the employment in tourism is in small firms. Employment in agroprocessing and other manufacturing is relatively evenly distributed across firm size.

The following criteria were taken into account when a stratified random sample for the survey was constructed:

- The sample should be reasonably representative of the population of establishments in the five specified industrial categories.
- The establishments surveyed should account for a substantial share of national output in each of the industrial categories.
- The sample should be sufficiently diverse in terms of firm size.
- There should be enough representation outside Kampala to draw conclusions about industrial activity in Uganda as a whole.

The final sample consisted of 243 surveyed firms and was similar in size and regional distribution to the stratified sample constructed initially. The characteristics of the sampled firms are set out in table B3 by firm size, sector, location, and ownership. More than 80 percent of large firms, about 30 percent of medium-size firms, and approximately 10 percent of small firms in the five sectors were surveyed. Five different geographical areas were covered: Kampala, Jinja-Iganga, Mbale-Tororo, Mukono, and Mbarara. The first four make up 98 percent of total employment in the five selected sectors reported in the 1996 census update. In terms of ownership, which was not a criterion for sample selection, 70 percent of firms were Ugandan owned, 16 percent were foreign owned, and 14 percent were jointly owned. Table B4 presents the distribution of establishments and employment in the final sample by sector and size of the firm.

The survey typically consisted of at least two visits to each firm by one or two enumerators. While the manager's perceptions were relatively easy to obtain during a single interview, quantitative data on costs, sales, and taxation, which were collected for three years, usually required another visit to consult the accountant. During the course of the survey it was found that a number of firms had changed business activity since 1996, for example, by shifting to trading instead of manufacturing. Also, a number of firms were difficult to locate; either they had gone out of business since

Table B2. Distribution of Establishments and Employment Within the Five Selected Industrial Sectors, 1996

<i>Sector</i>	<i>Small (5–20)</i>		<i>Medium (21–100)</i>		<i>Large (101–500)</i>		<i>Very large (>500)</i>		<i>Total</i>	
	<i>Number</i>	<i>Share (percent)</i>	<i>Number</i>	<i>Share (percent)</i>	<i>Number</i>	<i>Share (percent)</i>	<i>Number</i>	<i>Share (percent)</i>	<i>Number</i>	<i>Share (percent)</i>
<i>Commercial agriculture</i>										
Establishments	39	61	13	20	7	11	5	8	64	100
Employment	457	3	385	3	1,385	10	11,326	84	13,553	100
<i>Agroprocessing</i>										
Establishments	265	66	113	28	20	5	5	1	403	100
Employment	2,358	16	4,933	33	3,346	22	4,332	29	14,969	100
<i>Other manufacturing</i>										
Establishments	493	74	145	22	29	4	2	0	669	100
Employment	4,227	25	6,121	37	5,181	31	1,053	6	16,582	100
<i>Construction</i>										
Establishments	32	60	13	25	6	11	2	4	53	100
Employment	339	6	601	10	1,397	23	3,818	62	6,155	100
<i>Tourism</i>										
Establishments	82	88	10	11	1	1	0	0	93	100
Employment	739	58	417	33	120	9	0	0	1,276	100
<i>Total</i>										
Establishments	911	71	294	23	63	5	14	1	1,282	100
Employment	8,120	15	12,457	24	11,429	22	20,529	39	52,535	100

Source: 1996 updated industrial census, Department of Statistics, Entebbe.

1996 or had moved to another address, or the 1996 industrial census update may have contained firms from the 1989 census that had gone out of business. A few firms refused to participate in the survey. For all these reasons, 39 percent of the firms in the final sample were randomly chosen alternates to the initially drawn random sample.

Table B3. Characteristics of the Firms in the Sample

<i>Category</i>	<i>Enterprises</i>		<i>Employment</i>	
	<i>Number</i>	<i>Share (percent)</i>	<i>Number</i>	<i>Share (percent)</i>
<i>By firm size</i>				
Small (5–20)	93	38.3	990	3.3
Medium (21–100)	86	35.4	4,293	14.3
Large (>100)	64	26.3	24,788	82.4
Total	243	100.0	30,071	100.0
<i>By sector</i>				
Commercial agriculture	28	11.5	2,137	7.1
Agroprocessing	58	23.9	12,792	42.5
Other manufacturing	102	42.0	7,748	25.8
Construction	26	10.7	6,240	20.8
Tourism	29	11.9	1,154	3.8
Total	243	100.0	30,071	100.0
<i>By location</i>				
Kampala	130	53.5	18,602	61.9
Jinja-Iganga	45	18.5	3,806	12.7
Mbale-Tororo	19	7.8	2,382	7.9
Mukono	24	9.9	3,801	12.6
Mbarara	25	10.3	1,480	4.9
Total	243	100.0	30,071	100.0
<i>By ownership</i>				
Ugandan	170	70.0	9,477	31.5
Foreign	39	16.0	11,700	38.9
Joint	34	14.0	8,894	29.6
Total	243	100.0	30,071	100.0

Source: 1998 enterprise survey.

Table B4. Distribution of Establishments and Employment of the Firms Included in the Survey Sample

<i>Sector</i>	<i>Small (5–20)</i>		<i>Medium (21–100)</i>		<i>Large (101–500)</i>		<i>Total</i>	
	<i>Number</i>	<i>Share (percent)</i>	<i>Number</i>	<i>Share (percent)</i>	<i>Number</i>	<i>Share (percent)</i>	<i>Number</i>	<i>Share (percent)</i>
<i>Commercial agriculture</i>								
Establishments	13	46	10	36	5	18	28	100
Employment	122	6	554	26	1,461	68	2,137	100
<i>Agroprocessing</i>								
Establishments	18	31	18	31	22	38	58	100
Employment	214	2	911	7	11,667	91	12,792	100
<i>Other manufacturing</i>								
Establishments	42	41	38	37	22	22	102	100
Employment	453	6	1,760	23	5,535	71	7,748	100
<i>Construction</i>								
Establishments	3	12	12	46	11	42	26	100
Employment	22	0	641	10	5,577	89	6,240	100
<i>Tourism</i>								
Establishments	17	59	8	28	4	14	29	100
Employment	179	16	427	37	548	47	1,154	100
<i>Total</i>								
Establishments	93	38	86	35	64	26	243	100
Employment	990	3	4,293	14	24,788	82	30,071	100

Source: 1998 firm survey.

References

The word “processed” describes informally reproduced works that may not be commonly available through library systems.

Biggs, Tyler, and Pradeep Srivastava. 1996. *Structural Aspects of Manufacturing in Sub-Saharan Africa: Findings from a Seven Country Enterprise Survey*. Discussion Paper no. 346, Africa Technical Department Series. Washington, D.C.: World Bank.

World Bank. 1994a. “The Private Sector in Uganda: Results of the World Bank Enterprise Survey.” World Bank, Eastern Africa Department, Washington, D.C. Processed.

———. 1994b. “Eastern Africa—Survey of Foreign Investors.” Report prepared by Economisti Associati (Italy) for Eastern Africa Department. Washington, D.C.

———. 1999. “Uganda Survey of Foreign Investors.” A report prepared by Consorzio Italiano Consulenti for Africa Region, Macroeconomics 2. Washington, D.C.

List of Table, Figures, and Boxes

Tables

2.1	The Risk of Civil War in the Ensuing Five Years, 1970, 1986, and 1999	18
2.2	The Level and Composition of Economic Activity, Selected Years.....	20
2.3	The Predicted Change in Flight Capital as a Proportion of Ugandan Private Wealth, 1985 and 1998	29
2.4	Capital Flight and Repatriation, 1991–97	30
2.5	Investment as a Share of GDP at Market Prices, Fiscal Years 1986/87–1997/98	40
2.6	Export Shares of GDP, Fiscal Years 1990/91–1997/98	41
2.7	Foreign Currency Inflows, Fiscal Years 1989/90–1998/99	42
3.1	Inflation, Investment, and Growth before and after the Achievement of Stability	57
3.2	Actual Budget and Cash Flow Out-Turn, 1991/92–1996/97	61
3.3	Information Lags, Cash Flow Compilation, and Short-Term Macroeconomic Management	63
4.1	Estimates of Private Consumption Per Capita	88
4.2	Derivation of the Food Poverty Line	91
4.3	Poverty Lines	92
4.4	Poverty in the Integrated Household Survey	93
4.5	Poverty Rates in MS-1	94
4.6	Poverty Rates in MS-2	95
4.7	Poverty Rates in MS-3	96
4.8	Poverty Rates in MS-4	97
4.9	T-Test Statistics for Hypothesis of Equality of Poverty Statistics in IHS and MS-4	98

4.10	Consumption Per Adult Equivalent at Each Decile	103
4.11	Gini Coefficients for Uganda	105
4.12	Poverty by Sector of Household Head, IHS	107
4.13	Poverty by Sector of Household Head, MS-3	108
4.14	Sectoral Decomposition of Changes in Poverty between IHS and MS-3	111
A4.1	Adjusted Comparison of Mean Consumption Per Capita	114
A4.2	Daily Calorific Requirements and Equivalence Scales	117
5.1	Income Sources for Panel Households by Region, 1992 and 1999	139
A5.1	Changes in Extent of Production, Number of Producers, and Yields of Main Commodities, 1992–99	155
A5.2	Changes in Technology and Input Use, 1992–99	160
A5.3	Changes in Functioning of Credit and Land Markets, 1992–99	163
A5.4	Changes in Access to Infrastructure, Services, and Governance, 1992–99	166
A5.5	Determinants of Household-Level Income Growth, 1992–99	169
A5.6	Results from the Agricultural Production Function Estimation	170
A5.7	Demand Functions for Fertilizer, Seeds, and Hired Labor	172
A5.8	Probit Estimates for the Probability of Enterprise Startups in 1987/88–1992/93	173
6.1	Percentage of Ugandan Households Engaged in Farming, 1992	179
6.2	Number of Farms by Share of Output Marketed	181
6.3	Share of Crop Marketed, by Crop	183
6.4	Model Results for 1992/93 Survey	186
6.5	Explaining Differences in Average Community Price Levels ...	189
6.6	Community Prices: Crop Model Estimation Results	190
6.7	Market Participation: Household Tobit Results	192
6.8	Estimated Fixed Commodity Effects	193
6.9	Welfare Effect of a 10-Percent Increase in Cash Crop Prices	195
6.10	Household Income by Source, 1992–96	197
6.11	Main Occupation of Household Head, 1992 and 1995	198
6.12	Explaining Positive Responses to “Did You Sell Your Output?”	199
6.13	Results from the 1993 and 1995 Surveys	200
6.14	Modeling District Spreads	201
7.1	Summary Statistics for Ugandan Firms, Pooled Data, 1996–97	211
7.2	Investment Regressions for All Ugandan Firms, 1995–97	213
7.3	Profit Rate Regressions, Pooled Data for Cameroon, Ghana, Kenya, Zimbabwe, and Uganda	216

A7.1	Investment in Machinery and Equipment by African Firms	228
A7.2	Investment Regressions for Small and Large Ugandan Firms	229
8.1	Productivity Levels by Firm Characteristics	241
8.2	Efficiency Levels of Exporters in Five African Countries	242
8.3	Real Productivity Growth	243
8.4	Efficiency Growth of Exporters in Five African Countries	244
8.5	Nominal Exports Value and Shares by Destination, 1995–97	247
A8.1	Distribution of Sample by Categories, 1997	255
A8.2	Summary Statistics of Variables	256
A8.3	Real Output Growth by Firm Characteristics	257
A8.4	Productivity Levels by Firm Characteristics	258
A8.5	Real Productivity Growth	259
A8.6	Regression of Productivity Growth	260
A8.7	Summary Statistics of Exporters, 1995–97	260
A8.8	Exporting Status, 1995 versus 1997	261
A8.9	Nominal Export Growth Decomposition, Selected African Countries	262
A8.10	Probit Models of the Decision to Export, Uganda and Cameroon, 1997	263
A8.11	Output Elasticities Used in Computing the TFP, 1995–97	264
A8.12	Estimated Parameters of the Frontier Production Function	264
9.1	Central Government Revenues, 1991/92–1998/99	272
9.2	Marginal Effective Tax Rate on Capital for Ugandan Firms	284
9.3	Marginal Effective Tax Rate on Cost of Production for Ugandan Firms	289
9.4	Marginal Effective Tax Rate on Capital for Foreign Firms	290
9.5	Marginal Effective Tax Rate on Cost of Production for Foreign Firms	291
A9.1	Consumption Goods and Corresponding Tax Rates	304
A9.2	Extended Gini Coefficients of Taxes before Reforms, 1992	306
A9.3	Extended Gini Coefficients of Taxes after Reforms, 1995–96	307
A9.4	Summary of Welfare Dominance Test Statistics, 1992	308
A9.5	Summary of Welfare Dominance Test Statistics, 1995–96	309
A9.6	Business Taxes in Uganda	310
A9.7	Nontax Parameters for Uganda	311
A9.8	Marginal Effective Tax Rate on Capital for Small Ugandan Firms	312
A9.9	Business Tax Provisions Applicable to Manufacturing and Tourism in Uganda, Kenya, and Tanzania, 1998	313
A9.10	Summary of Firm Survey Results on Tax Administration	314
10.1	Sample Characteristics	322
10.2	Comparison of Corruption and Other Costs	324
10.3	Corruption and Investment	324
10.4	Characteristics of Firms that Reported Positive Bribes	326

10.5	Corruption Regressions	327
10.6	Effects on Corruption of Changes in Firm Characteristics	329
10.7	Partial Correlation between Connection Costs and Bribery	332
10.8	Differences in Tax Assessment and Corruption	334
11.1	Official Enrollment Data from Government-Aided Primary Schools, 1987–97	347
11.2	Enrollment Data from Surveyed Schools, 1991–95	348
11.3	Recurrent Budget Allocation for Education, 1991–97	349
11.4	Summary of School Income Data, 1991–95	350
11.5	Mean Parental and Government Contribution to School Income Per Student, 1991–95	352
11.6	Median Parental and Government Contribution to School Income Per Student, 1991–95	353
11.7	Parental and Government Contribution to Total School Income, 1991–95	353
11.8	Average Capitation Grant Per Student, 1991–95	355
11.9	Average Tuition Per Student, 1991–95	356
11.10	Contributions to Teachers' Salaries, 1991–95	358
11.11	Average Government Contribution Per Student Reaching Schools by Subregion, 1991–95	360
11.12	Average Parental Contribution Per Student by Subregion, 1991–95	361
11.13	Impact of Decentralization on the Flow of Capitation Grants to Schools, 1991–95	362
11.14	Recurrent Budgetary Allocations for Health, 1991–97	364
12.1	Predicted Probabilities from the Logit Model for School Enrollment	375
12.2	Reduced Form Household Earnings Functions with Community-Level Fixed Effects	382
12.3	Probabilities of Engaging in Income-Generating Activities	385
12.4	Household Earnings Functions with Community-Level Fixed Effects and Endogenous Labor Variables	389
12.5	Decomposing the Effect of Education on Expected Household Earnings	392
A12.1	Multinomial Logit Model for School Attendance for Children Ages 5–14, 1992	401
A12.2	Probit Models for Engaging in an Income-Generating Activity	402
13.1	Number and Types of Health Facilities, Selected Years	410
13.2	Staffing Ratios, 1972 and 1996	412
13.3	DLYs Lost due to Mortality, Selected Causes of Death, 1995 and 1996	415
13.4	Use of Curative Services, 1989, 1992/93–1996/97	425
A13.1	Numbers of Health Units, 1986 and 1996	436
A13.2	HIV/AIDS Funding, 1996	437

A13.3	Reporting of Illness among Children, 30 Days Prior to Survey, 1992/93–1996/97	437
A13.4	Annual Per Capita Household Medical Expenditure by Income Quartile, 1992/93–1995/96	437
A13.5	Probit Estimations of Illness and Use of Modern Curative Care	438
A13.6	Simulations Using Probit Results for Use of Modern Curative Care	439
A13.7	Probit Estimations of Use of Preventive Services, 1995/96 and 1997/98	440
A13.8	Orphanhood and Indicators of Child Welfare, 1995/96	441
A13.9	Probit Estimations of Use of Social Services by Children, 1995/96	442
A1	Summary Information on the Household Surveys in 1992/93–1997/98	464
B1	Private Sector Enterprises Based on the 1996 Updated Industrial Census	468
B2	Distribution of Establishments and Employment Within the Five Selected Industrial Sectors, 1996	470
B3	Characteristics of the Firms in the Sample	471
B4	Distribution of Establishments and Employment of the Firms Included in the Survey Sample	472

Figures

3.1	The Official/Interbank and the Parallel/Market Exchange Rates, 1985–98	55
3.2	Actual and Counterfactual Government Budgetary Operations, 1994/95–1995/96	66
3.3	Short-Term Fiscal Response to Increased Inflation, Fiscal Years 1992/93–1997/98	71
4.1	Poverty in Uganda, 1992 and 1997/98	85
4.2	Poverty Incidence Curves, 1992–97	101
4.3	Growth and Redistribution Decomposition, 1992–1997/98	106
5.1	Cumulative Distribution of Income, 1992 and 1999	140
6.1	Marketed Share, Cumulative Frequency by Share of Crop Marketed, 1992/93	180
6.2	Marketing of Crops Other Than Cotton and Coffee, 1992	182
6.3	Average Gross Margin between District and Local Market Prices, 1992	184
7.1	Investment and Profit in Uganda and Other African Countries	219
7.2	Ranking of Constraints to Investment, 1998	221
7.3	Ranking of Constraints to Future Operations and Growth in 1994	222

8.1	Main Constraints to Increased Exports	250
8.2	Main Constraints to New Exporters	251
A9.1	Concentration Curves for Main Taxes before Reform	302
A9.2	Concentration Curves for Main Taxes after Reform	303
10.1	Corruption and Growth	330
A10.1	Ranking of Constraints to Investment by Firm Category, 1998	336
A10.2	Distribution of Firms According to Logarithm of Bribe Payments in U.S. Dollars	338
A10.3	Distribution of Firms According to Bribe Payments	338
A10.4	Correlation between Graft and Excess Cost of Telephone Connection	339
A10.5	Partial Correlation between Graft and Connection Costs to Public Grid	339
13.1	Immunization Coverage of Children Aged 12–24 Months, 1994/95–1998/99	421
13.2	Percentage of Income Quartile Reporting Illness in the Past 30 Days, 1992/93 and 1997/98	423
A13.1	Life Expectancy at Birth for Selected East African Countries, 1960–95	433
A13.2	HIV Prevalence in Women Attending Prenatal Clinics, 1985–97	434
A13.3	Percentage of Lowest- and Highest-Income Quartiles Using Curative and Preventive Care, 1995/96	435

Boxes

3.1	Cash Flow	59
3.2	Arguments for the Coffee Stabilization Tax	69
3.3	Arguments Against the Coffee Stabilization Tax	70
9.1	Capital Taxes	282

Index

- Accountability: for education spending, 344, 366–68; for health services, 366, 368, 414, 431
- Agricultural production: changes in extent of, 155–59; estimation of, 145–47, 170–71. *See also* Rural sector; Rural households
- AIDS/HIV, 2, 10; economic impact of, 416–17, 433; effect on health sector of, 417, 433; efforts to combat, 86, 417–18, 433, 457; fertility rate and, 419; funding for, 437; orphanhood and, 422; statistics regarding, 407–8, 415–16, 434
- Allied Democratic Front, 22
- Amin, Idi, 1, 15; deportation of Asian business community by, 3, 16, 32; foreign investment policy of, 32; overthrow of, 16
- Appleton, Simon, 6, 10, 43
- Arbitrage model, 183
- Asians: deportation of, 3, 16, 32; property confiscated from, 54
- Assets, shift abroad of, 27–31
- Baganda, 17
- Bank of Uganda: fiscal operations of, 59, 60, 65; foreign exchange market and, 55–56, 68, 77; government savings with, 69; treasury bills and, 73
- Banks: closing of, 226; effect of opportunism on, 25, 27; expectations of firms regarding, 225–26; reserve requirements of, 72–74; treasury bills and, 73
- Birth control, 424
- Birth rate, 419
- Brazil, 69
- Breastfeeding, 421, 422
- Bribes: case studies on, 331–34; collection of information on, 321; effects of, 328–31; firms' experience with, 319; incidence of, 322–23; level of, 323–28. *See also* Corruption
- Budget Framework Paper (BFP), 58, 60
- Burden of disease studies, 414–15
- Calorie requirements, 116–18
- Cameroon: firm investments in, 210, 212; profit rates in, 216, 217; trade in, 247–51, 263

- Capital flight: effects of, 27–30; measures of, 30; predicted change in, 29
- Capital investment: explanation of, 282–83; marginal effective tax rate and, 283–86
- Capital taxes, 282. *See also* Taxes
- Cash budget, 64
- Cash crops: effect of price changes in, 194–95; poverty changes and, 105–11, 125
- Cash flow system: coffee boom and, 68–71; data lags for compiling, 63; effects of, 74–77; external shocks and, 68–71; fiscal shocks and, 66–67; management of, 60, 64–66; out-turn, 61–63; review of, 59–60
- Cassava: marketing of, 178, 180; production of, 128
- Chad, 248, 251
- Chen, Duanjie, 8
- Childbirth, 419
- Child labor, 377, 381–82
- Children: curative care for, 427–29; effect of AIDS on, 417, 420; health trends affecting, 408, 420, 421; immunization of, 408, 420, 421; malaria in, 418; mortality among, 86, 407; nutrition in, 408, 421–22; orphanhood among, 422, 429–30, 441; reporting of illness among, 437; use of social services by, 442–43. *See also* Education
- Chloroquine, 418, 419
- Christians, 17
- Civil war: effects of, 21; risk of, 17, 18
- Coffee Marketing Board (CMB), 34–36, 51
- Coffee sector: boom in, 2, 6, 35, 39, 49, 68, 70, 109, 112; exports and, 459; liberalization of, 34–36, 49, 53; marketing in, 178; measurement units for, 187; prices in, 54, 109; production in, 124, 128; taxes and, 32, 69, 70, 124, 275, 276
- Coffee stabilization tax: arguments against, 70; arguments for, 69; coffee farmers and, 276; Gini coefficient of, 280
- Collier, Paul, 5, 10
- Collier-Dollar cross-country analysis, 43
- Collier-Hoeffler model, 21, 22
- Collier-Hoeffler-Pattillo model, 30
- Common Market for Eastern and Southern Africa (COMESA), 33
- Competition, 223
- Concentration curves: after reform, 303; explanation of, 278, 280; for main tax categories, 280, 303; before reform, 302
- Consumer goods, 278–79, 304–5
- Consumer price index (CPI), 115
- Consumption goods, 304–5
- Contraception, 418, 424
- Coordination of Poverty Eradication Project, 84n
- Corruption: conclusions regarding, 334–35; constraints as perceived by firms and, 320, 336–37; data on, 321; distribution of bribes across firms and, 325, 338; effects of, 320, 328–31, 454; efforts to reduce, 9, 227, 456; incidence of, 322–23; level of, 323–28; overview of, 319–20; in public services delivery, 331–33, 339; return on investments and, 224; in tax paying, 333–34; in trade, 333
- Cotton sector: marketing in, 178; measurement units for, 187; production in, 124, 128
- Credit, to trade export and food crops, 187–88
- Credit markets: agricultural production and, 131–33; constraints and, 148; operation of, 143–45, 163–65
- Crime: demobilization and, 23; reduction of, 227; as risk to firms, 224–25

- Crop market model: credit and, 187–88; crop effects and, 186–87; crop model estimates and, 189–90; differences among communities and, 188–89; explanation of, 184–85; infrastructure and, 185–86; physical units of measure and, 187; prices and, 185; spatial arbitrage, 182–84, 202; state variables and, 188
- Crop markets: changing domestic demand and, 201–2; conclusions and policy implications of, 202–3; determinants of market participation and, 191–94; development of, 195–203; in early 1990s, 178–80; effects of price changes on household welfare and, 194–95; in industrialized vs. developing countries, 180–81; nature of, 180–83; overview of, 7, 177–78; participation in, 7, 196–99, 202; results of, 199–200; transfer costs and, 188, 191, 200–201. *See also* Food crops
- Curative care: for children, 427–29; health services and, 423–26, 438; income and, 428, 435; providers of, 431; use of, 438, 439. *See also* Health care facilities; Health services
- Decentralization: educational spending and, 359, 362–63, 367; health services and, 408, 409, 411, 413, 414, 431–32; institutional reform and, 4
- Decomposition analysis, 248–49
- Deininger, Klaus, 6, 7
- Demilitarization, 23–24
- Demobilization, 23–24
- Democratic Republic of Congo, 2, 22, 456
- Departed Asians Property Custodian Board, 36
- Department of Statistics, 84n
- Depreciable assets, 300
- Disease. *See* AIDS/HIV; Health care facilities; Health issues; Health services; Illness; Malaria
- District markets, 178
- District Service Commission, 411
- Economic growth: challenges to, 45; foreign aid and, 43, 45; impact of social and political disorder on, 17, 19–20; investment and, 207–8; level and composition of, 20; poverty reduction and, 83–84, 123. *See also* Sustainable growth
- Economic liberalization: coffee, 34–36; conclusions regarding, 44–45; investment policy and, 36–37; privatization and, 37–38; productivity and, 244–46; reform process and, 1, 41; relationship between reconstruction and, 15; tax reform and, 276–77; trade and, 31–34, 275. *See also* Trade liberalization
- Economic welfare, 87–89
- Education: access to, 372–78, 401; budget allocations for, 9–10, 349; conclusions and policy changes in, 366–68; enrollment and, 344, 347–49, 366, 372–78, 395–97; as government priority, 371, 372; income and, 141–42, 373, 381–95; Mincerian returns to, 379, 381, 383; parental, 374; parent funding of, 344–45, 350–53, 357, 361, 366, 376; primary, 344, 347–48, 366, 371–402 (*See also* Primary education); productivity and, 147, 387–95; public spending of, 347–63; quality of, 396, 397; rebellion and, 23–24; returns to, 378–87; student performance and, 398–99. *See also* Schools
- Educational spending: accountability and, 344, 366–68; availability of data on, 349–50; impact of decentralization on, 359, 362–63, 367; for primary schools, 350–59, 362; regional variations in, 359–61; for teacher salaries, 349, 350, 357–59, 366. *See also* Primary education; Schools
- Electric power sector, 224, 227
- Entandikwa, 133
- Enterprise start-ups, 150–52, 173

- Equipment, investment in, 210, 214, 228
- Ethics, 25–26
- Exchange rate: expectations of firms regarding, 225; managing floating, 54–56; reforms in, 50–52; unification of, 52–54
- Excise taxes, 277n
- Export crops, 177, 187
- Export sector: bribes and, 333; competitiveness in, 458–59; decision to enter, 263; efficiency levels in, 242; growth decomposition, 262; impact of liberalization on, 38–39, 246–53; from 1995–1997, 261; productivity in, 243–46; removal of taxation and, 3; summary statistics of, 260. *See also* Trade liberalization
- Export taxes: coffee, 276; overview of, 8; removal of, 271; switch to import taxes from, 32–33, 275. *See also* Taxes; Tax reform; Trade liberalization
- Extension services, 136–37, 166–67
- Farming. *See* Rural households; Rural sector
- Fertility rate, 419
- Fertilizers: demand functions for, 172; use of, 131, 148–49
- Firms: analysis of, 3–4; competitive environment and, 223; costs beyond control of, 223–24; effects of corruption on, 319–39 (*See also* Corruption); impact of taxation and foreign, 288, 290–92, 313; incidence of tax policies on, 9; investment and age and size of, 213–14; investment rates and, 209–11, 218–20, 226–27; investment regressions for, 212–15, 229–30; marginal effective tax rate for, 281–89; output and productivity growth in, 239–40, 242; overview of, 7–8; perception of constraints to, 220–23; policy credibility views of, 225–26; profit rates in, 216–20, 226; risk affecting, 224–25; status of, 3; survey of, 3, 238, 252, 467–72; trade liberalization and, 8, 238–46, 255. *See also* Investment; Trade liberalization
- Fiscal adjustments, short-term, 72–74, 76, 77
- Fiscal shocks, 66–67
- Flexible accelerator model of investment: application of, 212–15, 277n; explanation of, 211–12
- Food crops: credit and, 187; demand for, 196, 201; domestic participation in, 202; production of, 124, 131, 177; transaction costs for, 177. *See also* Crop markets
- Food poverty line: derivation of, 90, 91; use of, 99, 100, 110, 116–17
- Foreign aid, 39, 41, 43–45
- Foreign exchange: legalization of parallel market in, 49, 52–56; reforms in, 50–51
- Foreign Exchange Operations (FEO), 59, 60
- Foreign investment, 36–37
- Fractionalization, 17, 22, 23
- Fuel tax revenues, 276, 281
- Full information maximum likelihood (FIML) estimator, 246
- Gabon, 248, 249, 251
- Gauthier, Bernard, 8
- Gender, income and, 383–84, 386
- Ghana, 41; firm investments in, 210, 212; profit rates in, 216, 217
- Gini coefficients: of coffee stabilization tax, 280; explanation of, 278n; inequity in consumption per capita, 104, 105, 134, 134n; of taxes, 278, 280, 306, 307
- Government: constraints on efficiency of, 26–27; economic activity and, 137; normative view of, 345; overview of, 8–9; spending by postconflict, 24–25

- Government revenue: data regarding, 272–75; effort to rebuild, 272; tax reform and, 276–77
- Graduated personal tax (GPT), 277
- Granger causality test, 246
- Gross domestic product (GDP): effect of social disorder on, 19, 20; export shares of, 41; growth in, 271, 275; investment as share of, 19, 20, 40; liberalization and, 38–39; share of tax revenue in, 8, 457
- Gross-of-tax rate of return on capital, 300–301
- Growth theory, 208
- Health care facilities: access to, 407–9, 425–26, 428; availability of data on, 345, 363–64, 366, 367; births in, 419–20; conclusions and policy changes in, 366–68; description of, 346–47; government, 424, 430; medical personnel in, 411, 412, 432; number and type of, 409–11, 436; qualitative observations of, 365–67; quality of, 408, 413–14; user fees for, 408–9, 413, 414, 431; utilization of, 413, 424–26
- Health insurance, 409, 431
- Health issues: AIDS/HIV and, 2, 10, 86, 407–8, 415–18, 422, 437; malaria and, 408, 418–19, 430, 432; nutrition and, 408, 421–22; orphanhood and, 422, 429–30, 441
- Health services: accountability for, 366, 368, 414, 431; burden of disease studies and, 414–15; conclusions regarding, 430–33; curative and preventive service demand and, 423–26, 435; decentralization and, 408, 409, 411, 413, 414, 431–32; econometric analysis and, 426–27; government spending for, 407, 430; household expenditures for, 437; household outcomes and, 10; immunizations and, 429; improvements in, 407; maternal and child health and, 419–20; overview of, 407–9; performance monitoring in, 432; for prenatal care, 419, 427, 429, 434; for young children, 427–29
- Health unit management committees (HUMCs), 414
- Henstridge, Mark, 5
- Highway construction. *See* Road construction; Transportation
- HIV. *See* AIDS/HIV
- Households: changes in mean consumption per capita in, 87–89; education and characteristics of, 377, 456; engaged in farming, 178, 179; female-headed, 141–42, 377, 383–84, 386, 390; health expenditures by, 437; income in, 196, 197; issues related to, 6–7; nonagricultural enterprise start-ups by, 150–52; occupation of head of, 198; poverty information and, 83–87; tax incidence analysis and, 9, 278–81, 296–98, 302. *See also* Rural households
- Household surveys: budget survey, 84n, 89n; integrated household surveys, 84, 87, 88, 92, 93, 101–6, 109, 111, 113, 115, 116, 278, 463–65; monitoring surveys, 84, 87–92, 94–97, 101–6, 109, 111, 463–66; national household survey of 1999/2000, 463, 466
- Huber-White correction for heteroskedasticity, 245
- Hydropower, 227
- Illness: demand for curative care and, 427–29; income and, 423–25; poverty and, 423–25; reporting of childhood, 437. *See also* AIDS/HIV; Health care facilities; Health issues; Health services; Malaria
- Immunization: access to, 408; demand for, 429; econometric analysis and, 426–27; providers of, 424; trends in, 420, 421
- Import taxes: revenue from, 276; switch from export to, 32–33, 275. *See also* Taxes; Tax reform; Trade liberalization

- Income: curative care and, 428, 435; determinants of household-level growth in, 169; education and, 141, 142, 373–75, 381–95; from farming, 196, 197; gender and, 383–84; health expenditures and, 437; illness and, 423–25; intertemporal changes in, 137–43
- Income taxes, 275, 277n. *See also* taxes
- Incumbent effect, 248, 249
- Industrial census, 468
- Infant mortality, 407
- Inflation: policy to stabilize, 56–58, 71–72, 76; short-term fiscal response to, 68, 71
- Infrastructure: access to, 166; as firm constraint, 223–24; improvement needs for, 227; investment expenditures on, 24–25; market models and, 185–86; rural, 135–37, 166
- Institutional Investor* risk ratings, 28, 30, 455
- Institution building, 25–27
- Integrated household survey (IHS), 84, 87, 88, 92, 93, 101–6, 109, 111, 113, 115, 116, 278, 373, 400. *See also* Household surveys
- International Coffee Agreement export quota system, 34
- International Development Research Centre of Canada, 51
- International Labour Organisation, 302
- International Monetary Bank (IMF): commitment control system and, 76; reform agreement with, 51, 53, 56, 72
- Inventories, 283
- Investment: conclusions and policy recommendations for, 226–27; economic growth and, 207–8; flexible accelerator model of, 211–15; impact of liberalization on, 38–39; in machinery and equipment, 210, 214, 228; nature of, 7–8; policy for, 36–37; rates of, 226–27
- Investment Code (1991), 277
- Investment constraints: competitive environment and, 223; conceptual framework for, 218–20; corruption as, 336–37 (*See also* Corruption); costs beyond firms' control and, 223–24; firms' perceptions of, 220–23; overview of, 209; policy credibility and, 225–26; profit rates and, 216–18; ranking of, 220–22; risk and, 224–25
- Investment equation, 231–32
- Investment licensing, 36–37
- Investment response: flexible accelerator model and, 211–12; investment data and, 209–11, 228; regression results and, 212–15, 229–30
- Kasekende, Louis, 5
- Kenya: education in, 372; fuel tax in, 276; horticultural export industry of, 458–59; investments in, 210, 212, 455; profit rates in, 216, 217; taxes in, 9, 290, 291, 301
- Labor, hired, 149, 172, 178
- Labor productivity, 240–44, 254
- Land markets: changes in functioning of, 163–65; importance of, 133–35
- Land rights, 133–35
- Larson, Donald, 7
- Liberalization. *See* Economic liberalization
- Life expectancy, 408, 433
- Livestock: ownership of, 130–31, 167; use of technology for, 130
- Living standards, 84, 89, 100, 102, 112
- Lord's Resistance Army, 22
- Lorenz curve, 278n
- Machinery: investment in, 210, 214, 228, 287; tax on, 283

- Macroeconomic policy: aspects of, 5–6, 49; budget discipline costs and, 74–75; cash flow and, 59–66; commitment to spend and, 75–76; inflation targeting and, 71–72; reform measures and, 5–6, 50; short-term fiscal adjustment vs. monetary policy and, 72–74, 77
- Macroeconomic stability: achievement of, 49–50, 56–58, 74; cash flow system and, 76–77; recommendations for, 51
- Maize, 126–27
- Makerere University, 458
- Malaria: economic costs of, 418–19; efforts to combat, 430, 432; morbidity and mortality from, 408, 418
- Malawi, 372
- Mangoes, 129
- Manufacturing, 313
- Marginal effective tax rate (METR): analysis of, 295–96; on capital, 282–86, 299, 312; on cost of production, 279n, 287–89, 291–92, 301–2; cross-border comparisons of, 288, 290–92; dispersion, 301; effect of compliance and tax administration on, 280, 292–95; explanation of, 279, 298–302; for firms, 281–90; tax reform and, 286–87; use of, 279
- Marginal return (MR) curve, 218–20, 224
- Maternal health, 408, 419–20
- Matooke, 127–28, 186
- Matovu, John, 8
- Mean consumption per capita: adjusted comparison of, 113–15; changes in, 87–89; living standards and, 103–4
- Military expenditures, 24
- Millet, 127
- Mincerian returns to education, 379, 381, 383
- Ministry of Finance and Economic Planning: actions of, 58, 64–65, 67, 76; commitment control system and, 76
- Ministry of Health, 408, 411, 424
- Ministry of Planning and Economic Development, 52
- Monetization, 74
- Monitoring surveys, 84, 87–92, 94–97, 101–6, 109, 111. *See also* Household surveys
- Morocco, 249
- Mortality: from AIDS, 415; child, 86, 407; discounted life years due to, 414, 415; infant, 407; from malaria, 408, 418; maternal, 419
- Museveni, Yoweri, 1, 44; economic policy and, 50, 51, 64; education issues and, 371, 396
- National Resistance Movement (NRM), 5, 11, 459; demilitarization and, 23; economic policy and, 22, 50–51, 76; formation of government by, 15; taxation and, 295
- Net entry effect, 248, 249
- Net-of-tax rate of return on capital, 300
- Nonagricultural enterprise start-ups, 150–52, 173
- Noncommercial risk, 225
- Nutrition, 408, 421–22
- Obote, Milton, 1, 17
- Okidi, John, 6
- Opportunism: banks and, 25, 27; high- vs. low-, 25–26; in private sector, 454; in public sector, 454
- Orphanhood: AIDS and, 422; child welfare indicators and, 441; health service demand and, 429–30
- Output: by firm characteristics, 257; trade liberalization and, 239–40, 242, 246
- Paris Club, 41
- Payroll tax, 288n

- Peace: opportunism and, 25; restoration of, 21–24, 453
- Petroleum tax revenue, 276, 281
- Plow ownership, 130–31
- Polarization, 22
- Political disorder: causes of, 16–17; impact of, 17, 19, 21
- Postconflict economy: capital flight and, 27–31; institution building priorities in, 25–27; interest in, 1; overview of, 5–6; public spending priorities in, 24–25
- Poverty: agricultural growth and, 105–11, 125; analysis of statistics for, 102–5; calculating estimates of consumption and, 113–16; coffee sector liberalization and, 49; conclusions regarding, 111–13; dynamics of, 6, 454; economic growth and, 83–84, 123; foreign aid and, 43–45; health facility use and, 424–25; illness and, 423–25; interventions to reduce, 99, 99n–100n; nutrition and, 421; private consumption per capita and, 87–89; sectoral decomposition and, 105–11; by sector of household head, 107–8; survey information on, 84, 87–92, 94–97, 101–6, 109, 111, 463–66 (*See also* Household surveys); trends in, 85, 91–102, 123, 125, 142; varying conceptions of, 85–86
- Poverty incidence curves, 101
- Poverty line: calorie requirements and, 116–18; defining absolute, 89–91; derivation of, 84n, 85, 116–19; food, 90, 91, 99, 100, 110, 116–17; nonfood requirements and, 118–19
- Poverty statistics: changes in, 94, 98; sectoral decomposition and, 105–11; types of, 92, 98n–99n
- Prenatal care, 419, 427, 429, 434
- Presidential Economic Council, 51, 53
- Preventive care, 423–26, 435, 440. *See also* Immunization
- Primary education: enrollment data for, 347–49, 366, 372–78, 395–97; as government priority, 371; parent funding of, 344–45, 350–53, 357, 361, 366, 376; productivity effects and, 387–95; public spending for, 350–59, 362; returns to, 378–87. *See also* Education; Educational spending; Schools; Universal primary education (UPE) initiative
- Privatization: effects of, 37–38, 45; expectations of firms regarding, 225; as policy priority, 227
- Production cost, 279n, 287–89, 291–92, 301–2
- Production function, 254, 264
- Productivity: economic reform and, 244–46; education and, 147, 387–90; growth in, 239–40, 242–46, 259, 260; indexes of, 240, 253–54, 264; labor, 240–44, 254; levels of, 240–42, 258; output and, 239–40; in rural households, 145–47, 177
- Profit rates: cost of capital and risk and, 224; investment rates and, 218–20, 226–27; regressions of, 216–18
- Public officials, 319
- Public services: bribes paid for, 331–33, 339; importance of, 456–57; to primary schools, 456 (*See also* Primary education)
- Real cost of financing, 299–300
- Reconstruction, 15
- Regional Project for Enterprise Development, 209, 467
- Reinikka, Ritva, 5, 7–10
- Repatriation, 30
- Revenue. *See* Government revenue
- Risk, 224–25
- Road construction, 24–25. *See also* Transportation
- Rural households: conclusions regarding, 152–53; crop market participation

- and, 193–94; crop market price changes and, 194–95; efficiency of input use and determinants of factor demand and, 148–49; hired labor use by, 149, 172, 178; income growth analysis for, 140–43, 169; income in, 196, 197; income sources for, 138–40; nonagricultural enterprise start-ups and, 150–52; productivity in, 145–47, 177; profile of, 6–7, 178; stylized facts characterizing, 143–45. *See also* Crop markets; Households
- Rural sector: agricultural output in, 124–25; factor markets in, 131–35; historical background of, 124; infrastructure, services, and social capital in, 135–37, 166; structure of output in, 125–30; technology use in, 130–31, 160–62. *See also* Uganda
- Salaries, teacher, 349, 350, 357–59, 366
- Sales tax, 280, 294n, 295
- Schools: distance to, 376–77; enrollment data for, 344, 347–49, 366, 372–78, 395–97; parent funding of, 344–45, 350–53, 357, 361, 366, 376; primary, 344, 347–48, 350–59; public spending for, 347–63; record keeping for, 348; student-teacher ratio in, 348, 399. *See also* Education; Educational spending; Primary education
- Seeds, 149, 172
- Sexually transmitted diseases, 417, 418. *See also* AIDS/HIV
- Sim-sim, 178, 180
- Social capital, 137
- Social disorder: impact of, 17, 19–21; origins of, 16
- Social service delivery system: conclusions and policy changes and, 366–68; diagnostic survey and, 346–47; education and public spending and, 347–63; health facility survey and, 345, 363–66; public spending increases and, 343–44; school survey and, 344–45. *See also* Education; Educational spending; Health care facilities
- Sorghum, 127
- Spatial arbitrage model, 182–84, 202
- Subsistence farming: reliance on, 3, 177; trends in, 124, 125, 178
- Surveys. *See* Household surveys; Uganda enterprise survey
- Sustainable growth: issues related to, 10–11; poverty reduction and, 123; requirements for, 209. *See also* Economic growth
- Svensson, Jakob, 7, 9
- Tanzania: cash budget in, 64, 76; education in, 372; taxes in, 9, 276, 290, 291, 301
- Tax administration analysis, 292
- Taxes: arbitrary assessment and audits and, 224; bribery and, 333–34; business, 276, 277, 310, 313; capital, 282; collection of, 26, 27, 227; excise, 277n; expectations of firms regarding, 226; graduated personal, 277; income, 275, 277n; switch from export to import, 32–33, 275; taxpayer compliance and administration of, 280, 292–95, 314–15; value added, 275, 276. *See also* Export taxes; Import taxes; Marginal effective tax rate (METR)
- Tax incidence analysis: on households, 9, 279–81, 296–98, 302; methods and data for, 278–80
- Tax reform: conclusions regarding, 295–96; effects of, 9; Gini coefficients before and after, 278, 280, 306, 307; impact of, 286–87; overview of, 271, 275–76; revenue trends and, 276–77. *See also* Export taxes; Import taxes; Marginal effective tax rate (METR)
- Tax reforms, 280–81
- Tea, 124

- Technical efficiency index, 240–45, 253
- Technology use, 130–31, 160–62
- Telecommunications: advances in, 458; bribery and, 331–33, 339; mobile, 455, 458; restructuring of, 38
- TFP (total factor productivity), 240–45, 253, 264
- Tobit regression, 212, 214n, 215n
- Total unit cost, 240, 241, 243, 244
- Tourism, 313
- Trade liberalization: bribes and, 333; conclusions regarding, 252; effects of, 236–37; export response to, 246–52; methods of examining, 235–36; output and productivity growth and, 239–40, 242–46; overview of, 31–34, 44; productivity level and, 240–42. *See also* Economic liberalization
- Trade shocks, 68
- Transportation sector: improvement needs for, 227; marginal effect tax rate and, 283; public spending on, 24–25; as risk to firms, 224
- Treasury bills, 72–74
- Tree crops, 129
- Tuberculosis, 417
- Tumusiime-Mutebile, Treasury Secretary, 77
- Turnover effect, 248, 249
- Uganda: absolute poverty line for, 89–90; achievements during 1990s of, 453–54; contemporary challenges of, 455; household surveys of (*See* Household surveys); lessons from studying, 2; nontax parameters for, 311; outlook for, 453–59; policy challenges for, 44; political rights in, 22–23; profile of rural, 124–37; Regional Program on Enterprise Development data on, 209; restoration of peace in, 21–24, 453; risk of civil war in, 17, 18; risk of conflict in, 21–22
- Uganda Coffee Development Authority, 35
- Uganda Commercial Bank (UCB), 59, 60
- Uganda enterprise survey, 3, 238, 252, 467–72
- Uganda Manufacturers Association, 467
- Ugandan Private Sector Foundation, 3–4, 238, 252, 467
- Ugandan Revenue Authority (URA): data produced by, 59–60, 279; establishment of, 26, 271, 456; function of, 271
- Uganda Participatory Poverty Assessment Project (UPPAP), 83, 85–87
- Uganda Programme of Action for Children, 422
- United Nations Development Programme (UNDP), 372, 421
- Universal primary education (UPE) initiative: assessment of, 400–401; concerns regarding, 396; educational access following, 372; educational access prior to, 373–78, 400; overview of, 371–73; school quality and, 395–97; student performance and, 398–99. *See also* Education; Primary education
- Utilities, 227
- Value added tax (VAT): implementation of, 275, 276, 278, 294; nonpayment of, 292; sales tax vs., 280, 294n, 295
- Veterinary services, 137, 167
- Violence, 137, 168
- The Way Forward I (Republic of Uganda 2000), 51, 53
- Welfare dominance analysis: application of, 278; household incidence analysis and, 296–98; statistics, 308, 309
- World Bank: enterprise survey by, 3, 238, 252, 467–72; foreign investor survey by, 467n; poverty rates and, 92; reform

- agreement with, 51, 56; Regional Project
for Enterprise Development, 209, 467
- World Health Organization (WHO), 90,
98n, 116
- Zambia, 64, 76
- Zimbabwe: investments in, 210, 455;
profit rates in, 216, 217

Uganda is rightly regarded as a pioneer of macroeconomic stabilization and structural adjustment in Sub-Saharan Africa. *Uganda's Recovery: The Role of Farms, Firms, and Government* consists of a series of studies analyzing the responses of private sector agents—households and firms—and of the government itself to the reforms implemented since the late 1980s in a society recovering from a traumatic civil conflict. Drawing on a wealth of quantitative data from a series of household surveys and from surveys of firms, the book presents an analysis of the evolution of incomes, poverty, and investment during the 1990s.

Unique in providing comprehensive analysis of policy reform in a Sub-Saharan African country, the book is designed to share the lessons of reform with a wide audience and stimulate informed debate among development practitioners.

“This book provides a truly remarkable record and a persuasive analysis of Uganda’s post-conflict reconstruction and sustained economic liberalization. It helps shed light on the complex interplay of behavior, policy tradeoffs, and economic management against immense odds. It is a must read for analysts, policymakers, and development practitioners.”

*Benno Ndulu, Lead Economist, The World Bank; former
Executive Director, African Economic Research Consortium*

“This excellent book highlights three key aspects of governmental behavior which account for Uganda’s remarkable recovery in the last fifteen years—provision of internal peace, ending of predatory taxation, and maintenance of fiscal discipline. However, the book is not complacent and emphasizes the challenges facing Uganda as it goes from recovery to sustainable growth and poverty reduction.”

*Ravi Kanbur, T.H. Lee Professor of World Affairs and Professor
of Economics, Cornell University*

Internal Documents Unit
MC C3-301

3 copies



THE WORLD BANK
1818 H Street N.W.
Washington, D.C. 20433 USA
Telephone: 202-477-1234
Facsimile: 202-477-6391
Internet: www.worldbank.org
E-mail: feedback@worldbank.org



ISBN 0-8213-4664-4