DIRECTIONS IN DEVELOPMENT
Trade

African Agricultural Reforms

The Role of Consensus and Institutions

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Dedication

This book is dedicated to the economists in the Southern Africa Department who struggled with me to find the best ways to design the reform programs.

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Foreword

The ongoing process of globalization in recent decades has lifted millions of people out of poverty and greatly increased average incomes in a large number of countries. It has been driven by a mix of technological changes and policy reforms, including liberalization of trade. One result of the liberalization of trade implemented by countries around the globe is the decline of anti-agriculture and anti-export biases. Historically, agriculture in many developing countries has been taxed relative to other economic activities, either directly through tariffs on inputs or marketing boards that paid farmers below-market prices for their crops, or indirectly through protection of industrial activities more than agricultural ones. In recent decades, many developing countries have greatly reduced the extent of such taxation of farmers.

The results of the agricultural policy reforms undertaken by countries have been mixed. Although in most cases there was a positive short-run supply response to reforms, in many cases this was not sustained. The contributions in this book revisit the experience of a number of African countries that reformed their agricultural policies and analyze cases of both success and failure measured by output and productivity performance for each country/crop over time. The underlying objective is to improve our understanding of the necessary conditions for a sustained supply response to reforms.

Making the results of globalization more beneficial to the poorest households and poorest countries is critical for the sustainability of the gains achieved by the world as a whole in recent decades. Identifying measures that can help achieve this objective is an objective of the Global Trade and Financial Architecture (GTFA) project. This project, which is supported by the U.K. Department for International Development (DFID), was originally set up to support follow-up activities that build on the report of the UN Millennium Taskforce on Trade (http://www.ycsg.yale.edu/core/forms/Trade_for_Development.pdf). It is piloted by a Steering Committee of researchers and policy makers and co-chaired by Ernesto Zedillo (Yale Center for the Study of Globalization) and Patrick Messerlin (Groupe d'Economie Mondiale, SciencesPo). The GTFA's objectives are to identify and promote concrete policy options for reinvigorating and strengthening the multilateral economic system that has supported the process of globalization and making it more sustainable and inclusive.

This book is the product of one of the activities that was implemented under GTFA auspices, and the support provided by DFID is gratefully acknowledged. Thanks are also due to all the contributing authors for their willingness to participate, and to Olivier Cattaneo, Michelle Chester, and Rebecca Martin for their assistance with the logistics of putting together the volume.

Bernard Hoekman
Director, International Trade Department
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Abbreviations

ADF	Augmented Dickey-Fuller
AIA	Association of Agribusiness Industries
ATTT	Association of Tanzanian Tobacco Traders
Bt	*Bacillus thuringiensis*
CAS	Country Assistance Strategy
CATA	Cashew Authority of Tanzania
CAWG	Cotton Act Working Group
CAZ	Cotton Association of Zambia
CBK	Coffee Board of Kenya
CBT	Cashewnut Board of Tanzania
CDC	Commonwealth Development Corporation
CDT	Cotton Development Trust
CNSL	cashew nut shell liquid
COCF	Cotton Outgrower Credit Fund
COMTRADE	Commodity Trade Statistics Database
CORI	Coffee Research Institute
CPI	consumer price index
CTC	crush, tear, and curl
DDA	Doha Development Agenda
DFID	Department for International Development

DSB	Dispute Settlement Body
EU	European Union
FAO	Food and Agriculture Organization
FAOSTAT	Food and Agriculture Organization statistical database
f.o.b.	free on board
f.o.t.	free on truck
FRELIMO	Liberation Front of Mozambique
GDP	gross domestic product
GOK	Government of Kenya
GTZ	German Development Agency
HIPC	heavily indebted poor countries
ICA	International Coffee Agreement
ICO	International Coffee Organization
IDA	International Development Association
INCAJU	National Cashew Institute
IMF	International Monetary Fund
KPCU	Kenya Planters' Cooperative Union
KTDA	Kenya Tea Development Agency
LCUs	local currency units
LDCs	least developed countries
LINTCO	Lint Company of Zambia
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MACO	Ministry of Agriculture and Cooperatives
MARD	Ministry of Agriculture and Rural Development
MFPED	Ministry of Finance, Planning and Economic Development
MoU	Memorandum of Understanding
MTTI	Ministry of Tourism, Trade, and Industry
MUV	manufactures unit value
NAADS	National Agricultural Advisory Services
NAPB	National Agricultural Products Board
NGO	nongovernmental organization
NOAGMU	National Organic Agricultural Movement of Uganda
NRA	nominal rate of assistance
NUCAFE	National Union of Coffee Agribusiness and Farm Enterprises
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
OLS	ordinary least squares

R&D	research and development
RRA	relative rate of assistance
SARB	Southern Agricultural Products Board
SCDA	Special Crops Development Authority
SCIP I	Smallholder Coffee Improvement Project
SOE	state-owned enterprises
SRCB	Southern Region Cashew Nut Board
SSA	Sub-Saharan Africa
TAT	Tobacco Authority of Tanzania
TCNB	Tanzania Cashew Nut Board
TLTC	Tanzania Leaf Tobacco Company Limited
TRFK	Tea Research Foundation of Kenya
TRI	Tea Research Institute
T Sh	Tanzanian shilling
TTB	Tanzania Tobacco Board
TTPMB	Tanzania Tobacco Processing and Marketing Board
UCDA	Uganda Coffee Development Authority
UCRA	Uganda Coffee Roasters Association
UCTF	Uganda Coffee Trade Federation
USDA FAS	U.S. Department of Agriculture Foreign Agriculture Service
VBARD	Vietnamese Bank of Agriculture and Rural Development
VBSP	Vietnam Bank for Social Policy
VFU	Vietnamese Farmers Union
VICOFA	Vietnam Coffee and Cocoa Association
VIENCAFE	Vietnam Coffee Corporation
VND	Vietnamese dong
WTO	World Trade Organization
ZCPA	Zambia Cotton Pre-Financiers' Association

Introduction and Overview

M. Ataman Aksoy

In the late 1980s and early to mid-1990s, most of the countries in Sub-Saharan Africa (SSA) initiated agricultural policy reforms either as part of wider structural adjustment or as self-standing programs. These reforms intended to eliminate or reduce export restrictions and taxes, privatize parastatals that were marketing monopolies, and, more importantly, restructure smallholder support systems, with the core objective of increasing the rate of return for producers.

Studies evaluating the supply response in SSA to the agricultural policy reforms have found that agricultural growth rates after reforms have been uneven, and, in many countries, the sustained agricultural growth observed in Asia and Latin America has not been replicated (Akiyama et al. 2001, 2003; Kherallah et al. 2002). "Structural and institutional constraints" are suggested as the reason for the lack of supply response to changes in the incentive regime following reforms (Kherallah et al. 2002). Baffes and Gardner (2003), although not limiting their cases to SSA, have shown that outcomes are highly diverse, and it is not easy to determine the reasons for success and failure. Others have concluded that the lack of response was caused by lack of complementary inputs, especially the lack of rural infrastructure. Recent studies by Anderson and Masters (2009), however, showed that, unlike in other regions, incentives for agricultural production in SSA did not change despite comprehensive reform programs.

This volume, using a combination of comparative and case studies on selected export crops, provides a different framework with which to interpret the outcomes of the reforms program. First, it tries to place the reforms in a global context by analyzing the behavior of international prices and the real exchange rates that determine local prices. Price increases after the reforms help the supply response, whereas price collapses lead to unsuccessful reforms based purely on price developments. International prices increased after the reforms during the early 1990s, helping to create an aura of success. Prices collapsed around 2000, which contributed to negative evaluations of reforms.

Second, the volume develops a framework that ties the success of the reforms to the degree of consensus around the reform programs and the ability of the institutional arrangements established after the reforms to accommodate unexpected or negative shocks. It uses a framework that differentiates between short-run growth accelerations caused by elimination of some constraints and sustained growth episodes that require better and more flexible institutional structures (Rodrik 1999, 2007).

Finally, it tries to link the types of support institutions for smallholders that evolved after the reforms back to the political economy of the stakeholders and their interests. The requirements of collective action to deliver solutions to shocks, such as diseases and technological developments, require reasonably efficient institutions that can meet the needs of smallholders. This further requires that the arrangements to establish such institutions and maintain them are acceptable to all stakeholders.

Our original contention—and the focus of this research—was that significant reforms had been undertaken, and these reforms have led to short-run supply responses. Almost two decades after the initial reforms, a careful look at selected export crops in various countries corroborates our original hypothesis. *In almost all instances, agricultural policy reforms generated an immediate positive supply response: real producer prices increased along with output*. These reforms, however, also upset the existing distribution of income between producers, most of which were smallholders with little political connections, and the historical intermediaries, which were usually connected to the political leadership. This redistribution led to conflicts that might not be resolved over time. These conflicts also affected the ability of a sector to restructure itself after reform, so that it would have the capability to withstand negative shocks.

In unsuccessful cases in which the short-run supply response petered out, new domestic and institutional arrangements could not be maintained under external and internal shocks. The degree of political and social consensus on the reforms was weak, and the ability to redistribute income after a negative shock was not built into the new arrangements. Furthermore, in these cases, nonprice support to agriculture was neither increased nor maintained.

In cases in which reforms were successful, there was greater consensus on the reforms program or less conflict about it.[1] The rent-seeking fight was not intense, and usually producers were supported by their governments. There was also greater nonprice support; the support agencies were given greater autonomy and were more efficient. Although difficult to prove conclusively, the existence of more autonomous and efficient nonprice support agencies could have been caused by the lack of conflict surrounding these commodities. Finally, in most of the successful cases, enough political and economic space existed for the parties to find alternatives to the existing arrangements in case of shocks.

The book contains 10 studies focusing on a group of agricultural commodities and the reforms programs associated with them. These cases were selected to illustrate different dimensions of price developments, shocks, and institutional arrangements used to manage these shocks and thus do not constitute a representative sample of agricultural reform processes in SSA. The focus is on export crops because most of the reforms initially focused on these, and the data are more reliable and domestic prices are better connected to international markets. The framework and the evidence presented here is a first attempt to place these agricultural reforms in the context of the consensus literature. Further case studies in this framework are needed to test whether the hypotheses advanced here have more general applicability.

In the first study, Aksoy and Anil develop a political economy framework that brings together the issues of consensus and conflict over the distribution of rents in the SSA cases, the development of unexpected changes, and the capabilities of institutions to handle these changes. This study, in addition to summarizing the nine SSA cases, also develops the underlying theme of the remaining studies in the volume.

The next two studies analyze international and domestic price behavior and its impact on production decisions. Onal tests the econometrics of supply response, while Onal and Aksoy analyze the volatility and behavior of commodity prices and their transmission to producers. Baffes looks at technological revolutions, such as switching to Bt (*Bacillus thuringiensis*) cotton in China and India; the reasons for the inability of SSA to switch; and the impact of this development on cotton production in SSA. Then, Baffes and Onal undertake a comparative study of coffee sectors in an SSA reformer, Uganda, and Vietnam. They try to explain the reasons for the differential outcomes when both countries faced similar shocks.

The next five case studies cover cashews in Mozambique by Aksoy and Yagci, coffee and tea in Kenya by Mitchell, cashews in Tanzania and tobacco in Tanzania by Mitchell and Baregu, and cotton in Zambia by Yagci and Aksoy.[2] In total, 12 cases are discussed in the volume; nine cases in SSA, and coffee in Vietnam and cotton in China and India.

Background of the Reforms

For much of the period since 1950, many development economists and practitioners have taken the view that low prices for agricultural commodities discourage poverty alleviation in developing countries because, in low-income nations, agriculture generates a major share of the economic output and is thus a key determinant of household incomes (Aksoy and Beghin 2005; Aksoy and Hoekman 2010). Furthermore, the incidence of poverty is much higher in rural areas, and farmers are much poorer than the rest of their society (Aksoy and Hoekman 2010).

Krueger et al.'s (1988) findings about agricultural policy regimes showed that developing countries penalized their agricultural sectors in addition to the low prices generated by global subsidies. Therefore, greater incentives or "support" to agriculture could increase agricultural output and reduce the pervasive poverty seen in rural areas.[3] Significant supply response after price reforms in China and other countries (such as Vietnam), and higher agricultural productivity and output growth in middle-income countries that improved their incentive regimes, have led to a gradual change in the "conventional wisdom" about the impact of agricultural pricing policies. Earlier skepticism about the capacity of the agricultural sector in developing countries to respond to incentives slowly disappeared. For example, in their survey article, Binswanger and Deininger (1997) stated that "While the short-run supply response of agriculture is inelastic, the long-run response is highly elastic, as the literature unambiguously shows."

Sub-Saharan African countries had also taxed their agriculture, especially their export crops. By the 1980s, agriculture in SSA was in a state of decline. Many of the countries were losing market share in their primary export crops. Agricultural exports were excessively taxed by the state, either directly or de facto through marketing arrangements. In addition, agricultural production, especially by smallholders, requires significant nonprice support through research, extension, and input provision, as well as lower transaction costs in general. However, these support systems were not effective in SSA (World Bank 2008). Most of the public agencies tasked to provide nonprice support to agriculture through better seeds, new technologies, better transport, and credit ended up taxing agricultural production through interventions in marketing and processing. Furthermore, these agencies were almost bankrupt because their interventions were not fiscally sustainable, especially in the face of fiscal crises facing their governments. In addition, donors that funded many of the agricultural support systems began to ask for more fundamental changes in the operation and structure of these institutions and the policies under which they operated.

In the late 1980s and early to mid-1990s, agricultural policy reforms to increase producer incentives, as well as support for agricultural production, were implemented in SSA as they were in other developing countries.[4] In SSA, agricultural growth rates after the reforms have been uneven, and, in many countries, the sustained agricultural growth observed in Asia and Latin America has not been replicated. The literature on the evaluation of the reform programs has also rated the outcomes of these reform programs as mixed (Akiyama et al. 2001, 2003; Kherallah et al. 2002). Many of these reforms lacked a sustained supply response, and this has sometimes been attributed to inappropriate design. In other cases, the lack of supply response has been attributed to policy reversals and lack of full program implementation. Kherallah et al. (2002), who undertook an extended evaluation of agricultural policy reforms in Africa, claimed that the reform process has not been successful and the supply response has been limited. One of their major conclusions was that “Despite positive changes in some sectors and some countries, the overwhelming current consensus is that the overall limited supply price response in SSA is due to structural and institutional constraints that have been ignored by market reforms” (Kherallah et al. 2002, 157).

Many have interpreted this lack of sustained supply response as nonresponse, despite changes in the incentive regime.[5] The point of emphasis has then moved to other constraints to faster and greater supply response, such as credit, transport, and the like. These are inputs that must be supplied by or supported by the state. Many, including the World Bank, have argued that it was this inability of the state to invest and support agriculture that led to lower returns and lower productivity. This has led to greater emphasis on rural infrastructure (especially roads) investments and other similar programs. But little effort has been made to analyze the political economy reasons for the lack of collective action to restructure agricultural policies and support institutions. Similarly, in cases in which reforms were more successful and incentives were increased for producers, the reasons for these positive outcomes also need to be evaluated. This set of issues is analyzed in the chapters of this volume.

Contributions to the Volume

Aksoy and Onal, in "Consensus, Institutions, and Supply Response," develop the underlying framework for all of the case and comparative studies in the volume. They show that in seven out of nine SSA cases analyzed in the study, significantly higher output occurred after reforms. In five of the nine cases, the initial increase in output growth could not be maintained, whereas in the other four cases sustained growth occurred despite negative shocks. Four cases of sustained growth were tea in Kenya and Tanzania, cotton in Zambia, and tobacco in Tanzania.

Short-term increases in output were driven by increases in producer prices, which in turn were primarily caused by increases in the share export prices received by producers. Increases in producer prices were also assisted by the increase in international prices during the early 1990s. The authors show that tradeoffs existed between short-run producer gains and longer term growth sustainability. In cases of large initial gains in the share of export prices received by the producers, growth rates were not sustained in the longer run. They attribute this anomaly to increased conflicts between producers and intermediaries over the distribution of rents. In cases in which reforms were successful, the changes in initial income distribution were not very large and did not disturb the historical rent allocation significantly.

Their next point involves the degree of consensus surrounding the reforms. In successful cases, there was greater consensus on the reform program or less conflict about it. The rent-seeking fight was not intense, and producers were usually one of the stakeholders supported by the governments. Enough political and economic space was available for the stakeholders to find alternatives to existing arrangements in the face of external and internal shocks, and greater institutional support was available for smallholders. Finally, the sizes of the successful cases were smaller relative to the overall economy and were not key elements of political rent distribution before the reforms. Thus, more insignificant or newer products had greater chances of success.

In the five unsuccessful cases, the post-reform equilibrium could not be maintained in the presence of negative shocks and price collapses. These products had been important avenues of rent distribution, and politically important groups played a key role in the distribution of these rents. The changes in income distribution created by reforms were contested, and adjustments to unexpected developments could not be implemented. Finally, the nonprice support systems for smallholders turned out to be as important as the incentives generated by relative prices. In cases in which consensus was lacking on the reforms programs, efficient support systems could not be established.

Aksoy and Onal also argue that there is sufficient diversity in the outcomes across similar products and countries to suggest that it is possible to have local-level outcomes that are different from national ones, and there can be local successes as well as failures. This suggests that, rather than trying to model the political economy structures within countries, more emphasis should be placed on sectoral arrangements and outcomes.[6]

Determinants of producer prices and their volatilities are driven by international prices, real exchange rates, and domestic distribution between producers and intermediaries. The timing of price increases or collapses can have an important bearing on the success of reform programs independent of the design and implementation of the program itself. Producer price increases after the reforms can ease the adjustment to a new equilibrium, whereas price collapses can jeopardize the whole program by exacerbating conflict among different groups. High volatility in producer prices might impair longer term commitments by farmers and thus lower long-run growth rates. Onal and Aksoy, in "International Commodity Prices, Exchange Rates, and Producer Prices," examine the transmission of international prices to producer prices during post-reform periods and measure their volatility for the 12 cases (nine in SSA and three in Asia) analyzed in this volume.

One large commodity price cycle occurred since 1990. Prices began increasing during the early 1990s and decreased dramatically after the 1997 Asian crisis. Prices began increasing again in the mid-2000s, reaching their peak in 2008, the last year of the sample for this volume. Onal and Aksoy find that, although the declines in international prices were often transmitted to domestic producers, the recent commodity price spike starting in 2002 has not been passed on, mainly due to real exchange rate appreciations against the U.S. dollar. They also show that the volatility of real producer prices as mostly higher than the volatility of international prices (in nominal U.S. dollars) in all of the SSA cases, except Ugandan coffee. In seven out of nine SSA cases, exchange rates and domestic interventions led to significantly higher volatility of producer prices than did international prices, although the opposite is true of the three Asian cases. Collapse of producer prices during the post-1997 period and their failure to increase with international price increases during the 2000s have dampened the supply response during the post-reform periods.

Onal takes the measurement of supply response one step further in "An Empirical Analysis of Supply Response for Selected Export Crops in Sub-Saharan Africa," and estimates supply response for the five sample commodities using panel data from the 12 sample cases. She estimates the short- and long-run price elasticity of agricultural supply, as well as the effects of support, measured as nominal and relative rates of assistance (NRA and RRA, respectively), and nonprice support dummies. Her results are mixed. Coffee, cotton, and tobacco supplies show robust positive response to real producer price changes in the short run. The long-run elasticity estimates are higher, as expected. The short-run own-price elasticity estimates for cashew and tea supplies are less robust. The support variables have no effect on crop production, and the estimated coefficients do not change with the reforms. However, there is a robust increasing trend in Vietnamese coffee production that cannot be explained by price or NRA changes. Bt cotton introduction increases trend cotton production after 1999 in China, and after 2002 in India, again independent of price developments.

Development is never linear and is interrupted by technological changes and unexpected shocks. Although most of the collective action literature emphasizes institutional capacity to accommodate negative shocks, it is equally important to have the institutional capacity to benefit from positive shocks. Countries on the forefront of new technologies can implement higher productivity production systems before others reap higher benefits. The ability of support institutions to adapt and copy new technological developments allows countries to maintain their competitiveness and accelerate their growth. Cotton is one of the most important export products of SSA and it has seen major technological development. Baffes, in "How Africa Missed the Cotton Revolution," discusses the most important technological development in cotton production—the switch to Bt cotton by the rest of the world—and examines the reasons for the inability of the SSA countries to develop the institutional structures to adopt this new seed technology. The higher yields and output generated by switching to Bt cotton in China and India have kept world cotton prices much lower than other agricultural commodities. Sub-Saharan African countries, by not moving into Bt cotton, have lost on two counts: first by foregoing the yield increases and second by facing much lower cotton prices in world markets. Output increased by 31 percent in China and 51 percent in India, but fell by 22 percent in SSA between 2000–04 and 2005–09. SSA countries have not been able to create a consensus on an issue that is crucial to the growth of one of their key commodities, and they have been left behind.

Baffes and Onal analyze the divergent paths taken by Uganda and Vietnam in coffee production after reforms in "Coffee in Uganda and Vietnam: Why They Performed So Differently." Both countries started their reforms in the early 1990s and benefitted from increasing international coffee prices. They had similar rates of growth during the first few years. Both then faced serious price collapses and were hit by the same type of diseases, which required the development of new strains and major replanting programs using disease-resistant varieties. The parastatals and public sector in Vietnam were able to help smallholder coffee producers to overcome these shocks, and Vietnam managed to quadruple its coffee output despite these unfavorable developments. In Uganda, the parastatal, which was privatized but acted as a quasi-parastatal, could not overcome these problems. Coffee output, assisted by increasing world prices, barely reached its previous post-reform output peak only in 2008 and did not reach its historical peaks.

Aksoy and Yagci, in "Mozambique Cashew Reforms Revisited," and Mitchell and Baregu in "The Tanzania Cashew Sector: Why Marketing Reforms Were Not Sustained," show that Mozambique and Tanzania supplied almost 70 percent of the world's cashews in the 1970s and had highly mechanized processing factories. This sector collapsed in both countries and ended up producing less than 7 percent of world's exports and production by the early 1990s. Nationalization of processing in both countries, along with villagization (*ujamaa*) in Tanzania and civil war in Mozambique, contributed to this outcome. Both countries initiated reforms in the early 1990s—1992 in Tanzania and 1994 in Mozambique—under highly contentious environments. Cooperatives in Tanzania were connected to the ruling party and were its extension in rural areas. In Mozambique, private processors were connected to a political leadership that opposed reforms and wanted to maintain a monopsony on exports.

After the reforms, significant increases occurred in the share of export prices received by producers, and output doubled in both countries. This expansion came to an end around 2000, when international prices collapsed along with output. Local and export taxes were increased in Tanzania to collect more of the rents, and export taxes were maintained at a high level in Mozambique. Support to the sectors was sporadic and insufficient to reverse years of neglect, eliminate diseases, and replant old trees with better seedlings. Despite the fact that most of the old capital-intensive factories are closed, both countries still maintain high export taxes, and government affects the marketing through a warehouse marketing system in Tanzania and through the National Cashew Institute (INCAJU) adjusting the timing of the export season in Mozambique and high export taxes. By the end of 2008, output in Mozambique barely reached its 2000 level, and, in Tanzania, it was far below that. Despite years of controversy and discussion, there is still no consensus on the optimal interventions for the cashew sector, and serious support to smallholders is not available.

Mitchell compares tea and coffee sector performance before and after reforms in Kenya in "Kenya Smallholder Coffee and Tea: Divergent Trends Following Liberalization."[7] The tea sectors in Kenya and Tanzania have been treated differently than the coffee sectors. Tea sector parastatals in both countries were privatized. Multinational companies (estates) have been very strong in this sector, and they have created an umbrella under which smallholders have received protection and quality nonprice support. Despite low prices for tea in both countries, outputs have increased substantially. The Kenya Tea Development Agency (KTDA) has always been very efficient and effective, and is now owned by the smallholders. In Kenya, the smallholder tea expansion has been driven by the tribe of the president, and this, along with the strength of the multinationals, has created a positive outcome. In Tanzania, the tea reforms were the least contentious among all commodities, and most tea estates had not been nationalized with other commodity estates.

Coffee sectors, conversely, have been penalized by political and other distributional issues. In Tanzania, cooperatives have played a very negative role through extracting rents. Even after allowing the private sector to purchase and process coffee, all coffee output had to go through an auction that the cooperatives dominated. Cooperative unions also maintained a long-term contractual arrangement monopoly. There was little systemic support, and output never increased significantly. In Kenya, the situation was even worse. Political leadership wanted to destroy the political base of the past president, which was with coffee growers in the central region. Reforms were never fully implemented and, coupled with declining producer prices, this led to continuously declining output and negative supply response. Thus, these two coffee cases clearly show the impact of a political rent fight on two important sectors of their economies. Furthermore, these two sectors were major elements of rent distribution in these countries; thus, the reforms could not overcome the conflict among the groups.

Two case studies, "The Tanzania Tobacco Sector: How Market Reforms Succeeded" by Mitchell and Baregu and "Performance of Zambia's Cotton Sector Under Partial Reforms" by Yagci and Aksoy illustrate more successful outcomes. In both countries, the existing parastatals were privatized and replaced by large multinational companies. In both cases, the commodity was small in relation to the economy, and there was little conflict about reforms. The parastatals had gone bankrupt and their limited staff was absorbed by the multinationals, which supplied inputs and extension, and created a ready market for output under quasi-monopsonistic conditions. These monopsony powers were legally structured in Tanzania and were effective, although less formally structured and somewhat less effective in Zambia.

Output increased in both cases, and the quality of the commodity improved despite declining producer prices. These prices were also negatively influenced by declines in the shares of producers in export prices. In both cases, the companies faced crises due to side-selling, mostly caused by low producer prices and exchange rate fluctuations. Both sectors found ways to overcome these shocks without interference from their governments, and outputs increased dramatically in both cases despite low returns to farmers and overall low prices.

Key Findings

Almost two decades after agricultural policy reforms in SSA, a careful look at nine export crops in five SSA countries shows that, in almost all instances, agricultural policy reforms generated an immediate positive supply response along with increases in real producer prices. However, the post-reform institutional and governance structures in five of these cases have not been able to maintain the profitability of production beyond the first stage. These cases are cashews in Mozambique and Tanzania, and coffee in Kenya, Tanzania, and Uganda. In the remaining four cases, cotton in Zambia, tea in Kenya and Tanzania, and tobacco in

Tanzania, reforms were more successful in the sense that the initial increases observed in output following the reforms were sustained despite unfavorable developments. In the three non-SSA examples used in the study—China and India cotton, and Vietnam coffee—reforms were successful in increasing output, and growth has been maintained.

Causes for success and failure can be grouped under four headings:

1. ***Prices are important***. Changes in producer prices after the reforms and their sudden collapse become especially important variables affecting the levels of output, sustainability of growth, and the degree of conflicts over the rents. Higher international or export prices after reforms help to make distributional conflicts more manageable and also increase the returns to producers, thus leading to greater output without significantly reducing the share of politically important intermediaries. Price collapses, however, destroy consensus and bring latent conflicts to the fore. They also reduce producer incentives. In addition, high price volatility makes smallholder support systems more vulnerable.

2. ***Consensus on the nature of the reforms and the nature of the arrangements for conflict resolution make up the second important variable***. In the four cases in which reforms were successful, there was greater consensus or less conflict on the reform programs. The rent-seeking fight was not intense, and producers' income increases usually did not threaten the incomes of groups supported by the governments. Finally, in most of the successful cases, enough political and economic space was available for the parties to find alternatives to the existing arrangements in case of shocks.

   In the five cases in which the initial supply response was not sustained over the longer run, the new institutional arrangements that resulted from the reforms could not be maintained under shocks to the domestic sectors. The degree of political and social consensus on the reforms was weak, which affected the ability to adjust to the shocks. In addition, the ability to redistribute income after a negative shock was not built into the new arrangements, which reduced the sustainability of reforms.

3. ***The type and the degree of nonprice support given to the commodity in question is also very important and is driven partially by political and social consensus and the existing capabilities and regulations of the country***. In successful cases, vertical arrangements

that provide nonprice support were more autonomous and efficient. In cases in which the state supports producers (or at least is not antagonistic to them), there is a greater ability to develop better institutional structures to provide nonprice support. In these cases, shocks to the sector can also be more easily accommodated. In the five cases considered to have failed in sustaining the initial supply response after reforms, nonprice support to agriculture was not increased or even maintained. Although difficult to prove conclusively, the existence of more autonomous and efficient nonprice support mechanisms could be an artifact of the lack of conflict around these commodities.

4. ***Finally, not only price shocks, but also nonprice shocks, drive the sustainability of a reform's success.*** Nonprice shocks can be technological changes, diseases, or weather-related developments. One of the most important technological innovations over the last two decades has been the development of genetically engineered seeds for cotton, which is one of the main export crops in SSA. The inability to adopt Bt cotton has reduced the profitability of cotton production in SSA tremendously in the face of declining world prices and lowered output growth rates. Post-reform agricultural production performance in SSA has also been severely affected by diseases. There are also other negative developments, such as diseases in coffee in Uganda and cashews in Mozambique and Tanzania. The coffee sector in this case has failed to develop necessary vertical arrangements to effectively fight coffee wilt disease, which has reversed the production growth experienced immediately after the reforms. Similarly, cashew diseases that require pesticide applications, new varieties, and replanting could not be effectively eliminated by the existing support institutions.

Price Behavior

Although international prices (expressed in U.S. dollars) for the individual commodities covered in this volume have slightly different turning points, they follow a similar pattern. One large price cycle has occurred since 1990. Prices start increasing during the early 1990s, then decreased dramatically after the Asian crisis. They then began increasing again in the early 2000s, reaching their peak in 2008, the last year of the sample for this volume.

All of the reforms in SSA analyzed in this volume were undertaken during the early 1990s. This was a period of generally increasing prices, which contributed to the initial supply response observed after the reforms. It also minimized conflicts during the initial years of reform. In almost all cases, real producer prices declined around 2000, along with declines in international prices. This price collapse lowered the rates of return on cash crop production and also triggered latent conflicts.

Although the negative effects of price declines were experienced by most of the producers, the positive effects of the post-2000 price increases have not been passed on fully to producers, mainly because of real exchange rate appreciations in SSA. The depreciation of the U.S. dollar against most other currencies during the 2000s has meant that the positive effects of international price increases were not enjoyed by producers in the sample cases.

In terms of commodity price volatility in U.S. dollars, coffee is the most volatile, followed by cotton, tea, cashews, and tobacco. Except for coffee in Tanzania and Uganda, real exchange rate behavior has increased the volatility of international prices in all 12 cases.

Not only the behavior of real exchange rates but also domestic policies are important in the transmission of international price volatility (in nominal U.S. dollars) to producers. Whatever the reasons, domestic policies have generated higher price volatility for most producers in SSA countries. This fact increases the need for institutions that arbitrate among different groups, especially when negative shocks occur.

Consensus, Reforms, and Shocks

An important factor affecting growth rates is a sector's ability to respond to unexpected shocks. In almost all cases, negative and positive shocks affect producers and require collective action by other players, including the state. The ability to adjust requires institutional arrangements that facilitate this adjustment. Administrative arrangements that allow periodic evaluations of policy changes and create a forum for re-evaluations also ease the adjustment. Similarly, arrangements such as arbitration councils representing different interest groups and active political arrangements that allow consensus building also make the adjustment to a shock easier.

The agricultural policy reforms themselves can also be viewed as shocks to the sectors. They pitted groups that were benefitting from the old regime against new groups that would benefit from liberalization. Losses were sustained by political groups associated with the management of parastatals, by groups that were in key positions in public service, and by the political elite. The gainers were smallholders, who had little political support, and private processors and marketers that entered the sectors after the reforms. Some private groups, such as Mozambique cashew processors, were connected to the political elite and tried to maintain the pre-reform system. Others, such as the cashew and coffee marketers in Tanzania, had fewer connections and faced unexpected shocks.

The hypothesis advanced in this volume is that social conflict and an inability to respond successfully to shocks is greater when initial policy changes face substantial disagreement. In cases in which some agreement was met on the need for and desirability of policy changes, adjustment to a negative shock is easier.

In cases in which serious disagreements arise over reform policies, shocks that jeopardize gains from the reform face the criticism of those groups that objected to the policy changes in the first place. This is followed by attempts to return to ex ante environments, probably with little success. This controversy creates uncertainties for producers and reduces the probability of a successful adjustment or improvement in the original reform program. In cases in which some agreement is reached on the desirability of the policy actions undertaken, there is greater probability of trying to solve the new problems.

Sufficient difference exists among the cases on the degree of political conflict. For example, cashew policies in Mozambique and coffee reforms in Kenya and Tanzania have been very controversial. Because the degree of political conflict has been quite high, it amplified the impact of external shocks. Even decades after the reforms, most of these policies have been controversial, and there is still no consensus on their desirability. Other cases have been less controversial. Reforms in cotton in Zambia, tea in Kenya, and tea and tobacco in Tanzania have not faced the same kind of conflict as some of the other commodity reforms.

Institutional Arrangements and Support for Commodities

The organizational structures that emerge after the reforms directly affect the nonprice support given to producers. These activities are implemented by the ministries of agriculture and constitute the core of project support from international organizations such as the World Bank, the Food and Agriculture Organization (FAO), the International Fund for Agricultural Development (IFAD), CGIAR (originally the Consultative Group on International Agricultural Research), and others.[8]

Because of historical developments, political interest groups, and the nature of the commodities, different institutional arrangements for production, marketing, distribution, and support have emerged after the reforms. In many countries, before the reforms, the institutional arrangements were organized around the primacy of public sector organizations and parastatals. Their elimination left a void that was filled by other arrangements. Post-reform organizational structures in the sample SSA cases can be categorized into three groups.

The first group includes cotton in Zambia and tobacco in Tanzania. In these two cases, large international companies effectively replaced the parastatals through supplying inputs and extension, and creating a ready market for output under quasi-monopsonistic conditions. These monopsony powers were legally structured in Tanzania and were very effective, although they were less formally structured and less effective in Zambia. In both cases, the export crops were not very significant in terms of their size and had not been major sources of patronage during the pre-reform period. In both cases, parastatal companies were effectively and quickly privatized, along with their processing facilities. The private companies were allowed to find solutions to side-selling and the lack of contract enforcement—a basic problem with outgrower systems—without heavy-handed interventions by the state. In the terminology developed earlier, these two cases could be classified as having less social and political conflict and a greater degree of political consensus on the reform program.[9]

The second group consists of the smallholder tea sectors in Kenya and Tanzania. In these two cases, multinational tea companies represented a large share of production and were rather strong, both in local and international markets. The nationalization of most enterprises in Tanzania had spared the tea estates, except for two that were a part of nationalized holding companies. Thus, the estate sectors in both countries were left to manage themselves, and, in Kenya, even smallholders had access to high-quality support from the government's KTDA, which was later privatized to the smallholders. In Tanzania, smallholders were supported very inefficiently under the nationalized tea company and the cooperatives. However, tea reforms, even in Tanzania, were undertaken with much less controversy than was the case with other commodities.

The third group consists of the remaining five SSA cases: Mozambique and Tanzania cashews, and Kenya, Tanzania, and Uganda coffee. This is a rather narrow set of commodities and countries, but they are representative of many other cases in which a major liberalization has occurred and ad hoc organizational support arrangements were undertaken for the sector. In all of these cases, the parastatals were converted into quasi-parastatals. These agencies continued their traditional activities, with only minor changes. In Mozambique, the INCAJU is still very much a public agency, despite the fact that it was given autonomy a long time ago. It is an organization whose support to smallholders is judged to be quite weak. In Kenya and Tanzania, coffee cooperatives continued to control the marketing of coffee, were never really privatized, and did not create an efficient system of support for smallholders. In Tanzania cashews, a series of changes has resulted in cooperatives and local governments repeatedly interfering with marketing channels after the reforms. In Uganda, the Uganda Coffee Development Authority (UCDA) is a statutory public agency that never operated as an efficient supplier of support. The supply response in these cases depended on the behavior of producer prices, which were driven by international prices and exchange rates and by ad hoc support supplied by either quasi-public agencies or donors. For example, cashew spraying and seedlings were supported in both Mozambique and Tanzania, but these supports were not extensive, efficient, long-lasting, nor effective enough to change the nature and profitability of the commodity in question. These differences are caused not only by the ownership and control structures of the support agencies, but also by the alignment of the beneficiaries with politically powerful groups. The KTDA has managed to support smallholders mostly because this group is supported by the political leadership, as well as being the group that has been supported by donors such as the Commonwealth Development Corporation (CDC) and the World Bank.[10]

Positive Shocks and Technological Breakthroughs

Most of our previous discussions have been focused on negative shocks, such as price collapses, diseases, and the presence or absence of institutions to adjust to these negative shocks. Inability to take advantage of a positive shock can also create problems in maintaining growth processes. Discontinuities exist in the farming technologies generated by new developments in seed, fertilizers, pesticides, and other discoveries that change the profitability of farming and also affect the productivity of different inputs. These new technologies change the relative yields of commodities, and their rapid dissemination can give significant advantages to earlier adopters. In the past two decades, this change is typified by genetically modified seeds that minimize the use of pesticides (for example, the development of Bt cotton has reduced the number of sprayings required). Originally, it was thought that adoption of the new technology only required a tradeoff between the higher cost of Bt seed and the cost of additional pesticide sprayings. Recent findings show that in countries with less than optimal spray schedules and therefore lower yields, the switch to Bt cotton still resulted in yield and output increases that were much higher than anticipated. In countries such as China and India, where the yields were lower than in developed countries, the introduction of Bt seeds has led to significant yield increases. This higher supply has led to lower price increases for cotton globally in the 2000s. By not adopting these technologies, SSA countries suffered the consequences of low international prices with low yields, losing a very important opportunity to increase their share of world cotton production and contribute to poverty reduction among their millions of smallholders.

Conclusions

First-stage positive response to a reform program does not guarantee the program's sustainability. Reform sustainability usually requires more comprehensive institutional overhauls that provide stakeholders with sufficient flexibility to accommodate upcoming shocks to the sector. These shocks originate not only from developments in the sector itself but also from macroeconomic policies and global supply-and-demand developments.

Consensus on a reform program across the key stakeholders is a determinant of its sustainability. Therefore, in the design of programs, stakeholders, as well as their political alignments and relationships, must be considered more explicitly. This requires identification of gainers and losers from the reform program and an explicit analysis of those mechanisms that ensure greater consensus on outcomes. This requires a better understanding of the country's political and social groups, and a restructuring of the donor support teams that work on these reforms.

It is vital that discussions about political economy be carried from national to sectoral levels. Sufficient diversity exists in the outcomes across similar products and countries to suggest that it is possible to have local-level outcomes that are different from national ones, and there can be local successes, as well as failures, within a country.

Finally, the studies and hypotheses outlined in this volume should be treated as preliminary. More case studies must be undertaken, following the paths outlined in this volume, to test whether some of the hypotheses advanced here have greater applicability and can be generalized with greater confidence.

Notes

1. It is difficult to quantify exactly the degree of conflict concerning a reform program, but it is possible to use an ordinal set of indicators to differentiate the environments for individual programs and commodities. It is obvious, for

example, that there was much less consensus about cashew sector reforms in Mozambique compared to cotton sector reforms in Zambia. Similar differences exist between the tea and coffee sectors in Tanzania.

2. We also use information on coffee and tea reforms in Tanzania in the cross-cutting chapters based on earlier studies undertaken by Baffes (2005a, 2005b), with some updates.
3. These results, along with continued high protection in industrial countries, have led many developing countries to slowly increase their support to agriculture with pricing and trade reforms. Aksoy and Beghin (2005) have termed this development "reactive protectionism," in that it is reactive to subsidies and support to agricultural production in industrial countries. This situation is more prevalent in middle-income countries.
4. This is evident in the increases in support to agriculture in developing countries after the 1990s (Anderson and Masters 2009).
5. Findings by Anderson and Masters (2009) suggest that the incentive regime might not have changed significantly despite reforms.
6. These results are very similar to the points made by Levy (2011).
7. Throughout the comparative studies, Tanzania tea and coffee, which behaved very similarly to Kenya tea and coffee, are used, relying on the previous work by Baffes and others.
8. These nonprice supports can be classified under three main headings. First is support through the development of new seeds, new disease-mitigating activities, and the development of pesticides, farming technologies, and other research-related activities. Second are investments in irrigation, drainage, transport, credit, marketplaces, etc. to increase the productivity of farming and lower the cost of doing business for farmers. Third is support thorough extension and similar programs that educate and help especially smallholders to take advantage of new research developments and farming systems. Finally, all these require some kind of collective action to be implemented.
9. With the rapid expansion of output and incomes in tobacco, the cooperatives, which had been the key elements of rent extraction by the political system in Tanzania, have reinserted themselves into the marketing chain after 2007.
10. However, parastatals and other state-sponsored institutions in Asia have been able to effectively support the cotton and coffee sectors. These differences need to be investigated further.

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CHAPTER 1

Consensus, Institutions, and Supply Response: The Political Economy of Agricultural Reforms in Sub-Saharan Africa

M. Ataman Aksoy and Anil Onal

Introduction

In the late 1980s and during much of the 1990s, many countries in Sub-Saharan Africa (SSA) initiated agricultural policy reforms either as part of wider structural adjustment programs or as self-standing reform programs. Agricultural growth rates recorded after the reforms have been uneven, and, in many countries, the sustained agricultural growth observed in Asia and Latin America was not replicated (Akiyama et al. 2001, 2003). Kherallah et al. (2002, 157) conclude that "Despite positive changes in some sectors and some countries, the overwhelming current consensus is that the overall limited supply price response in Sub-Saharan

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Africa is due to structural and institutional constraints that have been ignored by market reforms." Baffes and Gardner (2003) have shown that outcomes are highly diverse and that determining the reasons for success and failure is not a straightforward task.

This chapter summarizes the findings of nine country case studies of commodity market reforms in SSA. These expand on previous work by placing the reforms in the context of the political economy of redistribution generated by policy changes and focusing on the ability of the new institutional structures created through the reforms to accommodate shocks (North, Wallis, and Weingast 2009). The analytical framework developed by Rodrik (1999) to analyze gross domestic product (GDP) growth patterns can also be adopted to analyze agricultural reforms in Africa. This framework, suggests that the ability to respond to negative external shocks is related to the degree of social conflict and prevalent institutions of conflict management. The agricultural policy reforms implemented in the late 1980s and 1990s in SSA involved the reduction or elimination of regulatory and fiscal constraints on the private sector, redistributing income from intermediary groups to producers, many of whom were smallholders. For this redistribution to be sustained and successful, some agreement had to be reached among the stakeholders on the desirability and acceptability of the new set of arrangements and the resulting income distribution.

During the initial stage following a policy reform, such as marketing liberalization, there was often a surge in private sector activity resulting from increased producer prices as competition among traders increased or because export taxes were reduced. Producers responded to these higher prices by recommitting to the crop or activity. During this stage, production often increased, and the reform appeared to be successful. These initial positive responses were reversed in many cases when unforeseen developments or shocks took place, such as a price collapse or crop diseases, or when the private sector became unsuccessful in its efforts. Such initial positive responses and their subsequent reversals suggest that the distinction between growth accelerations and sustained growth episodes also can apply at the sectoral level.[1]

Our main hypothesis is that the capacity to respond to external and internal shocks depends on the degree of political and social consensus on the reforms. In cases in which the first-stage positive supply response could not be sustained, the degree of political and social consensus on the reforms was also found to be weak from the beginning. Moreover, adequate mechanisms to redistribute income following a negative shock were not built into the new institutional arrangements. In cases in which sustained growth occurred despite the shocks, there was greater agreement on the reforms. This allowed the stakeholders to experiment with alternative arrangements to cope with incoming shocks.

In the next sections, a conceptual framework is developed and applied to nine export commodities in selected countries in SSA. To limit the coverage, and for ease of analysis, this study focuses only on export crops, but the framework is equally applicable to other crops and sectors. The cases are cashew in Mozambique; coffee and tea in Kenya; cashew, coffee, tea, and tobacco in Tanzania; coffee in Uganda; and cotton in Zambia. This sample is not a representative one for SSA, but it is sufficiently diverse to illustrate the main hypotheses of this chapter and was selected on the basis of previous work done by the authors.

Growth Accelerations and Growth Sustainability

As mentioned, Rodrik (1999, 2007) differentiates between periods of growth acceleration, which are common and sustained growth over longer periods of time, which is rare. Growth accelerations usually require the elimination of only a few key constraints that hold back the economic activity, whereas sustained growth requires capacity and institutions to continuously monitor and eliminate emerging constraints. Sustained growth requires an ability to adjust to negative shocks.[2] Negative shocks or developments will have a greater impact in situations in which social or political conflicts are great and institutions for managing these conflicts are less well developed.[3] This is more likely when no consensus exists on how to redistribute the income losses resulting from shocks among different groups.

Rodrik (1999) expresses this relationship using the functional form shown below. Changes in growth rates depend on the magnitude and direction of external shocks, the existing degree of social conflict, and the strength of institutions of conflict management. A higher degree of social conflict amplifies the negative effects of an external shock, whereas better institutions of conflict management dampen its effects. Outcomes depend on the interactions of these three variables.

$$\Delta \text{ growth} = \text{external shock} \times \frac{\text{existing social conflict}}{\text{institutions of conflict management}}$$

This general framework can also be applied to analyses of commodity policy reforms by treating reforms as a "shock."[4] Their initial effect is to change the distribution of incomes along the production and distribution chain; therefore, they are almost inevitably a potential source of conflict.[5] In the case of commodity market reforms, the policy changes increase incomes of producers and new private sector participants and reduce incomes of intermediaries or other groups that were extracting rents from producers or the private sector. These reforms create both losers and gainers.[6] If the losing groups are small and the losses can be made up quickly, the degree of conflict is lower than in the reverse case, and the ability to create a consensus is thus greater.

Social conflict and the inability to accommodate negative shocks are greater when agricultural policy reforms initially face a significant level of disagreement. In such cases, the shocks that jeopardize the gains from adopted reforms increase opposition from those groups that objected to the policy changes in the first place, and attempts are made to return to ex-ante environments, probably with little success. This controversy creates uncertainties for producers and reduces the probability of making successful adjustments to or improvements in the original reform program. In cases in which some agreement exists on the need and desirability of policy changes, adjustment to a negative shock is easier. The degree of conflict and the new arrangements for conflict management determine not only the success of the reforms in the immediate future, but also the outcomes of future shocks.

Table 1.1 shows the production levels prior to and following the reforms for the sample cases.[7] Since each case has a separate reform date, the prereform period encompasses the five years prior to the reform—including the

Table 1.1 Production before and after the Reforms

		Period		*Production ('000 mt)*		
Commodity	*Country*	*Pre-reform*	*Post-reform*	*Pre-reform*	*Post-reform*	*2004–08*
Coffee	Kenya	1988–92	1993–97	87	82	47
Coffee	Uganda	1988–92	1993–97	121	172	167
Cashew	Mozambique	1990–94	1995–99	23	39	41
Cashew	Tanzania	1988–92	1993–97	26	59	90[a]
Coffee	Tanzania	1990–94	1995–99	47	46	53
Tea	Kenya	1988–92	1993–97	187	229	336
Tea	Tanzania	1989–93	1994–98	90	105	141
Cotton	Zambia	1990–94	1995–99	47	79	152
Tobacco	Tanzania	1991–95	1996–2000	22	35	52

Source: Authors.

a. Cashew production in Tanzania has been higher in the last five years but it is much lower than the peak production attained in the post-reform period (see figure 1.9).

reform year—and the post-reform period encompasses the five years following the initiation of the reform. In seven out of the nine cases, output increased substantially following the reforms. The exceptions are coffee in Kenya and Tanzania. These results partially support the fact that there is significant short-run supply response capability in SSA and that the reforms, by changing the incentives for producers, led to these output increases.

The key constraint on commodity sector performance was insufficient producer incentives. By eliminating most of the intermediate agencies and reducing or eliminating export taxes and restrictions, the agricultural policy reforms led to higher prices for farmers. These reforms fit into the category of growth accelerations due to the elimination of major constraints and, as expected, led to spurts in output growth.

We also include the production levels for the last five years in table 1.1 as a proxy for the longer term sustainable growth outcomes. These figures are indicative of whether the initial supply responses were maintained and improved upon. Of course, given the cyclical behavior of production in many cases, output in the last five years might not give a clear sense of the sustainability of the growth process[8]; rather, these figures serve as an additional indicator influencing our judgments on the sector's status around 2008. The case studies and discussions below indicate that four cases can be thought of as showing sustained growth. These are Zambia cotton, Kenya and Tanzania tea, and Tanzania tobacco. In Kenya coffee, we do not observe increases either after the reforms or in the longer run. The other four cases can be treated as having nonsustained supply responses.

Reforms, Stakeholders, and Redistribution

In many countries, the agricultural policy reforms coincided with political reforms. In Kenya, Tanzania, and Zambia, long-time single-party systems were being abandoned and multiparty systems were being established. In Mozambique and Uganda, civil war had ended and attempts were being made to establish multiparty systems, although one dominant party maintained control. While many of the old leaders stayed in power, the political processes became more competitive, and new actors and groups obtained some voice and had to be accommodated in the distribution of the rents.

Along with political liberalization, the primacy of state in economic affairs was also being revisited. Many of the SSA countries had disastrous economic outcomes as a consequence of nationalization of production, processing, and marketing of export crops. In almost all countries, attempts were made to privatize economic activities, especially the parastatals involved in agricultural marketing and production. Agricultural reforms were undertaken under this set of circumstances.

Agricultural policy reforms ended up redistributing income from politically connected intermediary groups to mostly smallholder producers with little connection to the political elites. This pitted those groups that were benefitting from the ancient regime against those groups that were to benefit from liberalization. Losses were sustained by those political groups that were associated with the management of the parastatals, groups that were in key positions in public service, and private groups that had been given monopolistic powers by the political system.[9] Many of the old and some of the new intermediaries and processors were linked to the political elite and ruling parties. In some cases, the revenue bases of local governments depended on taxation of export crops, and these revenue bases were lost with reforms. Other groups, such as agricultural producers and private marketers and processors, were beneficiaries of the reforms.

Policies were also influenced by two groups that entered into the economic sphere at the time of the reforms. The first of these new groups was the multinational companies that entered the sectors and started to work with the smallholders.[10] Historically, these companies had played a role through the large estates that they managed. Now, they began working directly with smallholders, supplying them with the services previously provided by the parastatals before the reforms.

A second group with an important role in policy discussions was the donor community. Most of the reforms in SSA were undertaken under pressure from international financial institutions and other donors. This was especially important during the early 1990s, when most of the SSA countries were effectively bankrupt, and donor groups gained greater influence by shifting their aid from project support to "structural adjustment" that required governmental policy reforms. Later, these groups insisted on similar policy changes in return for debt write-off.

One import indicator of changes in the income distribution is the share of the export price received by the producers. Historically, this share has been very low, which discouraged production and was seen as an important constraint to greater supply response. So, a key objective of the reforms was to increase this share. This measure of redistribution was used as an indicator of success in the evaluations of African reforms (Townsend 1999).

Table 1.2 shows the share of export price obtained by the producers five years before the reforms and five years after the reforms. Changes in this ratio illustrate the changes in the distribution of income between the producers and intermediaries. In six out of nine cases, there is a substantial

Table 1.2 Changes in the Producers' Share of Export Price Following Reforms

		Period		*Producers' share of export price (%)*	
Commodity	*Country*	*Pre-reform*	*Post-reform*	*Pre-reform*	*Post-reform*
Coffee	Kenya	1988–92	1993–97	51	80
Coffee	Uganda	1988–92	1993–97	12	39
Cashew	Mozambique	1990–94	1995–99	22	39
Cashew	Tanzania	1988–92	1993–97	37	54
Coffee	Tanzania	1990–94	1995–99	73	94
Tea	Kenya	1988–92	1993–97	68	85
Tea	Tanzania	1989–93	1994–98	28	26
Cotton	Zambia	1990–94	1995–99	72	60
Tobacco	Tanzania	1991–95	1996–2000	35	34

Source: Authors.

increase in the share of export price going to the producers. This shows that the reforms were successful in their objective of transferring income from intermediaries to producers. At the same time, these changes can also be interpreted as having disturbed the previous income distribution and political equilibrium, and this disturbance can be an important reason for lack of consensus. In three cases, Tanzania tea, Tanzania tobacco, and Zambia cotton, the producers' share of the export prices did not increase after the reforms. The reforms in these three cases did not change the rent distribution against then-existing processors and intermediaries. Yet, in these three cases longer term sustained growth occurred. In the other six cases in which significant redistribution occurred, five did not achieve sustained growth after the initial spurt. These are cashew in Mozambique and Tanzania, and coffee in Kenya, Tanzania, and Uganda.[11] Although not perfect, these results suggest that redistribution played an important role in the sustainability of policy changes and growth accelerations.

Finally, the arrangements for production, processing, marketing, and support require specific institutional structures. As pointed out before, these were organized around the parastatals, which were being eliminated with the reforms. Somewhat different institutional arrangements emerged for different commodities and countries after the reforms. It is to these organizational structures that we now turn.

Political Economy of Institutional Arrangements and Outcomes

In almost all countries, the farming sector, especially smallholders, needs and receives significant price and nonprice support. The nonprice support, which includes research, inputs, extension, credit services, and investments in supporting infrastructure, has to be taken into account in analyzing the output behavior of agricultural commodities. Furthermore, since a commodity is only one sector among many, the amount of support it receives compared to other sectors is also important in determining its performance.[12]

An important part of support is the organizational arrangements and the quality of the institutions that supply this support. In SSA before these reforms, this support was supplied through parastatals.[13] In general, these support systems have not been very effective in SSA (World Bank 2008), and most of the public agencies tasked to undertake this support actually taxed the agricultural sectors through interventions in marketing and processing, rather than providing farmers with better seeds, new technologies, better transport, and easier access to credit. At the time of the reforms, most of these agencies had gone bankrupt and were not effectively supporting the sector. Therefore, reforms focused primarily on eliminating these often bankrupt marketing companies, along with removing restrictions on trading and production of the crops and reducing export taxes.

The agricultural policy reforms also intended to reform these public institutions to deliver better support to agricultural production, especially to smallholders.[14] Yet, these reforms did not create the type of institutions that could manage existing conflicts or those conflicts that could arise in the face of lower international prices or other internal or external shocks. Furthermore, the institutions that existed, such as cooperative associations, ministries, and other agencies, were not designed to manage potential problems because both the legal arrangements and the relevant stakeholders had changed with reform. Thus, the reforms were mostly policy changes without significant institutional development.

In the cases in which the existing arrangements were satisfactory, usually an established marketing agency existed that had been given some autonomy by political leadership. In these cases, it was easier to move to a framework of greater autonomy and efficiency in delivering support. The Kenya Tea Development Agency (KTDA) is one such example. In other cases, this efficiency and autonomy were assisted by the existence of strong multinational companies that protected these agencies and the smallholders associated with them. Tea and tobacco in Tanzania and cotton in Zambia show that large international companies can extend significant support to the commodities, given their resources. The existence of specialized research institutes and dedicated programs for seeds, pesticides, credit, and the like also help farmers to overcome shocks and sustain higher long-run growth rates. Technological developments and their rapid dissemination, such as *Bacillus thuringiensis* (Bt) cotton in China and India that significantly increased yields and outputs, are equally important. In such cases, discontinuities are present that have to be treated outside the normal paradigms.

In five cases, the old parastatals were either privatized in name or given so-called autonomy. These agencies maintained their traditional behavior, with some ad hoc improvements. Availability of special donor projects for these commodities sometimes created periods of increased support. In Mozambique, the cashew promotion organization INCAJU (*Instituto Nacional do Caju*, the National Cashew Institute) is still very much a public agency although it was given autonomy long ago, and its support to smallholders is considered to be quite weak. In Kenya and Tanzania, coffee cooperatives continued to control marketing and were never really privatized, thus creating an inefficient system of support for smallholders. In Tanzania cashew, a series of changes occurred in which cooperatives and local governments repeatedly interfered with marketing channels after the reforms. In Uganda, the Uganda Coffee Development Authority (UCDA), which is a statutory public agency, never really operated as an efficient supplier of support. This does not mean that these agencies provided no support to producers. For example, cashew spraying and seedlings were supported in both Mozambique and Tanzania. But these supports were not efficient, long-lasting, or effective in changing the nature and profitability of the commodity in question.

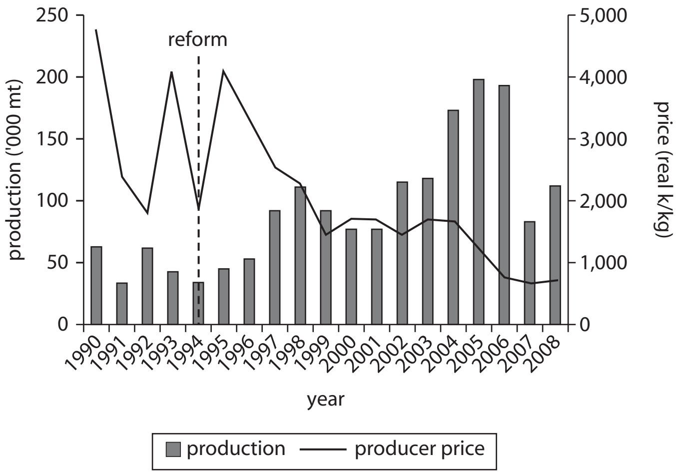
A related question is why parastatals were eliminated in some cases but continued to exist as quasi-parastatals in others. Again, our hypothesis is that these outcomes are not independent of the original social and political consensus about the reforms and the degree of conflict about the reform program. As explained below, the evolution of support systems is not accidental and is also determined by the strength of different groups of stakeholders and their ability to transfer resources to different groups. The interaction of political and social conflicts is also reflected in organizational support structures.

In the nine Sub-Saharan African cases analyzed here, three different post-reform institutional arrangements have evolved. These are not the only institutional arrangements possible; however, these have been identified in our specific cases. These organizational structures are related to the crop's role in political rent seeking and to the relative powers of different groups with a stake in the distribution of rents. Two groups of cases that we identify as more successful—those in which large multinationals provided direct support and those in which multinationals provided protection through international estates—demonstrated less initial political and social conflict on the reform program, enjoyed less volatile world prices for the commodity in question, and had better nonprice support.

Direct support by large multinationals. In SSA, one outcome of the reforms was the replacement of parastatals by large international companies that supplied inputs and extension and created a ready market for the output under quasi-monopsonistic conditions. Cotton in Zambia and tobacco in Tanzania fit this description (Mitchell and Baregu 2012b; Yagci and Aksoy 2012). These monopsony powers were legally structured in Tanzania and were very effective, although they were less formally structured and less effective in Zambia. In both cases, the export crops were not very significant in terms of their volume and were not major sources of patronage from politically connected groups before the reforms. In both cases, parastatal companies were effectively and quickly privatized, along with their processing facilities. The private multinational companies were allowed to find solutions to side-selling and the lack of contract enforcement—basic problems with outgrower systems—without heavy-handed interventions by the state. In the terminology developed earlier, these cases could be classified as having less social and political conflict and a greater degree of political consensus on the reform program.

In Zambia, the public sector cotton parastatal LINTCO (Lint Company of Zambia) had a monopoly in cotton ginning and marketing and was effectively bankrupt. LINTCO had not paid farmers regularly for a long time, and, in the last few years before reform, even its staff had not been paid for many months. It was privatized at the end of 1994, and its ginneries were sold to two multinational companies. There was little controversy over its privatization, and most of the staff was absorbed by the new companies. These companies began supplying credit, technical assistance, and seeds to the smallholders; they bought the resulting cotton and deducted the cost of inputs from sale proceeds. Output more than doubled after the reforms but declined rapidly after 1997/98 due to side-selling, credit defaults, and the collapse of the original arrangements (see figure 1.1). But even this collapsed level of output was much higher than it was before the reforms. By 2001, new arrangements were established and output started to increase; peak output in 2005 was fourfold higher than pre-reform levels. The arrangements collapsed again in 2006, due to a price shock caused by a significant appreciation of the currency. Again,

Figure 1.1 Cotton Production and Producer Prices in Zambia



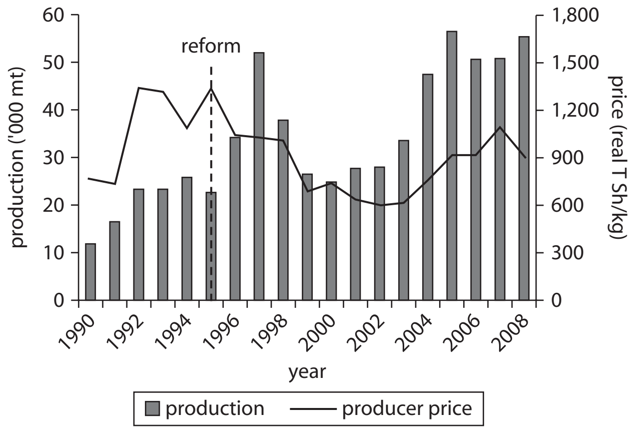
Source: Authors.

new arrangements were established and output has begun to go up again. These output increases took place despite steadily declining real producer prices (Yagci and Aksoy 2012).

In Tanzania, the private sector was allowed to market tobacco in 1995, and the processing company was privatized in 1997. A marked increase in output occurred after the initial reform, which continued until 1997 (figure 1.2). When the parastatal company was privatized, two multinational companies entered the market and began extending credit and supplying inputs to the smallholders. In 1998, side-selling caused a credit default by the farmers. The companies reduced their input supply and lowered the prices paid to farmers to compensate for the loan losses. This led to declines in output. A new arrangement was reached in 2000, when a quasi-monopsonistic arrangement was instituted; output exploded, helped by more satisfactory nonprice support and gradually increasing producer prices (Mitchell and Baregu 2011b).

In these two cases, reforms were successful despite internal and external shocks and other structural breaks. The sectors were able to find ways to reestablish a new equilibrium and continue the growth process. Output in both cases increased substantially, despite the fact that producer price did not increase significantly. Significant quality increases were also achieved in both cases due to better extension by the multinational companies. These companies, in both cases, were permitted by the

Figure 1.2 Tobacco Production and Producer Prices in Tanzania



Source: Authors.

state to experiment with alternative contractual arrangements for the provision of “support” while exercising their monopsony powers. Both experienced negative shocks and output collapses, once at the start of the privatization program in Tanzania due to side-selling, and twice in Zambia, once due to side-selling and once due to a price collapse caused by currency appreciation.[15]

At the same time, there are differences between the two cases. First, the Tanzanian tobacco producers were able to establish a tobacco board from the beginning and were allowed to set up an arrangement that was an effective monopsony. In Zambia, attempts were made to set up a cotton board, but it never became effective and the firms were left to their own devices.

Second, throughout the period of 1990–2008, the volatility of cotton producer prices in Zambia was more than twice as high as the volatility of tobacco prices in Tanzania. So, the higher price volatility in Zambia cotton could have contributed to the two collapses.

Third, significant productivity increase occurred in Tanzania tobacco after the reforms, whereas there was almost no productivity increase in Zambia cotton. Although there might be alternative explanations for the difference—higher volatility, shocks occurring in the middle of the reform period, and the like—one possible explanation might be the selection of farmers. In Zambia, the expansion was carried out essentially by increasing the number of farmers—area expansion. Most of the farmers who were added on in the years of expansion were smaller producers who had much lower productivity. The addition of these low-productivity farmers kept average productivity from increasing. In Tanzania, farms producing tobacco traditionally have been larger ones because the establishment of curing barns requires more substantial farmer investment than does the production of cotton. Thus, the entry of new and inexperienced farmers was much less in tobacco than in cotton. Significant investments by larger farmers for tobacco curing barns and other equipment signal more credible contractual and larger financial commitments. Therefore, vertical coordination along the supply chain can more easily be achieved with larger farmers than with smaller producers who have less investment in their commodity production.[16]

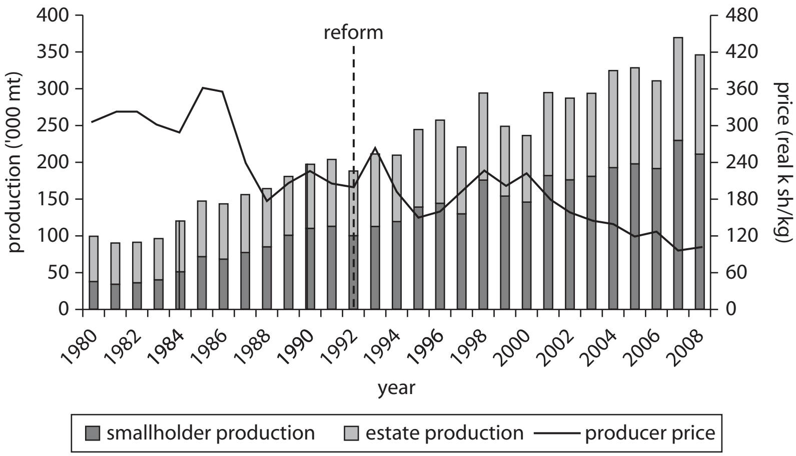
Protective structure with international estates. The second group for whom reforms were also successful consists of tea sectors in Kenya and Tanzania (Baffes 2005a; Mitchell 2012).[17] In this instance, large multinationals have successfully erected a support mechanism for smallholders. The tea sector is somewhat different from the other commodities because the output has to be processed very quickly, and the multinational companies dominate the international market. Tea prices have been rather stable, and the arrangements for international marketing have also traditionally been dominated by multinational tea companies.

The tea sector in Kenya has always been very well managed and continued to be well managed after the privatization of the KTDA in 1992.[18] The KTDA has effectively supported this sector by supplying research, inputs, and technical assistance and was not involved in the marketing of tea. Both estate and smallholder production has increased at similar levels. Despite declining producer prices, output has continued to increase and quality has continued to improve (figure 1.3).

Although Tanzania nationalized most export crop estates, tea was mostly excluded. Only two tea estates were nationalized because they were a part of a holding company that was nationalized. After the reforms in 1993, the two nationalized estates were privatized. In 2000, six of the tea factories owned by the tea authority were sold, and the regulatory and development functions of the tea authority were separated. The sector has expanded, and the support mechanisms developed jointly with the estates have been improved. Output has continued to increase despite declines in producer prices (figure 1.4).

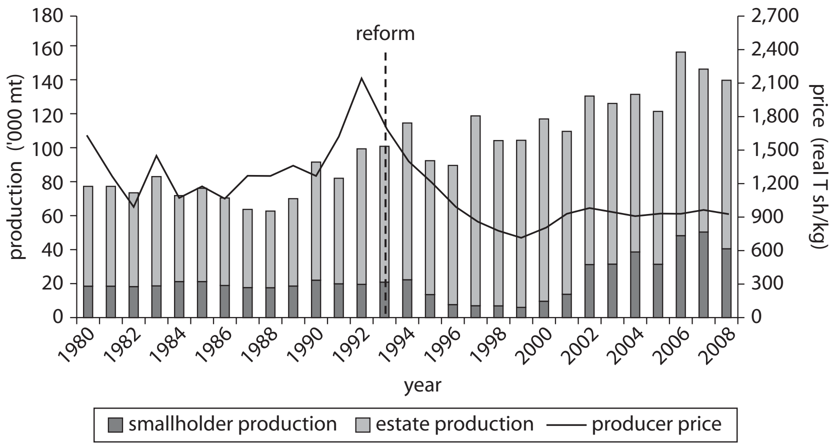
In these two cases, the multinational tea companies were rather strong, in both local and international markets. In both cases, support to

Figure 1.3 Tea Production and Producer Prices in Kenya



Source: Authors.

Figure 1.4 Tea Production and Producer Prices in Tanzania



Source: Authors.

production was available because estates provided a part of the output. Baffes (2005a, 590) has argued that the tea sector differs from other sectors in Tanzania:

> First, the reforms of the tea sector started much earlier than Tanzania's other export crop sectors (e.g. coffee, cotton, cashews). Second, there was no apparent "supply-driven" assistance or push for reforms; by and large,

reforms originated from within the country, accordingly characterized by a considerable degree of government and sector ownership. Third, the reforms have been largely successful, although much remains to be done. Finally, it has taken a considerable amount of time and resources for the reforms to be carried out.

In Tanzania, the nationalization of most enterprises spared the tea estates, except for the two companies that were part of nationalized holding companies.

In Kenya, the KTDA has always been successful, and it is one of the very few cases in which privatization has converted it to a smallholder-owned company (Ochieng 2010; Tyler 2007). Under President Kenyatta, predominantly coffee and some tea producers (mostly Kikiyu from the Central Province) were allowed a great degree of institutional and associational autonomy, supported by a friendly government.[19] These groups formed the basis of support for the political system under Kenyatta. In 1978, President Moi was elected, and his support base was the Kalenjin group from the Rift Valley. The change in the presidency meant that the power base of President Kenyatta—the coffee- and tea-producing Kikiyu families—became disfranchised. This led to the total takeover and mismanagement of the coffee sector by the government (its subsequent long-term demise is explained in the section on Kenya coffee). In the case of tea, however, there were other developments. the Commonwealth Development Corporation (CDC) and the World Bank had outstanding loans to KDTA and had veto powers on some decisions (Ochieng 2010). The most important of these decisions was the expansion of tea production outside the Central Province and among Kalenjin groups in the Rift Valley. Increased incentives were provided to the production of tea by non-Kikiyu groups in sections of the Rift Valley province where it was not grown before (Lofchie 1994). Thus, a new arrangement that supported those groups allied with the political leadership meant that policy changes did not reverse the quasi-independence of the KTDA, which was fully privatized to the smallholders in 2000. Therefore, historical developments helped the sector to maintain its quasi-autonomous status, and there was much less controversy and conflict over its reform.

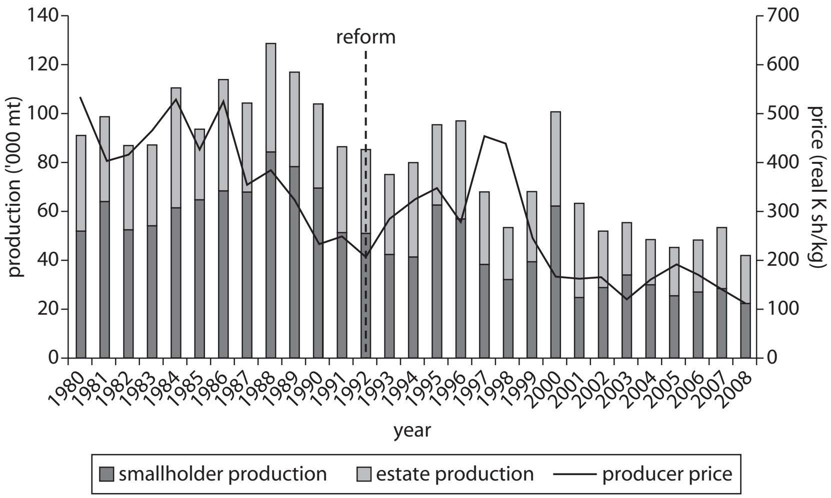
Thus, the estates and smallholder support agencies in both countries were left to manage themselves. They also created a protective structure around the smallholders through supplying them with inputs and know-how, and through purchasing their crops and paying them on time. The tea sector reforms were successful.

Reforms with quasi-reformed parastatals. In the third group of cases, an initial positive supply response occurred after the agricultural policy reforms, but this supply response could not be maintained in the face of internal and external shocks. These cases are cashew in Mozambique and Tanzania, and coffee in Kenya, Tanzania, and Uganda (Aksoy and Yagci 2012; Baffes 2005a; Baffes and Onal 2012; Mitchell 2012; Mitchell and Baregu 2012a). These are a rather narrow set of commodities and countries, but they are representative of many other cases in the SSA, where major liberalizations gave way to ad hoc support arrangements. In all these cases, the parastatals were privatized but continued to be tied to the state. In all these cases, the smallholder producers were not aligned to the interests of the political leadership, but the intermediaries were. In all five cases, reforms changed the distribution of income in favor of the producers. The quasi-parastatals and other intermediaries tried to reverse the changes in the distribution through regaining control of the production and marketing. The controversies associated with these conflicts led to lack of sustained support to the smallholders. In these cases the supply depended on the behavior of international prices and domestic exchange rates as well as the ad hoc supports supplied by these quasi-parastatals or donors. In these five cases, reforms led to immediate output increases, but negative price shocks along with continuing conflict led to anemic long-run growth.

Coffee was one of the key export sectors in Kenya throughout the 1970s and 1980s. New governments decided to reduce the incomes and political power of the coffee producers. Reforms to reduce the control of the cooperatives, allow private sector millers, and let the producers to conduct trades in foreign exchange were implemented in 1992. This led to a pickup in production assisted with the increases in producer prices until 1995. In 1997 the remaining positive controls on cooperatives were lifted and the inefficient cooperatives were allowed to operate without any controls. They were also staffed by people not associated with the producers (Mitchell 2012; Mude 2006; Nyangito 2001). These developments and declining producer prices led to a major decline in production (figure 1.5).

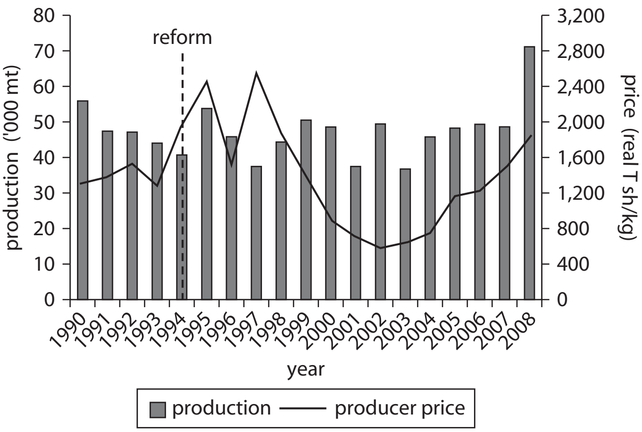
Performance of the coffee sector in Tanzania also illustrates a case in which supply response to the reforms was weak and output basically followed the trend in producer prices (figure 1.6). This is despite the fact that many coffee estates have been privatized, and outputs in these estates have increased. In 2003, a direct marketing channel was opened for specialty coffee producers. This change, along with increasing producer prices, led to some increases in output. Despite these recent

Figure 1.5 Coffee Production and Producer Prices in Kenya



Source: Authors.

Figure 1.6 Coffee Production and Producer Prices in Tanzania

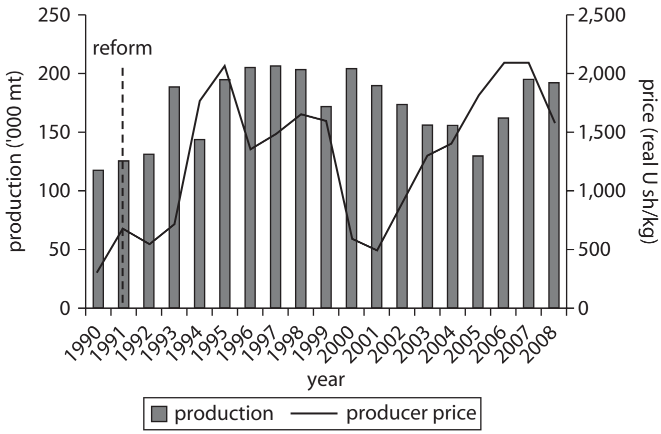


Source: Authors.

positive developments, output at the end of the period is at about the same level as it was just after the reforms (Baffes 2005b; Lofchie 1994; Mahdi 2010).

The Uganda coffee sector illustrates the positive effects of reforms that could not be maintained and improved (figure 1.7). Reforms coupled

Figure 1.7 Coffee Production and Producer Prices in Uganda



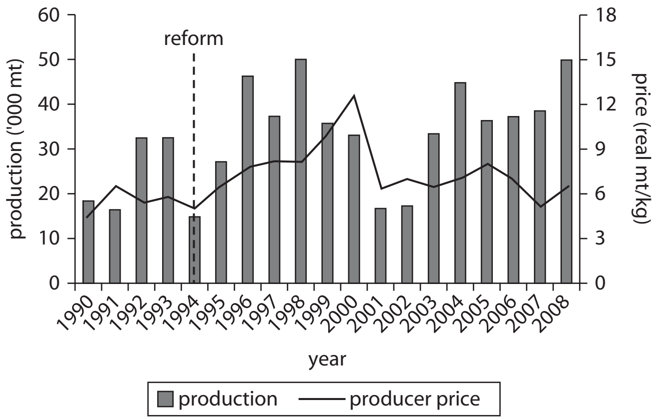
Source: Authors.

with increasing international prices have led to an almost doubling of output in a few years (figure 1.8). Producer prices increased because of the increasing share of export price paid to the farmers, devaluation, and the increase in international prices. Collapse of international prices, inability to deal effectively with coffee wilt disease, and a very unsuccessful replanting program led to the gradual collapse of output. By 2005, coffee output had declined to its level before the reforms. Producer price increases since then have led to an increase in output, but, by 2008, it had not reached its level of late 1990s (Baffes and Onal 2012).

Cashew reforms in Mozambique have been one of the most contentious and highly publicized reforms in SSA. Export restrictions on raw cashew were eliminated in 1994, and there was a rebound in marketed output despite high export taxes. This continued until 2000, when international prices collapsed along with output. A gradual improvement in the response occurred throughout the mid 2000s, supported by developments in labor-intensive processing, support for spraying for diseases, and a replanting program. Despite these more positive developments, officially marketed output only reached its post-reform peak in 2008 (figure 1.9).

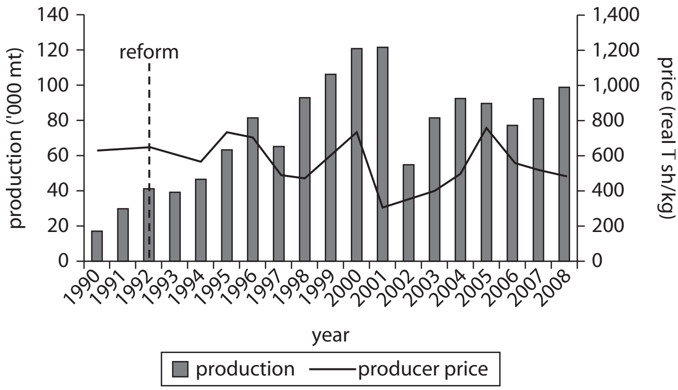
Tanzanian cashew reforms started in 1992, when marketing was liberalized and private sector participation in marketing was allowed. Within a few years, the private sector developed input and marketing channels, and a shift also occurred from selling processed nuts to raw nut exports.

Figure 1.8 Cashew Production and Producer Prices in Mozambique



Source: Authors.

Figure 1.9 Cashew Production and Producer Prices in Tanzania



Source: Authors.

After 1999, local governments slowly started to increase the taxes on cashew output, which reached as high as 60 percent of the value of output. Partial attempts were made to reverse these policies, but they were all short-lived, and local authorities managed to affect payments to smallholders either directly through taxation or through cooperatives and primary societies. The Cashew Board of Tanzania managed to affect the pricing and marketing decisions throughout this period. Although output has started to increase during the last few years, it is much lower than its peak level achieved during the early 2000s and much lower than the levels obtained in the early 1980s. In 2007, the new warehouse receipts system brought the cooperative back directly into the marketing system, which does not bode well for the future (Mitchell and Baregu 2012a).

In all these cases, a series of common themes occurs. Initially, the distributive system was very much against the producers, and the reforms increased the producers' share of the world/export prices. The reforms effectively redistributed income from the processors (intermediaries) to farmers, leading to higher producer prices and increases in production in the immediate post-reform period. In almost all cases, there were also conflicts and disagreements on the nature of the reform program. Arrangements for arbitration and mechanisms to monitor the emerging problems within the sector were absent. These five cases (cashew in Mozambique and Tanzania, coffee in Kenya, Tanzania, and Uganda) fit into the structure of developments outlined in the earlier sections of the chapter, in which reforms removed the immediate binding constraints on production and triggered a subsequent supply response but did not create institutions that could sustain these changes.

No support mechanisms were built into the reform programs or developed after the reforms. Ad hoc attempts were made to support smallholders, but none of them were systemic institutional changes.

In cashew reforms in Mozambique and Tanzania, powerful groups sustained large losses and, thus, a consensus on the reforms could not be achieved. In Tanzania, these groups included the local governments and cooperative unions, whereas in Mozambique the losing group was private processors closely tied to the ruling party. Success of coffee reforms in Kenya depended on the outcomes of a tribal struggle. Coffee growers supported the earlier regime and were penalized for it by the new government (Lofchie 1994). The reforms were never successful. Thus, the degree of political conflict for coffee reforms was quite high, which could have amplified the impact of external shocks. In Tanzania coffee, the cooperatives effectively blocked reforms and continued to extract rents through local taxes or controlling the marketing systems (Baffes 2005b; Mahdi 2010). Even a decade after the reforms, most of the policy changes are still controversial, and there is still no consensus on their desirability.

Reforms increased the share of the world/export price going to farmers. Farmers responded if this increase in their shares also corresponded to an increase in real producer prices. If those were also favorable (i.e., not decreasing substantially), output expanded. The supply response continued until an international price collapse or an intervention by the state occurred to reverse the price increases for producers. Due to a lack of systemic support arrangements, output in this group of five countries has been much more sensitive to real producer price developments than in the other two groups, in which support could maintain the supply response despite unfavorable prices.

The current outputs in these cases often remain at levels that were achieved just after the reforms. Prices indeed drive output, but within the limits of what has been achieved before reform. Output increases have occurred in recent years primarily because of increases in international prices. In these cases, we do not observe structural changes leading to much higher output levels, as we see in the two other more successful groups.

Conclusions

In this chapter, we have sought to develop a framework to help explain the outcomes of agricultural sector reforms in Sub-Saharan Africa using a set of nine case studies as examples. The framework is inspired by the work of Rodrik, which postulates that sustained GDP growth is a function of the degree of consensus that exists in a society and the ability and strength of institutions to manage distributional conflicts. Shocks, especially price shocks, whatever their cause, can trigger conflicts because they redistribute incomes from one group to another. The greater the consensus around an initial set of policy reforms, the higher the likelihood that groups found and developed new arrangements to solve such conflicts and continue growing. When such an initial consensus is lacking, shocks are more likely to result in policy reversals. It is not the design of the initial reform that guarantees success, but the ability of the stakeholders to redistribute incomes (accept redistribution) when an unexpected development takes place. We argue that this is determined to a large degree by the level of consensus that existed on the initial reforms.

Reforms are multistage processes. The focus of the agricultural policy reforms in SSA was predominantly on the "first stage," in which regulatory and fiscal constraints on the private sector were reduced or eliminated. Following such first-stage reforms, production increased in seven of the nine cases analyzed here, and the reforms appeared to be successful. This initial positive response often led the governments and donors to complacency and delayed actions to respond to potential problems. In some cases where farmers received a higher share of export prices and increased their output, these output gains were not sustained. We attribute this to the significant redistribution from the elites to the farmers, which led the former to try to reverse the reforms and destroy the new arrangements. In many cases, the crises were also triggered by a negative price shock that lowered producer prices and exacerbated the conflict among different stakeholders on how to redistribute the reduced returns. The absence of significant nonprice support in many cases amplified the effects of these shocks and delayed the supply response when prices improved.

On the other hand, there are cases in which the reform programs were successful despite internal and external shocks. In these cases, the sector was able to reorganize itself, find ways of meeting the new challenges, and reach a new equilibrium that led to sustained growth in output. Examples included the redesign and extension of smallholder support mechanisms and better nonprice support programs. Support institutions in these cases were given greater autonomy and were more efficient—responses to shocks were quick and positive.

Our main hypothesis is that the key variable that explains the capacity to respond to external and internal shocks is the degree of political and social consensus on the reforms. In those cases in which first-stage positive supply response could not be maintained, the degree of political and social consensus on the reforms was also weak from the beginning. In addition, the mechanisms to redistribute income after a negative shock were not built into the new institutional arrangements. Old groups that received rents from the activity either maintained their shares or came back in after the reforms to reestablish their shares. The conflicts also led to an undersupply of services to smallholders, which led to fights over a smaller output. The cases discussed in this chapter also show that, without generating an acceptable outcome among the stakeholders, attempts to develop effective and efficient support systems can easily fail as they may be corrupted and used to reestablish pre-reform distributional outcomes.

In the cases in which the reforms were successful, there was greater consensus on the reform program. The rent-seeking fight was not intense, and usually producers were one of the stakeholders supported by the governments. Although difficult to prove conclusively, the existence of more autonomous and efficient nonprice support agencies could also be related to the lack of conflict around these commodities. From our limited cases, one important new development seems to be the entry of international companies and their operation through new legal arrangements supported by international donors. This model seems to work better if the product is small vis-à-vis the rest of the economy and is not important historically as a key sector in rent allocation. The successful cases also suggest that nonprice support is as important as the pricing of the commodity. But low shares given to the farmers under these arrangements leave them open to predation by other private sector entrants or by previous stakeholders, such as cooperatives and other agencies. Finally, in most of the successful cases, there was enough political and economic space for the stakeholders to find alternatives to existing arrangements in the face of external and internal shocks.

The literature argues that in low-income countries with less developed institutional systems, positive outcomes depend on those agreements among the elites that determine the allocation of benefits among the groups they support (Levy 2011; Levy and Spiller 1996). In all our cases, established arrangements existed before the reforms, in which the parastatals were used to allocate the rents among different groups. In some, these groups consisted of cooperatives and local governments; in others, politicians and public sector employees were involved in the distribution. When these systems collapsed in late 1980s, conflicts came to the fore and new groups emerged that had a say in the outcomes.

There is sufficient diversity in the outcomes across similar products and countries to suggest that it is possible to have local-level outcomes that are different from national ones. There can be local successes, as well as failures. The cases discussed in this chapter suggest that, rather than trying to model the political economy structures within countries, more emphasis should be placed on subnational and sectoral arrangements and outcomes (Levy 2011). Without well-developed institutional support structures and explicit agreements between all stakeholders, it is difficult to generate sustained growth episodes even in micro and local environments. Formal or informal mechanisms that bring stakeholders together and allow disparate parties to develop alternatives to shocks and unforeseen developments seem to be the only reasonable strategy.

Notes

1. The timing of the reforms—mostly in the early 1990s—coincided with increases in international commodity prices. The period 1990–97 was characterized by increasing international commodity prices. These prices began to decline in 1997, in tandem with the Asian financial crisis. The period of declining and low prices continued until 2002, after which another price increase spiked in 2008. The price declines that occurred after 1997 were passed on to the producers but, in most of the cases in our sample, the

post-2000 price increases were not passed on to the producers because of appreciating local currencies. Output collapses took place when the international prices for such commodities started declining. For details, see Onal and Aksoy (2012).

2. North et al. (2009) also place the ability to adjust to shocks as a key variable creating higher growth in open access societies compared to limited access ones.
3. The term "shock" is used throughout the study as an unforeseen development that upsets the status quo and requires collective action for its solution.
4. The distinction between an internal and external shock is not very clear, especially in a commodity-based analysis. For example, a change in the international price of a commodity is clearly an external shock, but changes in real exchange rates that have the same effect as the change in international prices would be internal. In this chapter, the term "shock" will be used to denote a change that upsets the existing arrangements, whether it originates internally or externally.
5. This is pointed out by Acemoglu and Robinson (2006, 20): "Most policy choices create distributional conflict; one policy benefits one group while another benefits different individuals."
6. In the design of the reforms, their redistributive effects are not explicitly discussed. The implicit assumption is that the gains from greater output would allow everyone to gain from the reforms. However, the productivity and output gains are usually attained over a longer time period, whereas the income losses are immediate. Furthermore, most countries lack the redistributive instruments to reallocate incomes.
7. The details of the output movements, along with the behavior of producer prices, are analyzed in the following sections. For further details, the reader is referred to the original papers.
8. Commodity prices have been increasing for the last few years, which might skew the results of the last five years.
9. There are debates on whether one can define the managers and workers in the cooperative and parastatal sector as an interest group. In many countries, they are among the local supporters (cadres) of the party in power or are associated with the tribe that was in power. Thus, the group in power must support them in one form or another to maintain its power base.
10. In most countries, these multinationals existed in one form or the other, but privatization and liberalization gave them the opportunity to establish themselves as key actors in cotton production in Zambia and tobacco production in Tanzania. They were already established in the tea sectors in Kenya and Tanzania.

11. The sixth case of Kenya tea is a special one in which the interests and political base of the leadership and the smallholder tea producers coincided.
12. Nonprice supports can be classified under three main headings. First is support through the development of new seeds, new disease-mitigating activities, development of improved farming technologies, and other research-related activities. Second are investments in irrigation, drainage, transport, credit, marketplaces, etc. to increase the productivity of farming and lower the cost of doing business for farmers. Third is support through extension and similar programs that educate and help especially smallholders to take advantage of new research developments and farming systems. These are the activities implemented by the ministries of agriculture and constitute the core of project support from international organizations, such as the World Bank, the Food and Agriculture Organization, the International Fund for Agricultural Development, the Consultative Group on International Agricultural Research, and others. It is possible to organize the nonprice support to agriculture under different headings but the specific activities under these headings would be very similar.
13. In some countries, new seeds, better methods of farm management, infrastructure support, and the like were supplied reasonably efficiently by the public sector, such as coffee in Vietnam and cotton in China and India. Earlier work on agricultural service delivery had shown that even before the Doi Moi reforms, an efficient and extensive system of support existed for the agricultural households (Aksoy and Isik-Dikmelik 2007).
14. Sector investment programs complemented the agricultural reforms in many countries and tried to integrate donor support around a common investment and institutional development program.
15. Recent policy reversals in Tanzania and the elimination of longer term contracts might create another collapse if not managed carefully.
16. The new Yield Improvement through Empowerment, Learning and Discipline Program started by Dunavant in Zambia seems to recognize the differences between large and smaller farmers and tries to focus on larger farmers, who might have higher productivity and longer term commitment to the sector.
17. For the Tanzania tea case, we rely primarily on the work of Baffes (2005a, 2005b), Ochieng (2010), and Tyler (2007).
18. In Kenya, both the coffee and tea sector reforms were undertaken under the Public Enterprise Reform Program supported by the World Bank. There were also investment programs for both tea and coffee. Although the tea projects were highly successful, the coffee projects were not.
19. In the case of coffee, the policies that supported the Kikiyu coffee producers were abandoned and reversed to bring in greater control by the state.

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PART 1

Cross-Cutting Analysis

CHAPTER 2

International Commodity Prices, Exchange Rates, and Producer Prices

Anil Onal and M. Ataman Aksoy

International price developments are important for the success or failure of agricultural policy reforms. Price increases after policy reforms may ease the adjustment to a new equilibrium, whereas price collapses after a reform may jeopardize the whole program. In addition, high price volatility can impair longer-term commitments by farmers and, thus, lower long-term growth rates. Commodity prices increased during the early 1990s, when most agricultural policy reforms were implemented in Sub-Saharan Africa (SSA). Then, during the early 2000s, prices collapsed for most of the products affected. In most evaluations undertaken during the early 2000s, these price developments were not taken into account.

This chapter documents the behavior of commodity prices, international and domestic, and the timing of their increases and collapses between 1990 and 2008. Particular focus is placed on the transmission of international prices to domestic producers for our sample country/commodity combinations (nine SSA and three Asian cases). The extent to which international price volatility is reflected in domestic producer prices is examined first. Volatility can be caused by changes

The findings, interpretations, and conclusions expressed herein are those of the authors and do not necessarily reflect the views of the World Bank and its affiliated organizations.

in international prices, changes in real exchange rates that translate the international prices to local prices, changes in export prices, and changes in producer prices created by distributional changes (independent of the behavior of real exchange rates), international prices, or export prices.

A second dimension examined is the co-movement of international prices and domestic producer prices. In this context, domestic price levels can move with or independent of international prices. The timing of changes in producer prices affects the success of agricultural policy reforms. Rapid price collapses not only reduce the supply, but also affect the existing support and marketing arrangements, as well as the distribution of international price changes between producers and intermediaries. It is in this area that the real conflicts and policy debates take place. Finally, analyzing the price developments of the same commodities in different countries can provide some insight into the competitiveness of the commodity/country cases compared to their competitors.

In analyzing the effects of international price developments on commodity supply, four price series must be considered. In the first price series, international prices usually are expressed in nominal U.S. dollars, which are determined by world demand and supply. The second price series reflects the real local currency equivalents of international prices. Real local currency equivalents are obtained by converting international prices from nominal U.S. dollars to local currency units (LCUs) using nominal exchange rates and deflating them by either consumer price indices (CPIs) or gross domestic product (GDP) deflators. The difference between these two price series is determined by real exchange rate fluctuations. Real exchange rate movements can accentuate or attenuate volatility in nominal world prices. Export prices make up the third price series. Export prices may differ from international prices due to export restrictions, quality differences, and international transport margins. Finally, the fourth price series—producer prices—determines the supply of the commodity in question. Internal transport and processing (if relevant) costs and the market structure of the processing/export industry constitute the difference between export and producer prices.

The next section describes the data used in preparing this chapter. Then, an analysis is made of the volatility of international and producer prices for our sample of 12 country/commodity combinations: tobacco, cashew, coffee, and tea in Tanzania; cotton in China, India, and Zambia;

coffee in Uganda and Vietnam; tea and coffee in Kenya; and cashew in Mozambique. Following this, the co-movement of international and producer prices is examined.[1]

Data Description

International prices for the five sample commodities are from the Global Economic Monitor (GEM 2010). International prices are denominated in U.S. dollars and converted to real local currency unit (LCU) equivalents using nominal exchange rates and either CPIs or GDP deflators. The choice is driven by the series availability and is consistent with the subsequent case studies presented in this volume.[2] Exchange rates, CPIs, and GDP deflators are from World Bank world development indicators (WDI 2010).

Export prices for the 12 country/commodity combinations are unit export values from the United Nations Commodity Trade Statistics Database (COMTRADE 2010), as reported by trading partners. Partner data provide more reliable estimates for the SSA countries in the sample, whereas for the sample Asian countries partner-reported and own-reported data are very similar.

Unit export values from COMTRADE (2010) provide inconsistent estimates for those years with low export volumes. Export prices for Zambia cotton, for instance, are unreliable for this reason. Export prices for China cotton and India cotton have also been found to be inconsistent. Therefore, for the following analysis, international prices are used, leaving an analysis of export prices to the Annex.

This chapter's primary source for producer prices is Anderson and Valenzuela (2008), although alternative data sources were identified during the case studies. The producer prices of cotton in Zambia; tea, tobacco, and cashew in Tanzania; and tea and coffee in Kenya are from local sources in the respective countries. For the other coffee-producing countries in the sample, we use International Coffee Organization (ICO 2010) producer prices. China and India cotton producer prices from Anderson and Valenzuela (2008) are extended using the Food and Agriculture Organization (FAO) of the United Nations statistical database (FAOSTAT 2010). The Mozambique cashew producer price series from Anderson and Valenzuela (2008) is extended with data from local sources. Producer price series cover the period from 1990 through 2008, with the exception of coffee in Vietnam. In this instance, producer price data do not go beyond 2004. Producer prices are expressed in LCUs and deflated by domestic consumer prices or GDP deflators, using the same method as for the international prices. All prices are annual.

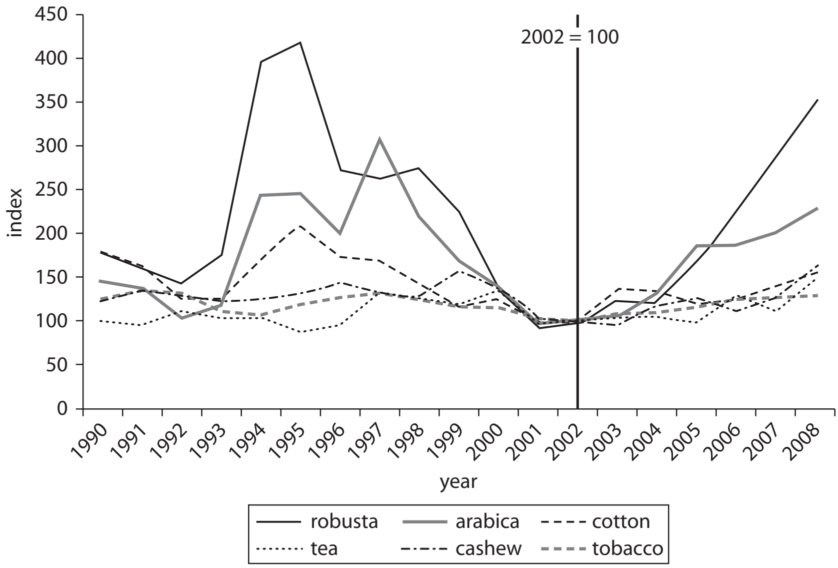
Transmission of International Price Volatility to Producers

The volatility measure used in this section is computed as the average of the absolute value of the residual price over the mean for a given series. The difference of this measure from standard deviation is that the latter gives more weight to the tails of the residual distribution.[3]

A simple look at the nominal world commodity prices in U.S. dollars, from 1990 until 2008, shows that among the five commodities in our sample, coffee (the robusta variety in particular) is the most volatile (see figure 2.1). After two coffee varieties, cotton is the second most volatile commodity in the sample, followed by tea, cashew, and tobacco.

In analyzing transmission of nominal international price volatility to domestic producers, we disaggregate the transmission mechanism into two components. The difference between the nominal world price volatility in U.S. dollars and the volatility of world prices in real LCUs reflects the effects of real exchange rate movements vis-á-vis the U.S. dollar. If the

Figure 2.1 Sample Commodity World Prices
Current U.S. dollar, 2002 = 100



Source: GEM 2010.

real exchange rates move in the opposite direction to international prices (i.e., they appreciate when international prices increase and vice versa), then exchange rates would reduce the international price volatility. If, on the other hand, currencies depreciate when international prices are increasing, and vice versa, then they would increase the volatility.

The difference between the volatility of international prices in LCUs and producer price volatility is caused by domestic policy variables, such as export taxes, transportation margins, processor returns, and the like. Similarly, if producer prices are further decreased (intermediate margins increased) when international prices collapse, then domestic intervention increases producer price volatility and vice versa. Table 2.1 shows the estimates for these two components.

The first four columns of table 2.1 show the absolute levels of the contributions of the real exchange rate movements and domestic distributional variables to the volatility of producer prices. Positive numbers indicate an increase in producer price volatility. The rightmost four columns in table 2.1 decompose producer price volatility into its three components: nominal international price volatility, exchange rates, and domestic policy effects. Total producer price volatility is normalized to 100, and the contribution of each component is given as a percentage of the producer price volatility. This exercise enables a cross-country comparison showing that, although most producer price volatility is caused by international price volatility, there are cases in which domestic policy variables have a greater effect or cases in which exchange rates are equally important. Figure 2.2 illustrates the findings.

The results are quite clear. Except for robusta coffee in Uganda and arabica coffee in Tanzania, real exchange rate behavior has increased the volatility observed in nominal international prices for all 12 sample country/commodity combinations.

More important than international price volatility is the volatility of producer prices because volatility in producer prices causes real shocks to and changes in the supply. In only four cases have domestic interventions reduced the volatility of international prices. These are Vietnam coffee and China cotton in Asia, and arabica coffee and tea in Kenya. In all other cases, domestic interventions have increased the volatility of international prices.

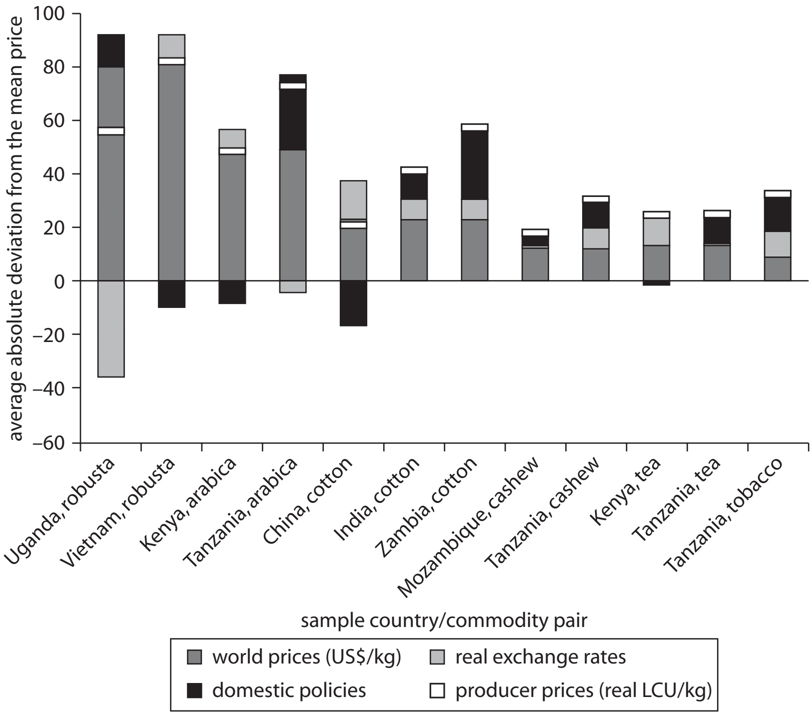
When analyzing the sum of both real exchange rate effects and domestic interventions, these reduce real producer price volatility significantly only in two cases: robusta coffee in Uganda and cotton in China. In two cases, they do not change the volatility measurably: robusta coffee in Vietnam and arabica coffee in Kenya. In the other eight cases (seven out of nine SSA cases), the net result of interventions has been to increase the

Table 2.1 Transmission of Commodity Price Volatility from World Markets to Producers

		World price volatility						*Determinants of producer price volatility*		
Commodity	*Country*	*Nominal US$*	*Real LCU*	*Real exchange rate effect*	*Producer price volatility (real LCU)*	*Domestic policy effect*	*Producer price volatility (real LCU)*	*World price volatility (nominal US$)*	*Real exchange rate effect*	*Domestic policy effect*
Robusta	Uganda	80.65	45.46	**–35.19**	56.27	**10.81**	100.00	143.34	–62.54	19.21
Robusta	Vietnam	82.41	91.44	**9.03**	82.11	**–9.33**	100.00	100.37	11.00	–11.36
Arabica	Kenya	49.38	56.60	**7.23**	48.92	**–7.68**	100.00	100.93	14.78	–15.71
Arabica	Tanzania	49.38	45.55	**–3.83**	73.01	**27.46**	100.00	67.63	–5.24	37.61
Cotton	China	23.59	37.46	**13.86**	21.24	**–16.22**	100.00	111.08	65.28	–76.36
Cotton	India	23.59	30.98	**7.39**	41.70	**10.72**	100.00	56.58	17.72	25.70
Cotton	Zambia	23.59	31.20	**7.61**	57.61	**26.41**	100.00	40.95	13.21	45.84
Cashew	Mozambique	12.59	13.65	**1.06**	18.61	**4.96**	100.00	67.64	5.71	26.65
Cashew	Tanzania	12.59	20.26	**7.68**	30.78	**10.51**	100.00	40.90	24.94	34.15
Tea	Kenya	13.76	25.97	**12.21**	24.95	**–1.02**	100.00	55.15	48.95	–4.10
Tea	Tanzania	13.76	14.26	**0.50**	25.29	**11.03**	100.00	54.41	1.98	43.61
Tobacco	Tanzania	9.40	18.94	**9.54**	32.90	**13.96**	100.00	28.58	29.00	42.43
Average		**32.89**	**35.98**	**3.09**	**42.78**	**6.80**	**100.00**	**72.30**	**13.73**	**13.97**

Source: Authors.
Note: LCU = local currency unit. Producer prices for Vietnam coffee are available only through 2004. World price volatilities are estimated for the periods for which producer price data are available.

Figure 2.2 Determinants of Producer Price Volatility for Sample Country/Commodity Pairs, 1998–2008



Source: Authors.
Note: LCU = local currency unit. Vietnam coffee producer price series does not extend beyond 2004; therefore, price volatilities for Vietnam coffee are calculated over the period 1990–2004.

volatility of real producer prices above the volatility of nominal international prices. No matter the reasons, domestic and exchange rate policies have amplified the volatility of nominal international prices for most cases in the sample.[4] Therefore, price shocks faced by producers have been much higher than would be expected from international price fluctuations. This fact increases the need for institutions that arbitrate among different groups with stakes in the vertical rents, especially during periods of negative shock.

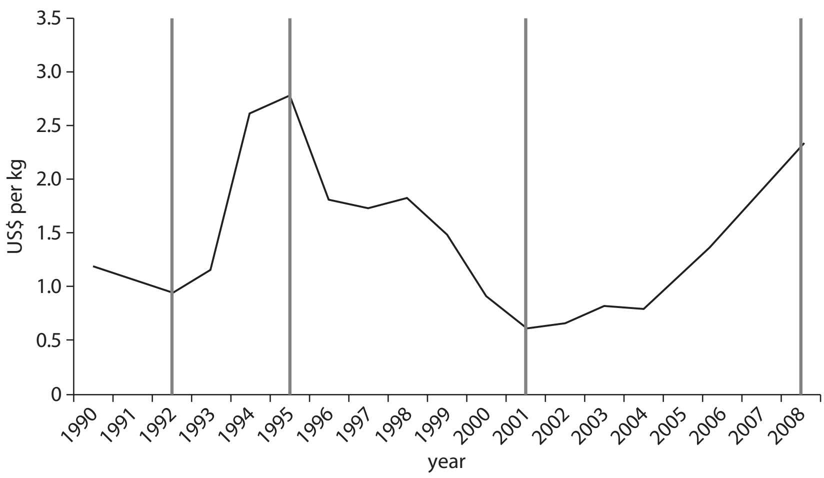
International Price Cycles, Exchange Rates, and Producer Prices

A simple volatility measure like that presented above provides several benefits, such as ease of computation, interpretation, and comparability across commodities and countries. However, it may also fail to indicate otherwise significant price increases or declines over shorter periods. Also, knowing whether international price cycles are observed in a similar manner at the producer price level helps explain how producer price cycles are generated and their relationships to those periods when important reforms are undertaken.

In the next sections, changes in international prices in U.S. dollars, international prices expressed in real LCUs, and real producer prices are analyzed and their behavior traced over the commodity price cycles. The plots in figures 2.3 through 2.10 of both producer and world price series in real LCUs are indexed so that their 2002 values are equal to the nominal U.S. dollar world price in 2002.

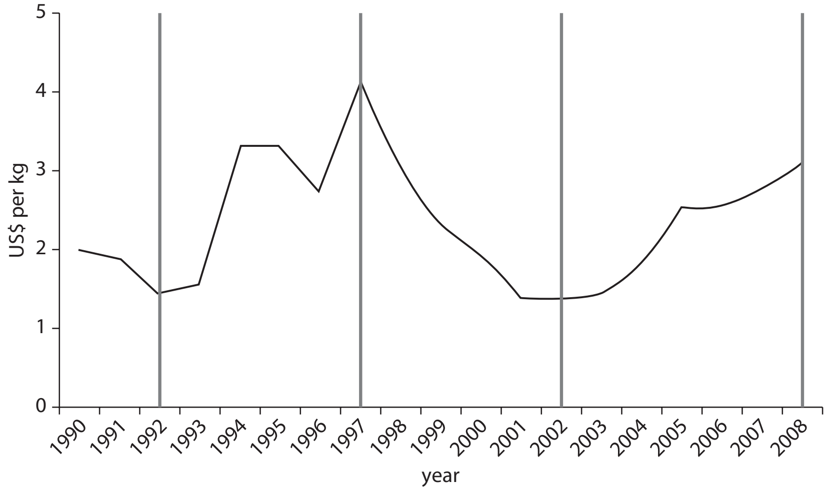
For both robusta and arabica varieties of coffee, as well as for cotton, three global price periods are identified from 1990 through 2008: two with increasing prices and one with a decline. For tea, cashew, and tobacco, there are two periods with price increases and two with price decreases. The timing of the agricultural policy reforms in the sample SSA countries coincided with increasing price periods for the majority of our cases. During this period, for most of our sample country/commodity pairs, producer price increases were greater than the increase in international prices. The decreases in prices around 2000 were fully passed on to

Figure 2.3a World Robusta Prices



Source: GEM 2010.

Figure 2.3b World Arabica Prices



Source: GEM 2010.

producer prices, and a decrease in producer prices was observed corresponding to the decline in international prices. During the post-2004 international price increases, producer prices recovered along with international prices in a few cases, whereas in others exchange rate movements prevented the transmission of world price increases to producers. Thus, for the last decade during which most of the reforms evaluations are made, producers have faced almost continuously declining or low prices.

Coffee

Coffee prices were the most volatile series in the sample. The sample countries produce two coffee varieties—robusta and arabica—whose prices generally move together. The turning points, however, are slightly different. Both coffee types experienced two periods with increasing prices and one period with declining prices, from 1990 to 2008. For robusta, the price decline began in 1995 and ended in 2001, whereas arabica prices peaked in 1997 and the subsequent decline leveled off in 2002 (figures 2.3a and 2.3b).

From 1992 to 1995, world robusta prices increased by 195 percent. Due to real exchange rate appreciations, Uganda and Vietnam experienced only 66 and 81 percent increases in real LCUs, respectively.

Similarly, an increase of 282 percent in the world price of robusta since 2001 translated to only 165 and 131 percent increases when nominal prices are converted to real Uganda shillings and Vietnamese dong, respectively (table 2.2a). Between 1995 and 2001, the nominal and real Vietnamese dong equivalent of world robusta prices closely followed each other.

Figures 2.4a and 2.4b compare annual nominal world robusta prices against their equivalents in real Uganda shillings and Vietnamese dong, as well as the real producer prices. Figures 2.4a and 2.4b also show the divergence of nominal world robusta prices and their real domestic currency equivalents in the late 2000s, which was caused by the appreciation of the Uganda shilling and Vietnamese dong against the U.S. dollar. Interestingly, this trend is observed in several other cases.

A large producer price increase occurred in Uganda after 1992. This was due to reforms that liberalized the coffee sector, which increased the share of the international prices received by the producers from 10 percent in 1990 to 47 percent in 1995. In Vietnam, coffee producers were already receiving 75 percent of the world price in 1991; their share was the same in 1995, although some volatility was observed throughout the period. The decline in nominal robusta prices from 1995 to 2001 was transmitted to producers in both countries. After 2001, an increase in the producer's share of world robusta price in both Uganda and Vietnam can be discerned, even though exchange rate appreciation limits the pass-through in both countries.

Table 2.2b displays percentage changes in arabica prices over the three periods under investigation. Between 1997 and 2002, world arabica prices declined by 67 percent after an increase of 195 percent between

Table 2.2a Changes in Robusta World and Producer Prices

World price (nominal US$ vs. real LCU)	*1992–95 (%)*	*1995–2001 (%)*	*2001–08 (%)*
Robusta index	194.63	−78.09	282.25
Uganda	65.55	−70.18	165.34
Vietnam	80.64	−79.20	130.62
Vietnam*	80.64	−79.20	16.49
Producer price (real LCU)	*1992–95 (%)*	*1995–2001 (%)*	*2001–08 (%)*
Uganda	388.84	−75.96	200.48
Vietnam*	88.06	−84.58	80.23

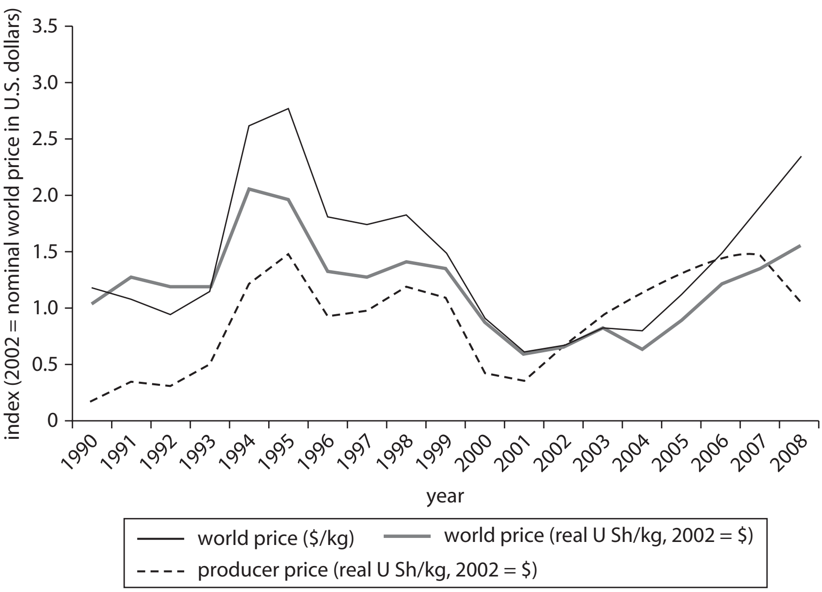
Source: Authors.
Notes: Coffee producer price series for Vietnam extends only through 2004. Therefore, * displays changes only through 2004. LCU = local currency unit.

Table 2.2b Changes in Arabica World and Producer Prices

World price (nominal US$ vs. real LCU)	*1992–97 (%)*	*1997–2002 (%)*	*2002–08 (%)*
Arabica index	195.20	–67.45	127.15
Kenya	132.42	–67.38	–6.95
Tanzania	101.91	–62.45	91.72
Producer price (real LCU)	*1992–97 (%)*	*1997–2002 (%)*	*2002–08 (%)*
Kenya	120.06	–64.45	–30.92
Tanzania	65.26	–77.16	215.14

Source: Authors.
Note: LCU = local currency unit.

Figure 2.4a Robusta World and Producer Prices, Uganda

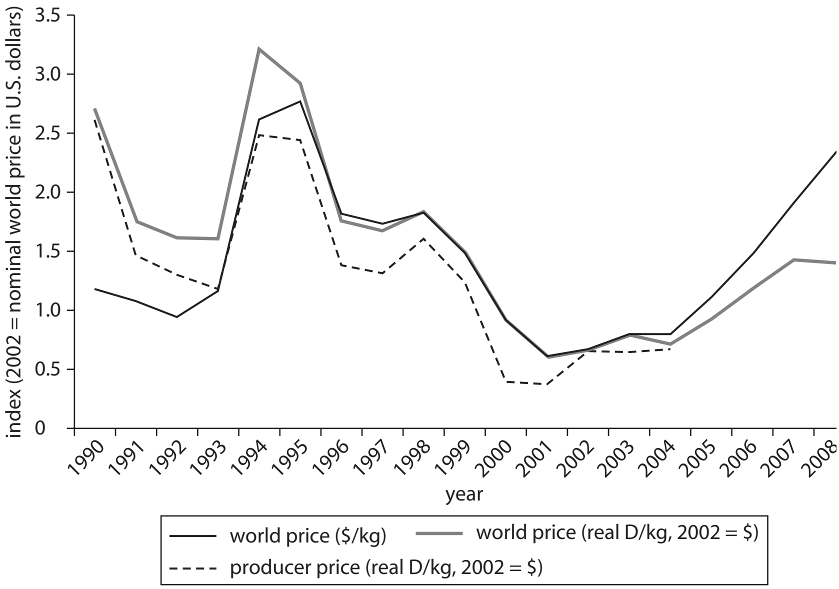


Sources: GEM 2010; ICO 2010; WDI 2010; Authors.

1992 and 1997. Prices in LCUs also increased after 1992 and declined with international prices during 1997–2002. After 2002, although prices increased in international markets, they declined in Kenya in local currency terms due to the appreciation of the currency.

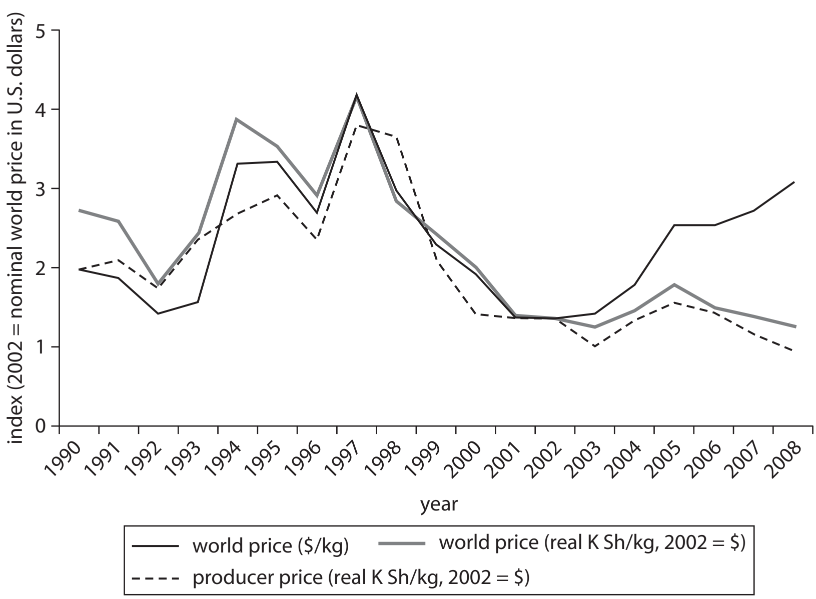
Figures 2.5a and 2.5b show nominal international arabica prices, their equivalents in real domestic currency units, and real producer prices between 1990 and 2008. Although nominal world arabica prices increased

Figure 2.4b Robusta World and Producer Prices, Vietnam



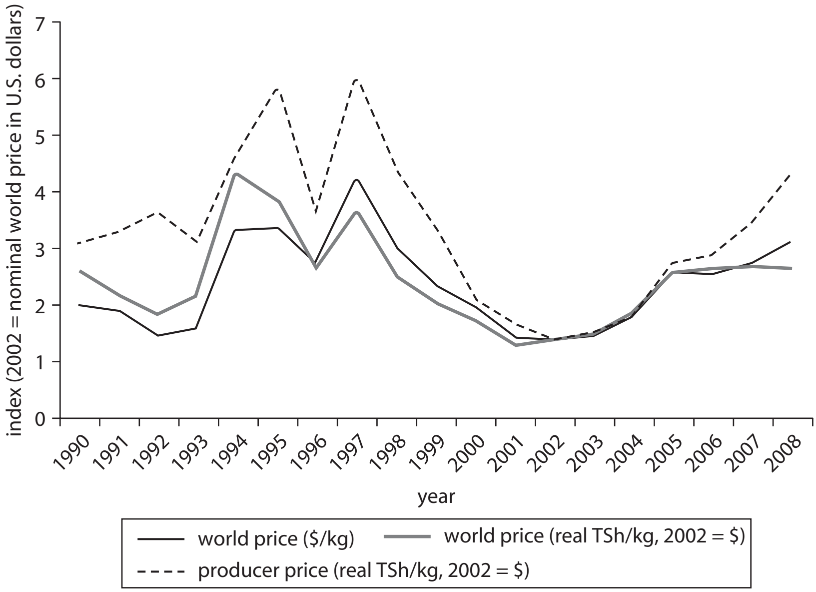
Sources: GEM 2010; ICO 2010; WDI 2010; Authors.

Figure 2.5a Arabica World and Producer Prices, Kenya



Sources: GEM 2010; WDI 2010; National Sources; Authors.

Figure 2.5b Arabica World and Producer Prices, Tanzania



Sources: GEM 2010; ICO 2010; WDI 2010; Authors.

by 195 percent from 1992 to 1997, their equivalents in real Kenyan shillings and real Tanzania shillings increased by only 132 percent and 102 percent, respectively. Coffee producers in both countries experienced an even smaller increase over the same period. Afterward, there was a collapse of international prices, both in U.S. dollars and in real local currencies, and producer prices followed the same pattern. After 2005, while nominal world arabica prices continued to increase, their equivalents in real Kenyan shillings fell. From 2002 to 2008, world arabica prices increased by 127 percent in U.S. dollars, but decreased by 7 percent in real Kenyan shillings. Producer prices for Kenya coffee declined even more—by 31 percent over the same recent period.

Since the second half of the 1990s, nominal world arabica prices and their equivalents in real Tanzania shillings have moved together. After 2002, the exchange rate did not change very much in real terms, and the share going to producers increased, leading to a faster increase in producer prices than in international prices. In Tanzania, producers' share of the world arabica price increased from 38 percent in 2002 to 63 percent in 2008.

Cotton

Similar to world coffee prices, since 1990, world prices for cotton exhibit two periods with increasing prices and one period with declining prices, as seen in figure 2.6. A significant price increase occurred between 1992 and 1995 of almost 66 percent, followed by an equally large decline of 52 percent by 2002. Cotton prices increased after 2002, along with other commodity prices, and, by 2008, this price increase amounted to 54 percent.

The top panel in table 2.3 shows that real LCU equivalents of nominal international cotton prices moved at similar rates from 1992 to

Figure 2.6 Cotton Cotlook A Index

Source: GEM 2010.

Table 2.3 Changes in Cotton World and Producer Prices

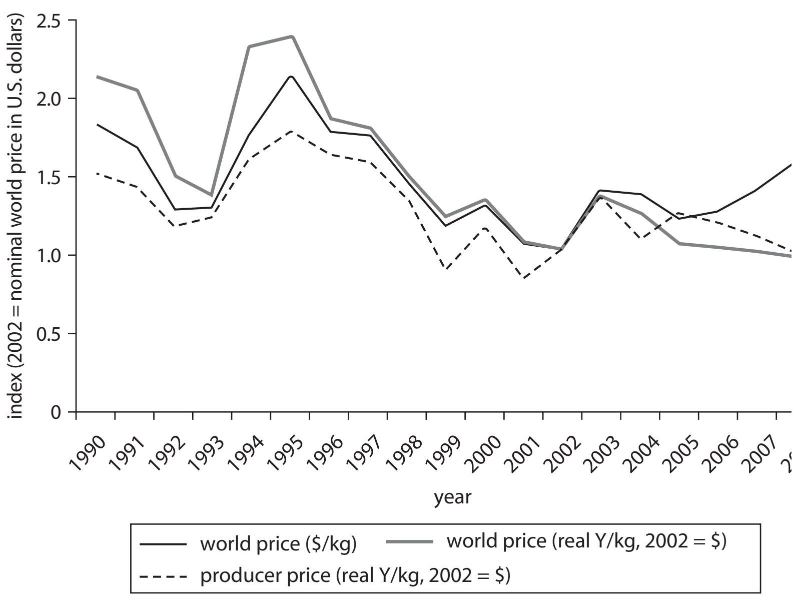
World price (nominal US$ vs. real LCU)	*1992–95 (%)*	*1995–2002 (%)*	*2002–08 (%)*
Cotlook A	66.50	–52.10	54.42
China	59.78	–57.14	–4.66
India	61.23	–53.92	0.95
Zambia	53.40	–41.64	–41.58
Producer price (real LCU)	*1992–95 (%)*	*1995–2002 (%)*	*2002–08 (%)*
China	51.81	–42.53	–2.72
India	33.63	–43.87	–11.79
Zambia	1.93	–62.47	–50.33

Source: Authors.
Note: LCU = local currency unit.

1995 for the cotton-producing countries in our sample. Similarly, real exchange rates moved in a way that leads to similar price declines during the 1995–2002 period. During the last price increase, however, real LCU equivalents of world cotton prices did not increase at the same rates as nominal world cotton prices. In China, and more dramatically in Zambia, cotton prices expressed in real LCUs actually fell. In Zambia, the decline was almost 42 percent, against a 54 percent increase in nominal international prices. In India, real exchange rate movements almost completely mitigated the increase in nominal world prices over the same period.[5]

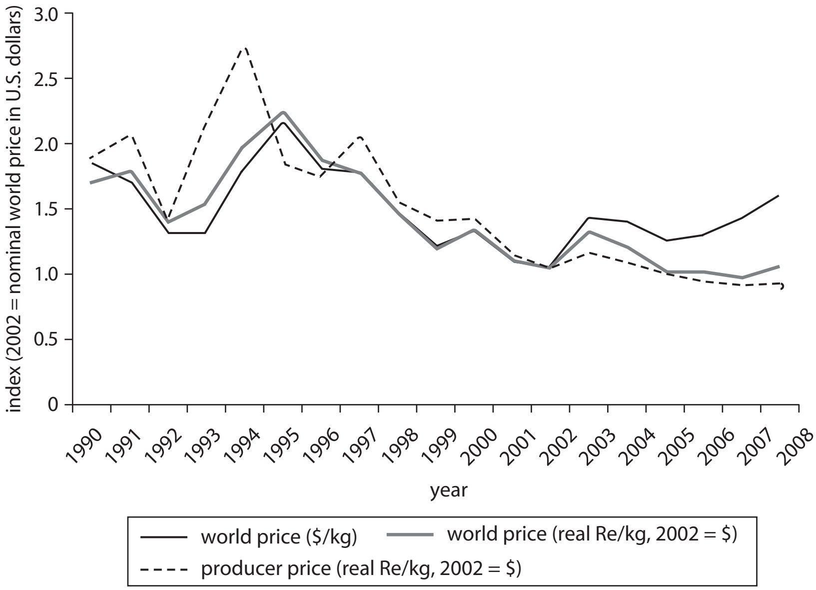
Figures 2.7a through 2.7c show world cotton prices in U.S. dollars and real LCUs, and real producer prices for China, India, and Zambia. Until 2003, real world cotton prices in LCUs more or less followed the fluctuations in world cotton prices in U.S. dollars. Since 2003, nominal international prices and their real LCU equivalents diverge. This divergence is more pronounced for Zambia due to large appreciation of the Zambian currency. Since 2005, while world cotton prices were increasing, their values in Zambian kwacha continued to fall, until they leveled off in 2007 and 2008. The changes in producer prices in Zambia closely

Figure 2.7a Cotton World and Producer Prices, China



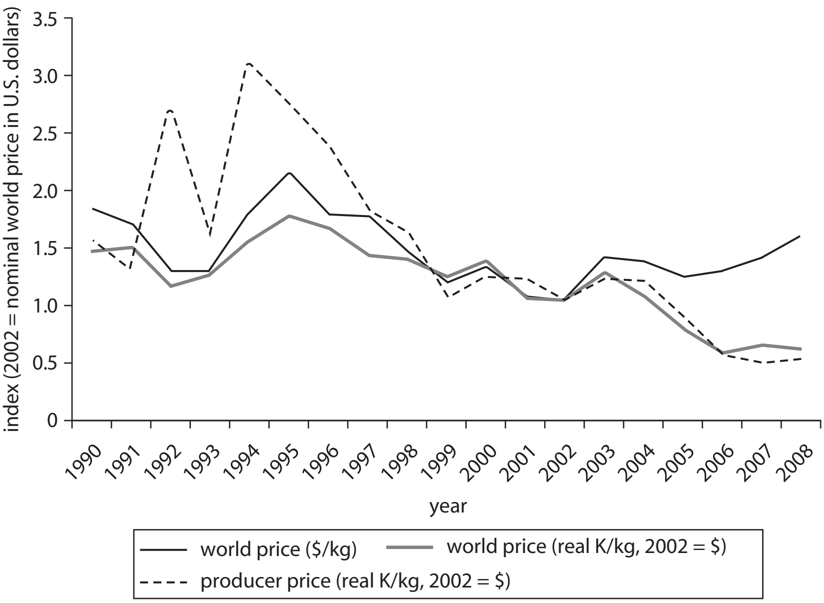
Sources: Anderson and Valenzuela 2008; GEM 2010; FAOSTAT 2010; WDI 2010; Authors.

Figure 2.7b Cotton World and Producer Prices, India



Sources: Anderson and Valenzuela 2008; GEM 2010; FAOSTAT 2010; WDI 2010; Authors.

Figure 2.7c Cotton World and Producer Prices, Zambia



Sources: GEM 2010; WDI 2010; National Sources; Authors.

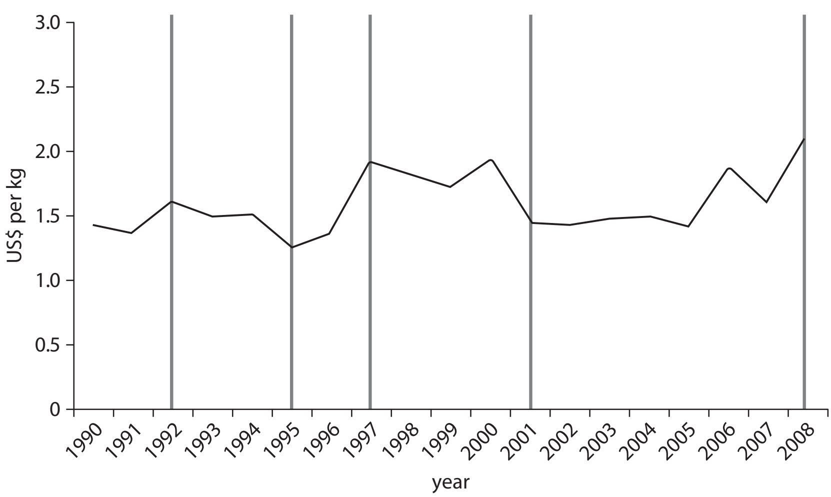
followed the changes in world cotton prices in real Zambian kwacha since the late 1990s, suggesting small changes in the producers' share of the world price.

Tea

Compared to coffee and cotton, tea is a less volatile commodity (see figure 2.8). Still, looking at the average Mombasa auction price, which serves as the proxy for the world tea price, four periods—two with increasing prices and two with decreasing prices—can be defined.

Between 1992 and 1995, nominal world tea prices declined by 22 percent, but increased by 55 percent between 1995 and 1997 (table 2.4). With the appreciation of their exchange rates, Kenya and Tanzania experienced a larger decline over the 1992–95 period, when nominal world tea prices are converted to real domestic LCUs. Tanzania and, to a lesser extent, Kenya, for the same reason failed to capture the increase in nominal world prices between 1995 and 1997. From 1997 to 2002, world tea prices decreased by 26 percent. Real LCU equivalents followed the decline, albeit to a lesser degree in the case of Tanzania; a 49 percent increase in nominal world tea prices since 2002 reflects a 39 percent price *decline* when prices are converted to real Kenyan shillings, due to appreciation of the real exchange rate.

Figure 2.8 World Tea Prices



Source: GEM 2010.

Table 2.4 Changes in Tea World and Producer Prices

World price (nominal US$ vs. real LCU)	*1992–95 (%)*	*1995–97 (%)*	*1997–2002 (%)*	*2002–08 (%)*
Mombasa auction price	−22.44	54.85	−25.96	48.62
Kenya	−35.17	45.86	−25.81	−39.12
Tanzania	−30.05	17.43	−14.57	25.44
Producer price (real LCU)	*1992–95 (%)*	*1995–97 (%)*	*1997–2002 (%)*	*2002–08 (%)*
Kenya	−25.18	29.80	−18.56	−35.84
Tanzania	−41.79	−26.06	12.21	−8.38

Source: Authors.
Note: LCU = local currency unit.

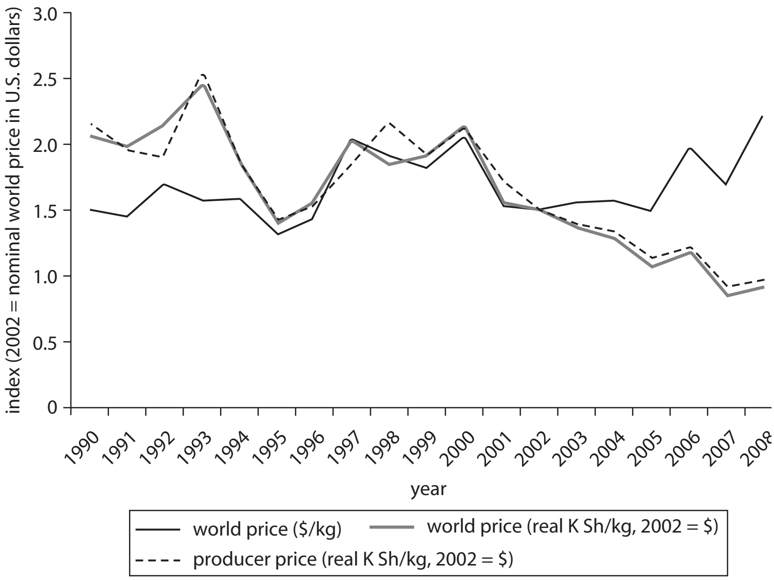
Figures 2.9a and 2.9b plot annual average Mombasa auction prices in real Kenyan shillings and real Tanzanian shillings against the U.S. dollar equivalents, along with the real producer prices. As in the case of coffee, real appreciation of the Kenyan shilling vis-à-vis the U.S. dollar caused a divergence from the prevailing nominal world tea price, although real LCU and nominal U.S. dollar world tea prices closely followed each other from 1995 until 2003.

In Kenya, producer prices closely followed the international prices in Kenyan shillings, indicating that the main variable affecting the producer prices was the behavior of the real exchange rate. In Tanzania, the producer prices moved almost independently of international prices, indicating significant changes in the distribution of income between producers and processors. During the last price increase after 2002, producer prices did not increase in either country, for different reasons. In Kenya, the appreciation of the currency did not allow the rise in international prices to be passed on to the domestic market. In Tanzania, the decline in the share of the international price received by the producers held producer prices down.

Cashew

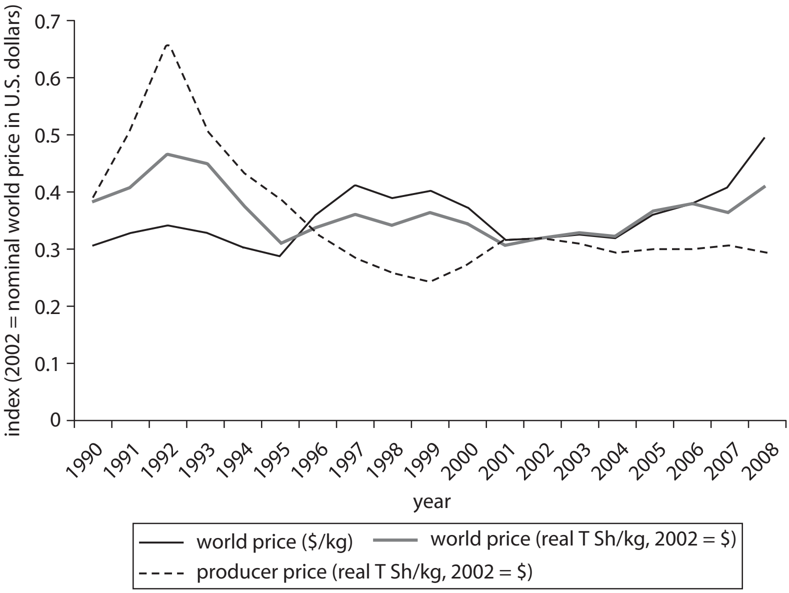
Similar to world tea prices, world cashew prices show four periods: two with increasing prices and two with price declines (figure 2.10). In real LCUs, Mozambique and Tanzania followed world cashew price declines during the period 1999–2003. However, between 1991 and 1993, while world cashew prices decreased by 13 percent nominally, they *increased* in real Mozambique meticais and real Tanzanian shillings by 14 percent and 6 percent, respectively, due to real depreciation. Subsequently, while world cashew prices increased by 28 percent from 1993 until 1999, their

Figure 2.9a Tea World and Producer Prices, Kenya



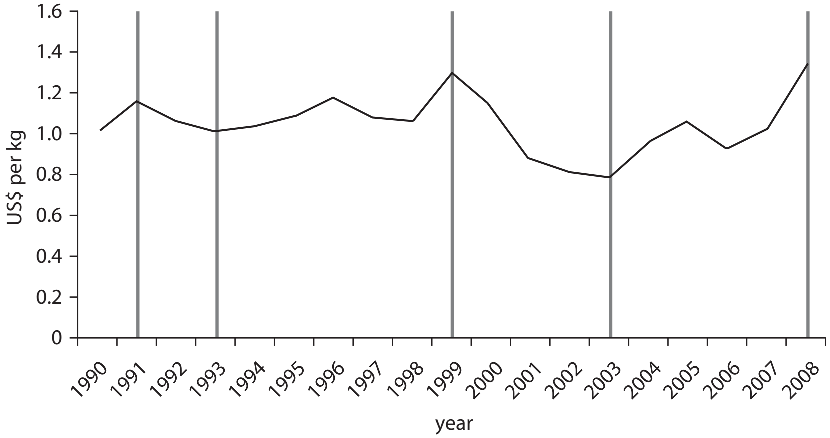
Sources: GEM 2010; WDI 2010; National Sources; Authors.

Figure 2.9b Tea World and Producer Prices, Tanzania



Sources: GEM 2010; WDI 2010; National Sources; Authors.

Figure 2.10 World Cashew Prices



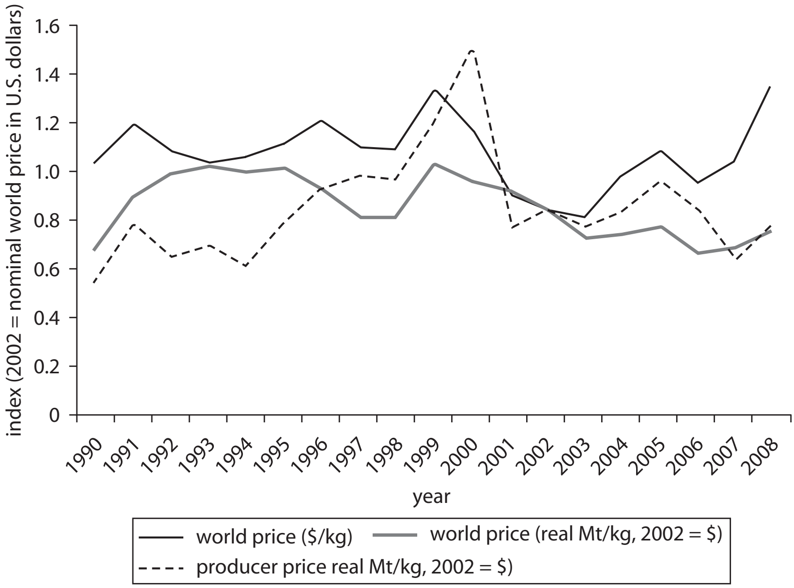
Sources: GEM 2010.

equivalents in real Tanzanian shillings *decreased* by 19 percent, and in meticais, prices showed a meager increase of 1 percent. Between 2003 and 2008, nominal world cashew prices increased by 68 percent; however, their real metical equivalent increased by only 5 percent. In Tanzania, LCU price increases are greater but less than the increase in international prices in U.S. dollars.

Figures 2.11a and 2.11b display annual world cashew prices since 1990 in U.S. dollars and real LCUs, as well as real producer prices for Mozambique and Tanzania. Between 1991 and 1996, cashew prices in U.S. dollars and their equivalents in real LCUs showed opposing trends. When U.S. dollar world cashew prices decreased between 1991 and 1993, real LCU equivalents increased; when U.S. dollar world prices declined between 1993 and 1996, world cashew prices in real LCUs increased. After 1996, world cashew prices in real Tanzanian shillings more closely followed their nominal equivalents. World cashew prices in real meticais, however, continued to diverge, staying at an almost steady level, while nominal world cashew prices increased by 68 percent after 2003 (table 2.5).

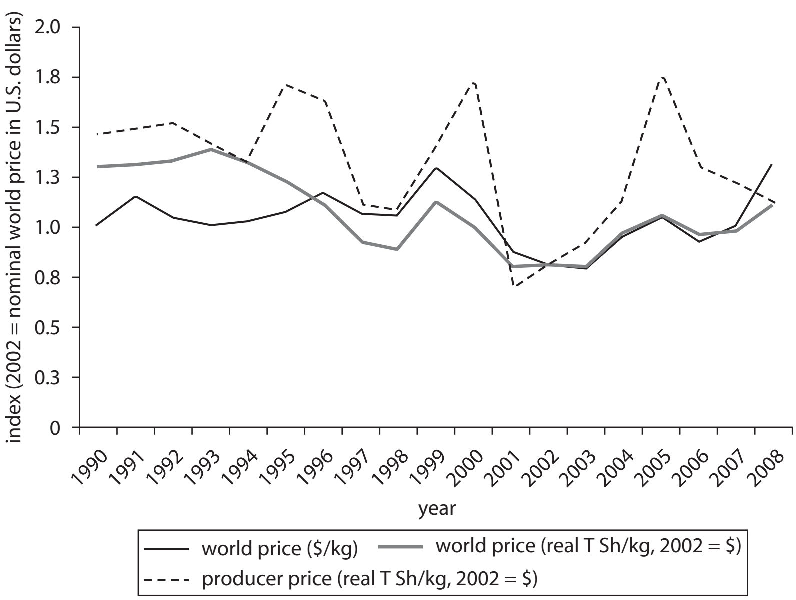
Producer prices show the effects of the reforms very clearly. In Mozambique, they increased at a much faster rate after the reforms in 1994 and reductions in export taxes; this was followed by a collapse, mirroring the decline in world prices. Mozambique producer prices moved up again with the pickup in both local processing and an

Figure 2.11a Cashew World and Producer Prices, Mozambique



Sources: Anderson and Valenzuela 2008; GEM 2010; WDI 2010; National Sources; Authors.

Figure 2.11b Cashew World and Producer Prices, Tanzania



Sources: GEM 2010; WDI 2010; National Sources; Authors.

Table 2.5 Changes in Cashew World and Producer Prices

World price (nominal US$ vs. real LCU)	*1991–93 (%)*	*1993–99 (%)*	*1999–2003 (%)*	*2003–08 (%)*
Cashew index	–12.74	28.17	–39.08	67.97
Mozambique	14.15	0.92	–30.38	5.20
Tanzania	5.71	–19.35	–28.27	38.96
Producer price (real LCU)	*1991–93 (%)*	*1993–99 (%)*	*1999–2003 (%)*	*2003–08 (%)*
Mozambique	–10.96	73.72	–36.18	0.84
Tanzania	–4.71	–1.55	–33.91	21.68

Source: Authors.
Note: LCU = local currency unit.

increase in international prices in real meticais. Producer prices in Tanzania showed the fluctuations created by the policy reforms and their reversals but also followed the international prices over the cycles.

Tobacco

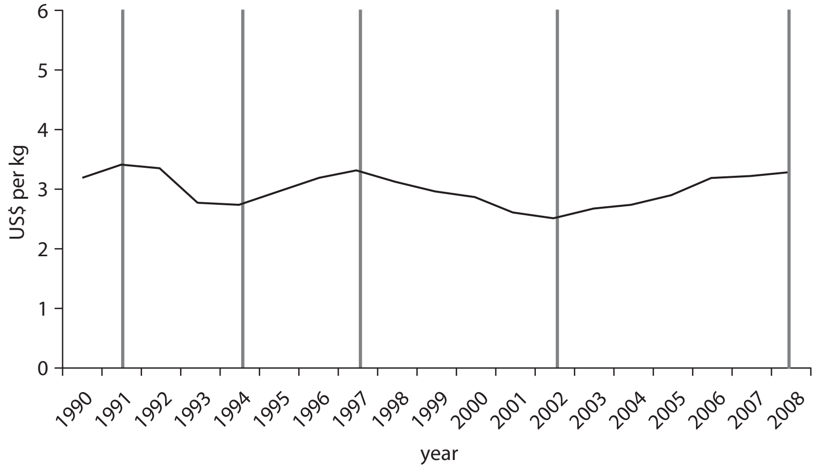
Tobacco is the last commodity in the sample. After 1990, world tobacco prices went through two periods of increasing prices and two periods of decreasing prices, with almost equal price changes, except for the price increase after 2002 (figure 2.12). From 1991 to 1994, world tobacco prices in U.S. dollars decreased by 20 percent, increased by a similar amount until 1997, decreased by 24 percent until 2002, and then increased with the rest of the commodities until 2008.

From 1994 to 1997, world tobacco prices in real Tanzanian shillings decreased even when nominal world tobacco prices increased by 21 percent. Since 2002, the nominal and real Tanzanian shilling equivalent of world tobacco prices increased by 31 percent and 10 percent, respectively (table 2.6). This rise was caused by a slight appreciation in the Tanzania shilling vis-à-vis the U.S. dollar in 2007 and 2008.

World tobacco prices in nominal U.S. dollars and real Tanzanian shillings exhibited quite different behaviors until 1997 (figure 2.13). While nominal international prices went through cycles, their equivalents in real Tanzanian shillings followed an almost consistent decreasing trend that extended until 2002. Since 1997, these two series moved more closely, and co-movement was more pronounced after 2002, indicating a rather stable real exchange rate.

Producer prices, on the other hand, showed large fluctuations caused by domestic policy changes during most of the 1990s. Between 1999 and

Figure 2.12 World Tobacco Price



Source: GEM 2010.

Table 2.6 Changes in Tobacco World and Producer Prices

World price (nominal US$ vs. real LCU)	*1991–94 (%)*	*1994–97 (%)*	*1997–2002 (%)*	*2002–08 (%)*
Tobacco index	–20.17	21.30	–24.11	31.21
Tanzania	–9.31	–18.59	–12.43	10.75
Producer price (real LCU)	***1991–94 (%)***	***1994–97 (%)***	***1997–2002 (%)***	***2003–08 (%)***
Tanzania	45.98	–5.50	–41.84	52.70

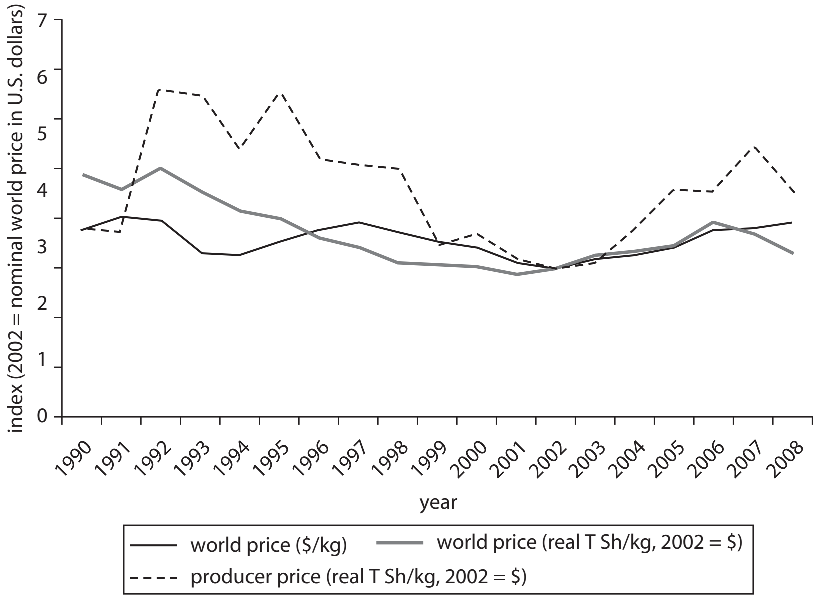
Source: Authors.
Note: LCU = local currency unit.

2003, after the reforms, producer prices more closely followed changes in international prices, and, after 2003, the increase in producer prices surpassed the increase in international prices, thus indicating higher shares for the producers.

Conclusions

This chapter analyzed the volatility and co-movement of international and producer prices for 12 country/commodity combinations, which are also examined in the subsequent case studies. High commodity price volatility not only has perverse effects on production and complementary

Figure 2.13 Tobacco World and Producer Prices, Tanzania



Sources: GEM 2010; WDI 2010; National Sources; Authors.

sectors in the supply chain, but also affects the success and sustainability of policy reforms. Volatility can be caused by changes in international prices, changes in real exchange rates that translate the international prices to local prices, or changes in export prices or producer prices independent of the behavior of exchange rates or international prices.

Commodity prices exhibit cycles. It is important to understand whether domestic producer prices follow international prices through increasing and decreasing price periods because distribution of rents along the supply chain may show a systematic relationship with respect to increasing or decreasing price periods. It is in this area where the real conflicts and policy debates take place.

This chapter focused on three prices that are the main drivers of the agricultural supply response. First are international prices, expressed in nominal U.S. dollars. To measure the impact of the real exchange rates (the second price driver), these international prices are converted to LCUs using the nominal exchange rates and deflated by domestic consumer prices or GDP deflators. Third are the real producer prices, with the deflator again being either CPIs or GDP deflators.

In terms of volatility, the results are clear. Among the five commodities in the sample, coffee—the robusta variety in particular—is the most volatile. After two coffee varieties, cotton is the third most volatile commodity, followed by tea, cashew, and tobacco. Except for robusta coffee in Uganda and arabica coffee in Tanzania, real exchange rate behavior increased the volatility of international prices in all countries over the 1990–2008 period. Only in two cases out of 12 is the volatility of the real producer prices significantly lower than the volatility of the international prices in U.S. dollars. These country/commodity pairs are cotton in China and coffee in Uganda. The volatility of real producer prices is about the same as the volatility of the nominal world prices in U.S. dollars for coffee in Kenya and Vietnam. Whatever the reasons, domestic and exchange rate policies have generated higher price volatility for producers.[6] Thus, the shocks faced by producers have been much higher than implied by international price and real exchange rate fluctuations. This fact highlights the increased need for institutions that arbitrate among different groups, especially in cases of negative shocks.

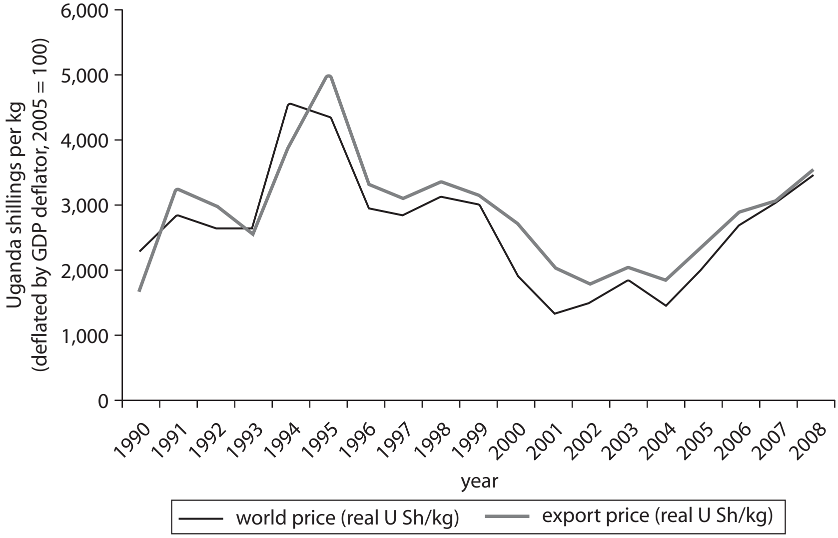
In terms of the time behavior of these three prices, differences exist among the cases but a few generalizations can be made. First, increases in producer prices may be observed independently of international developments during times of reforms, and decreases may be observed during reversals of reforms. Second, producer prices follow international price collapses. International price declines in the mid-1990s were passed on to producer prices in almost all cases. However, post-2000 price increases have not been passed on to the producers due to exchange rate effects. The depreciation of the U.S. dollar against most currencies in the post-2000 period means that many producers have failed to enjoy the positive effects of international price developments, and the effect is far more pronounced for Kenya and Zambia.

Placing these developments in context with the reform process, two points emerge from the discussion. The first is that the price increases of the early 1990s helped the policy reforms and made them look much more successful than they were. This was followed by significant price declines during the early 2000s. This period also corresponds to the period during which many reform evaluations were undertaken. Despite international price increases during the late 2000s, in most cases, producer prices did not increase commensurately, and, by the end of 2008, producer prices in most cases had not reached their peaks of the late 1990s.

Annex 2.1

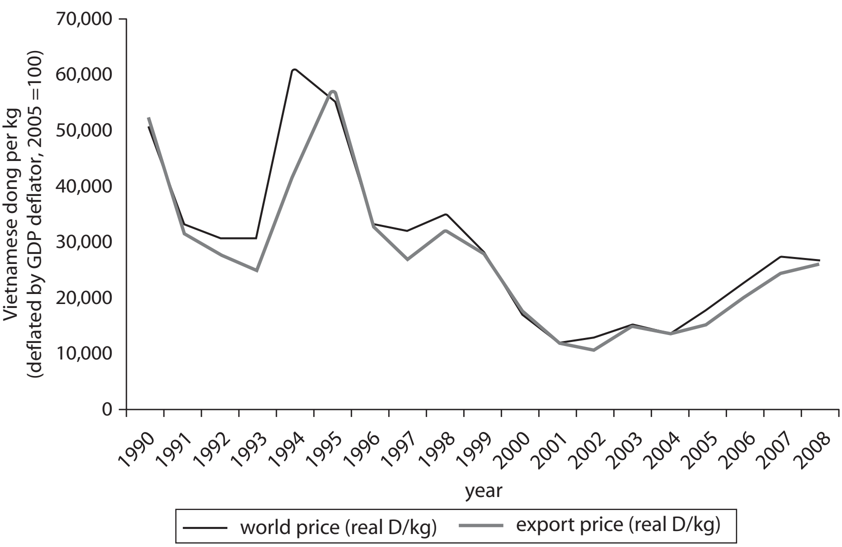
Sample Commodity World and Export Prices

Figure 2A.1a Robusta Coffee World and Export Prices, Uganda



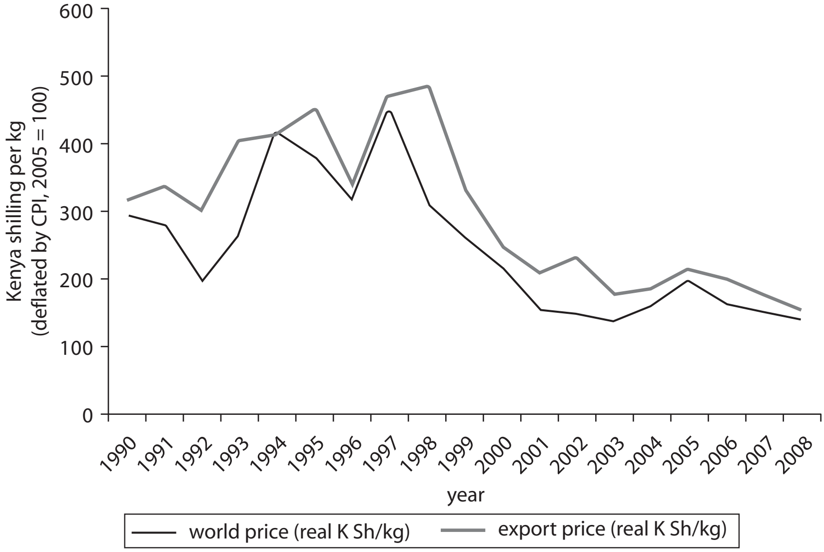
Sources: COMTRADE 2010; GEM 2010; WDI 2010; Authors.
Note: GDP = gross domestic product.

Figure 2A.1b Robusta Coffee World and Export Prices, Vietnam



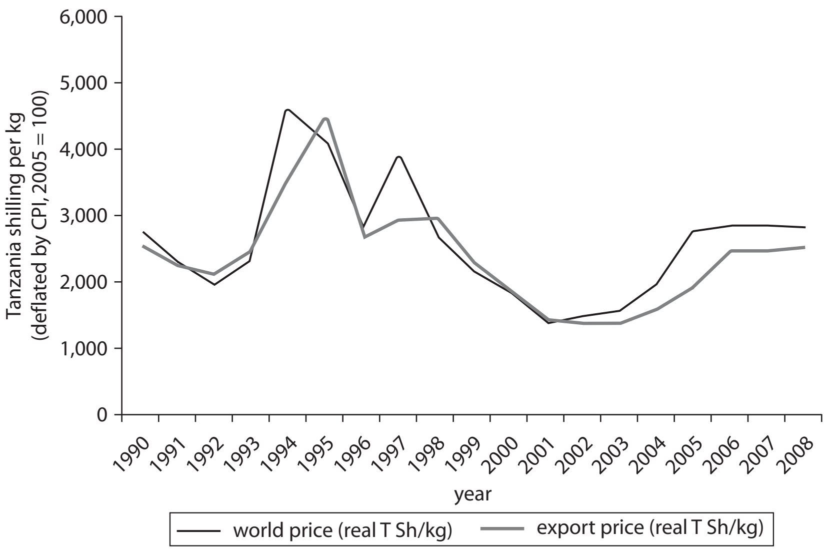
Sources: COMTRADE 2010; GEM 2010; WDI 2010; Authors.
Note: GDP = gross domestic product.

Figure 2A.2a Arabica Coffee World and Export Prices, Kenya



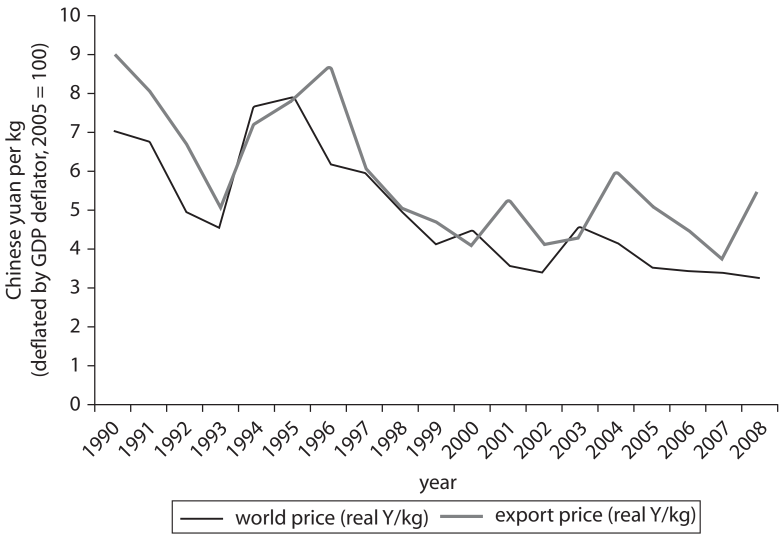
Sources: COMTRADE 2010; GEM 2010; WDI 2010; Authors.
Note: CPI = consumer price index.

Figure 2A.2b Arabica Coffee World and Export Prices, Tanzania



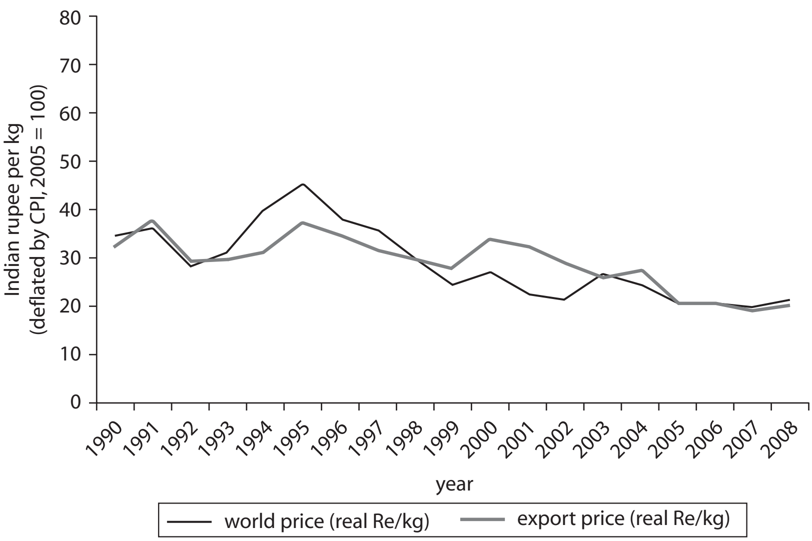
Sources: COMTRADE 2010; GEM 2010; WDI 2010; Authors.
Note: CPI = consumer price index.

Figure 2A.3a Cotton World and Export Prices, China



Sources: COMTRADE 2010; GEM 2010; WDI 2010; Authors.
Note: CPI = consumer price index.

Figure 2A.3b Cotton World and Export Prices, India

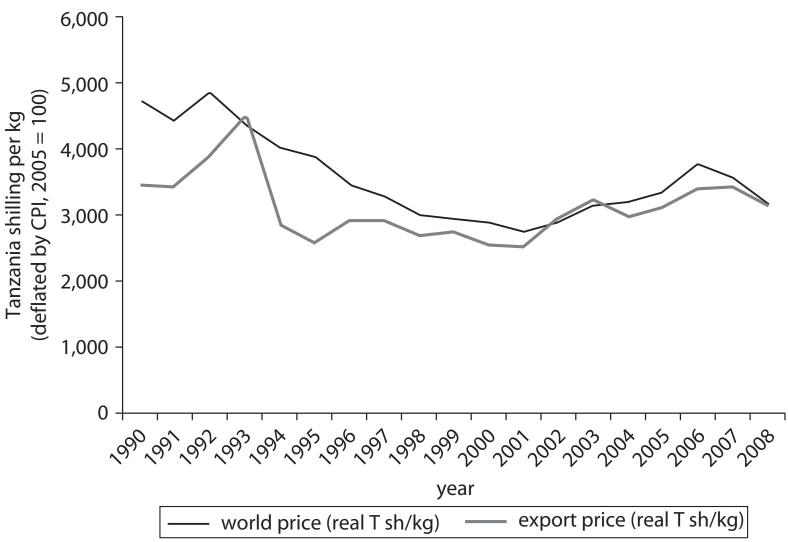


Sources: COMTRADE 2010; GEM 2010; WDI 2010; Authors.
Note: CPI = consumer price index.

Figure 2A.3c Cotton World and Export Prices, Zambia

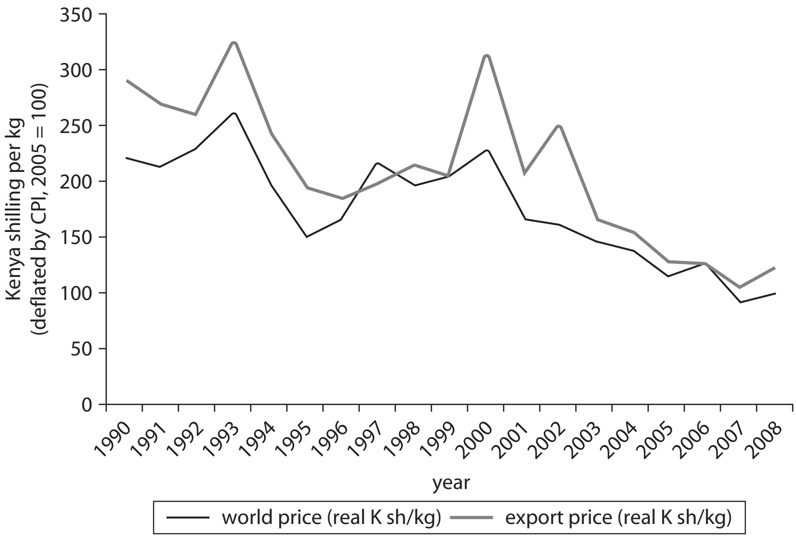
Source:s COMTRADE 2010; GEM 2010; WDI 2010; Authors.
Note: GDP = gross domestic product.

Figure 2A.4 Tobacco World and Export Prices, Tanzania



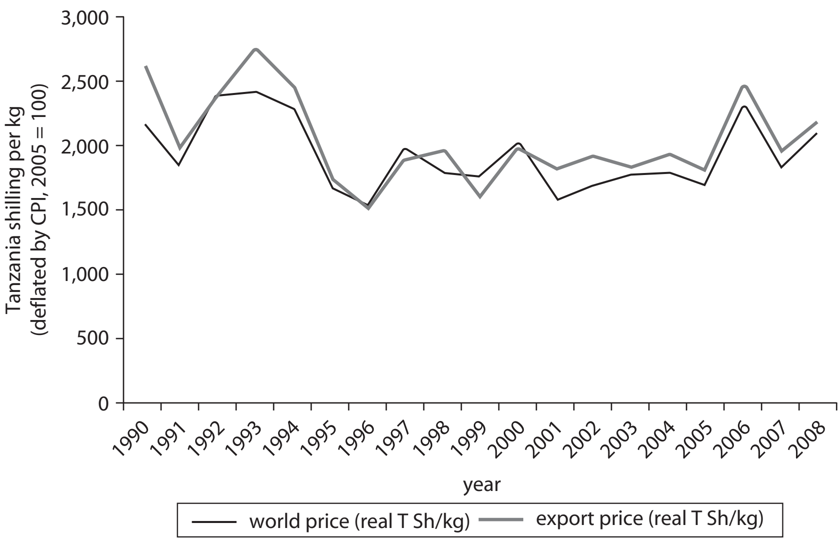
Sources: COMTRADE 2010; GEM 2010; WDI 2010; Authors.
Note: CPI = consumer price index.

Figure 2A.5a Tea World and Export Prices, Kenya



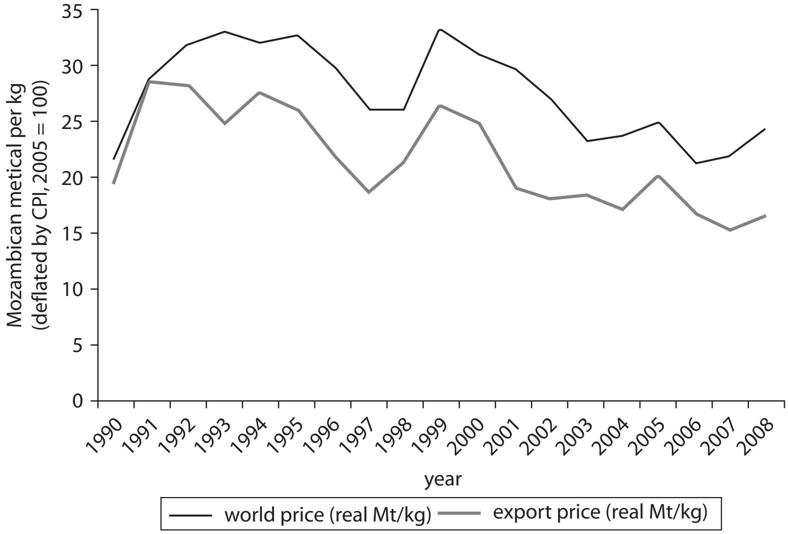
Sources: COMTRADE 2010; GEM 2010; WDI 2010; Authors.
Note: CPI = consumer price index.

Figure 2A.5b Tea World and Export Prices, Tanzania



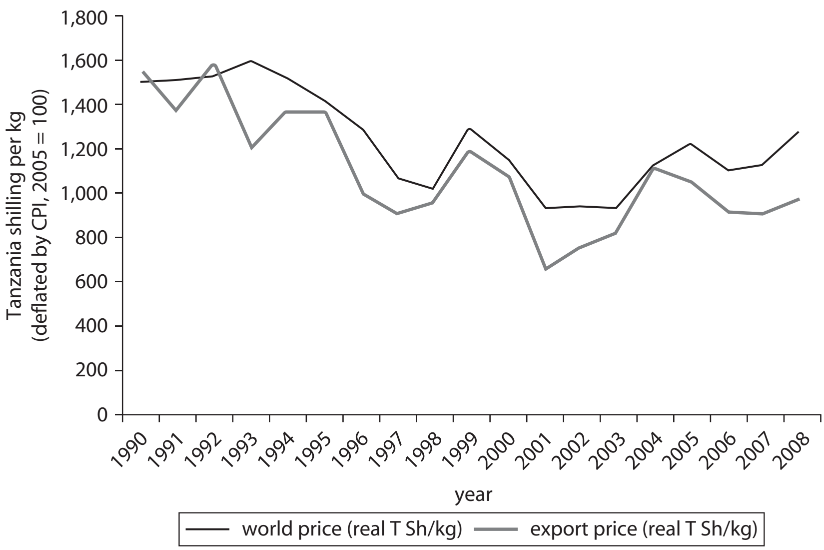
Sources: COMTRADE 2010; GEM 2010; WDI 2010; Authors.
Note: CPI = consumer price index.

Figure 2A.6a Cashew World and Export Prices, Mozambique



Sources: COMTRADE 2010; GEM 2010; WDI 2010; Authors.
Note: CPI = consumer price index.

Figure 2A.6b Cashew World and Export Prices, Tanzania



Sources: COMTRADE 2010; GEM 2010; WDI 2010; Authors.
Note: CPI = consumer price index.

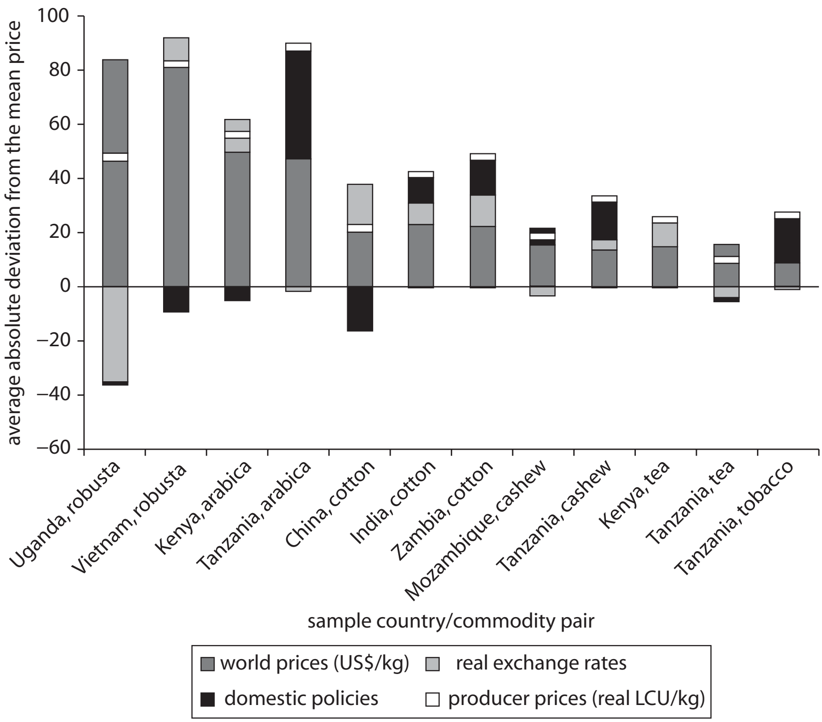
Transmission of International Price Volatility to Producers After Agricultural Policy Reforms

Table 2A.1 Agricultural Policy Reform Years in the Sample Sub-Saharan African Country/Commodity Pairs

Country	*Commodity*	*Reform year*
Mozambique	Cashew	1994
Tanzania	Cashew	1992
Kenya	Coffee	1992
Tanzania	Coffee	1994
Uganda	Coffee	1991
Zambia	Cotton	1994
Kenya	Tea	1992
Tanzania	Tea	1993
Tanzania	Tobacco	1995

Source: Authors.

Figure 2A.7 Determinants of Producer Price Volatility for Sample Country/ Commodity Pairs, Post-Reform Period until 2008



Sources: Vietnam coffee producer price series does not extend beyond 2004; therefore, price volatilities for Vietnam coffee are calculated over the period 1990–2004. Authors.
Note: LCU = local currency units.

Table 2A.2 Transmission of Sample Price Volatility from World Markets to Producers, Post-Reform Period until 2008

		World price volatility						*Determinants of producer price volatility*		
Commodity	*Country*	*Nominal US$*	*Real LCU*	*Real exchange rate effect*	*Producer price volatility (real LCU)*	*Domestic policy effect*	*Producer price volatility (real LCU)*	*World price volatility (Nominal US$)*	*Real exchange rate effect*	*Domestic policy effect*
Robusta	Uganda	84.38	48.63	**–35.75**	47.98	**–0.65**	100.00	175.87	–74.51	–1.36
Robusta	Vietnam	82.41	91.44	**9.03**	82.11	**–9.33**	100.00	100.37	11.00	–11.36
Arabica	Kenya	49.64	61.19	**11.55**	56.51	**–4.68**	100.00	87.84	20.45	–8.28
Arabica	Tanzania	47.52	45.92	**–1.60**	88.05	**42.13**	100.00	53.97	–1.82	47.85
Cotton	China	23.59	37.46	**13.86**	21.24	**–16.22**	100.00	111.08	65.28	–76.36
Cotton	India	23.59	30.98	**7.39**	41.70	**10.72**	100.00	56.58	17.72	25.70
Cotton	Zambia	22.06	33.85	**11.78**	47.94	**14.09**	100.00	46.03	24.58	29.39
Cashew	Mozambique	15.31	12.17	**–3.14**	18.30	**6.13**	100.00	83.68	–17.17	33.49
Cashew	Tanzania	13.72	17.54	**3.82**	32.22	**14.68**	100.00	42.59	11.86	45.55
Tea	Kenya	14.96	24.15	**9.19**	24.80	**0.64**	100.00	60.34	37.06	2.59
Tea	Tanzania	15.49	11.36	**–4.13**	10.17	**–1.19**	100.00	152.31	–40.61	–11.70
Tobacco	Tanzania	9.14	8.19	**–0.95**	26.49	**18.29**	100.00	34.51	–3.58	69.07
Average		**33.49**	**35.24**	**1.75**	**41.46**	**6.22**	100.00	**83.76**	**4.19**	**12.05**

Source: Authors.
Note: LCU = local currency unit.

Sample Commodity World, Export, and Producer Prices over the International Price Cycles

Table 2A.3a Changes in Robusta World, Export, and Producer Prices

World price (nominal US$ vs. real LCU)	*1992–95 (%)*	*1995–2001 (%)*	*2001–08 (%)*
Robusta index	194.63	–78.09	282.25
Uganda	65.55	–70.18	165.34
Vietnam	80.64	–79.20	130.62
Vietnam*	80.64	–79.20	16.49
Export price (real LCU)	*1992–95 (%)*	*1995–2001 (%)*	*2001–08 (%)*
Uganda	68.80	–59.64	75.93
Vietnam	105.73	–79.62	123.70
Vietnam*	105.73	–79.62	14.76
Producer price (real LCU)	*1992–95 (%)*	*1995–2001 (%)*	*2001–08 (%)*
Uganda	388.84	–75.96	200.48
Vietnam*	88.06	–84.58	80.23

Source: Authors.
Note: Coffee producer price series for Vietnam extend only through 2004. Therefore, * displays changes only through 2004. LCU = local currency unit.

Table 2A.3b Changes in Arabica World, Export, and Producer Prices

World price (nominal US$ vs. real LCU)	*1992–97 (%)*	*1997–2002 (%)*	*2002–08 (%)*
Arabica index	195.20	–67.45	127.15
Kenya	132.42	–67.38	–6.95
Tanzania	101.91	–62.45	91.72
Export price (real LCU)	*1992–97 (%)*	*1997–2002 (%)*	*2002–08 (%)*
Kenya	57.90	–51.45	–34.59
Tanzania	39.01	–53.80	86.30
Producer price (real LCU)	*1992–97 (%)*	*1997–2002 (%)*	*2002–08 (%)*
Kenya	120.06	–64.45	–30.92
Tanzania	65.26	–77.16	215.14

Source: Authors.
Note: LCU = local currency unit.

Table 2A.4 Changes in Cotton World, Export, and Producer Prices

World price (nominal US$ vs. real LCU)	*1992–95 (%)*	*1995–2002 (%)*	*2002–08 (%)*
Cotlook A	66.50	–52.10	54.42
China	59.78	–57.14	–4.66
India	61.23	–53.92	0.95
Zambia	53.40	–41.64	–41.58
Export price (real LCU)	*1992–95 (%)*	*1995–2002 (%)*	*2002–08 (%)*
China	16.80	–47.89	34.19
India	28.32	–23.00	–30.59
Zambia	28.69	–21.39	–51.26
Producer price (real LCU)	*1992–95 (%)*	*1995–2002 (%)*	*2002–08 (%)*
China	51.81	–42.53	–2.72
India	33.63	–43.87	–11.79
Zambia	1.93	–62.47	50.33

Source: Authors.
Note: LCU = local currency unit.

Table 2A.5 Changes in Tea World, Export, and Producer Prices

World price (nominal US$ vs. real LCU)	*1992–95 (%)*	*1995–97 (%)*	*1997–2002 (%)*	*2002–08 (%)*
Mombasa auction price	–22.44	54.85	–25.96	48.62
Kenya	–35.17	45.86	–25.81	–39.12
Tanzania	–30.05	17.43	–14.57	25.44
Export price (real LCU)	*1992–95 (%)*	*1995–97 (%)*	*1997–2002 (%)*	*2002–08 (%)*
Kenya	–25.10	1.48	26.87	–51.62
Tanzania	–26.82	8.17	2.11	14.22
Producer price (real LCU)	*1992–95 (%)*	*1995–97 (%)*	*1997–2002 (%)*	*2002–08 (%)*
Kenya	25.18	29.80	–18.56	–35.84
Tanzania	–41.79	–26.06	12.21	–8.38

Source: Authors.
Note: LCU = local currency unit.

Table 2A.6 Changes in Cashew World, Export, and Producer Prices

World price (nominal US$ vs. real LCU)	*1991–93 (%)*	*1993–99 (%)*	*1999–2003 (%)*	*2003–08 (%)*
Cashew index	−12.74	28.17	−39.08	67.97
Mozambique	14.15	0.92	−30.38	5.20
Tanzania	5.71	−19.35	−28.27	38.96
Export price (real LCU)	*1991–93 (%)*	*1993–99 (%)*	*1999–2003 (%)*	*2003–08 (%)*
Mozambique	−13.53	6.66	−30.24	−10.12
Tanzania	−12.72	−0.30	−31.23	18.40
Producer price (real LCU)	*1991–93 (%)*	*1993–99 (%)*	*1999–2003 (%)*	*2003–08 (%)*
Mozambique	−10.96	73.72	−36.18	0.84
Tanzania	−4.71	−1.55	−33.91	21.68

Source: Authors.
Note: LCU = local currency unit.

Table 2A.7 Changes in Tobacco World, Export, and Producer Prices

World price (nominal US$ vs. real LCU)	*1991–94 (%)*	*1994–97 (%)*	*1997–2002 (%)*	*2003–08 (%)*
Tobacco index	−20.17	21.30	−24.11	31.21
Tanzania	−9.31	−18.59	−12.43	10.75
Export price (real LCU)	*1991–94 (%)*	*1994–97 (%)*	*1997–2002 (%)*	*2003–08 (%)*
Tanzania	−16.47	1.74	0.53	6.82
Producer price (real LCU)	*1991–94 (%)*	*1994–97 (%)*	*1997–2002 (%)*	*2003–08 (%)*
Tanzania	45.98	−5.50	−41.84	52.70

Source: Authors.
Note: LCU = local currency unit.

Notes

1. In this study, less emphasis is placed on the export prices because these series are found to be more unreliable. There are periods of few exports, and the prices recorded for those years might not be representative of "normal" export prices. Cotton prices in China, India, and (for some years) in Zambia fall into this category. Most of the analysis in this chapter is carried out using the international prices in local currency. The information on export prices is presented separately in the annex.
2. World prices in LCUs are deflated by CPIs except for China, Uganda, Vietnam, and Zambia. In these four instances, GDP deflators are used.
3. Having said this, different measures, such as variance and standard deviation, have not yielded large differences in the ranking of commodities in terms of volatility.

4. Furthermore, it is not predominantly export prices that cause this higher volatility because they are randomly distributed and do not, on average, have higher volatility than the international prices.
5. China and India adopted Bt cotton in 1999 and 2002, respectively. It is this move to Bt cotton that has allowed them to increase their output despite nonincreasing producer prices (see Baffes, chapter 4 in this volume).
6. Furthermore, it is not predominantly export prices that cause this higher volatility because they are randomly distributed and do not, on average, have higher volatility than the international prices.

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CHAPTER 3

An Empirical Analysis of Supply Response for Selected Export Crops in Sub-Saharan Africa

Anil Onal

In the early to mid-1990s, along with many other developing countries, Kenya, Mozambique, Tanzania, Uganda, and Zambia initiated agricultural policy reforms mostly as conditions attached to their structural adjustment programs (Akiyama et al. 2003). Even though the exact timing, degree of implementation, and conditions of the reforms varied across countries and commodities, at the core, the policy reforms intended to increase producer incentives by opening agricultural markets to more competition and reducing taxation, price distortions, and rigidities in agricultural production, processing, and marketing.

The fundamental assumptions behind the agricultural policy reforms were that prices reflect all the incentives for production, and agricultural production responds to price changes—if not in the short run, then in the long run—which reflects the current consensus in the agricultural supply response literature. Agricultural supply response studies usually estimate

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higher short-run price elasticity for individual crops than for aggregate agricultural supply, which is intuitive considering that factors of production can more easily be transferred across crops than between agriculture and the rest of the economy. Therefore, the degree of aggregate agricultural supply response has historically been subject to much more debate. A consensus seems to have emerged, however, as to the inelasticity of short-run aggregate agricultural supply, which turns out to be highly elastic in the long run (Binswanger and Deininger 1997; Schiff and Montenegro 1997).[1]

Many consider price elasticity of agricultural supply in low-income countries, especially those in Sub-Saharan Africa, to be constrained by transaction costs and lack of inputs such as infrastructure, research, extension, and credit services (Chhibber 1989; Key, Sadoulet, and de Janvry 2000). Rigidities in food and labor markets in low-income countries may further prevent producers from replacing food crop production with cash crop production (de Janvry, Fafchamps, and Sadoulet 1991).[2] Therefore, in analyzing agricultural supply response to price changes, support to agricultural production in the form of input extension, research, and credit services, and lower transaction costs in general, becomes an important variable that helps the sector to more easily respond to price changes. The effects on production of this form of support can more easily be observed in individual crops than in aggregate agriculture.

Building on these ideas, this study estimates individual crop supply response in five Sub-Saharan African countries—nine country/commodity pairs in total, as listed in table 3.1—to real producer price changes. These country/commodity pairs are the subjects of the subsequent case studies.

Table 3.1 Sample Country/Commodity Combinations

Country	*Commodity*	*Reform year*	*Data period*
Mozambique	Cashew	1994	1990–2008
Tanzania	Cashew	1992	1990–2008
Kenya	Coffee	1992	1990–2008
Tanzania	Coffee	1994	1990–2008
Uganda	Coffee	1991	1990–2008
Vietnam	Coffee	N/A	1990–2004
China	Cotton	N/A	1990–2008
India	Cotton	N/A	1990–2008
Zambia	Cotton	1994	1990–2008
Kenya	Tea	1992	1990–2008
Tanzania	Tea	1993	1990–2004
Tanzania	Tobacco	1995	1990–2008

Source: World Bank.
Note: N/A = Not applicable

China and India for cotton and Vietnam for coffee were included as control groups, thus making 12 overall country/commodity pairs in the sample. The period of analysis is post-1990, since it is easier to control for structural changes over this period.

Any robust estimation depends on the availability of reliable data. However, reliable agricultural data are hard to come by, especially in the case of Sub-Saharan African countries. Anderson and Valenzuela (2008) provide an extensive dataset that tries to fill this need. Therefore, this dataset has been used as the starting point for the analysis, and it is updated with data from the case studies in this volume and other sources where deemed more reliable.

Estimations are based on panel regressions, using the basic Nerlove's partial adjustment model. Even though single-equation, time-series models such as Nerlove's have some shortcomings (Schiff and Montenegro 1997; Thiele 2000), they are still widely used for their relatively meager data requirements.

Nerlove's partial adjustment model defines two coefficients for estimation. The first is the short-run price elasticity of supply, and the second is the adjustment coefficient. The adjustment coefficient shows how much of the desired level of production is realized in the short run. Therefore, dividing estimated short-run own-price elasticity by the adjustment coefficient gives the long-run own-price elasticity of the commodity supply in question.

All in all, some degree of supply response to price changes was observed in both the short and long run for the sample country/commodity pairs. The specific findings include:

1. Four of the five sample commodities showed short- and long-run supply response to real producer price changes. These commodities are cashew, coffee, cotton, and tobacco. The short-run own-price elasticity estimates are 0.46, 0.13, 0.37, and 0.71, respectively. The corresponding long-run own-price elasticity estimates are higher (as expected), except for cashew: 0.46, 0.24, 0.49, and 1.20, in the same order. Tea, on the other hand, did not show any supply response to real producer price changes over the sample.
2. At the aggregate level, the annual crops in the sample—cotton and tobacco—were more responsive in the short run to real producer price changes than were the perennial crops—cashew, coffee, and tea. The difference in the short-run own-price elasticity estimates is 0.34.
3. Short-run own-price elasticity of the coffee supply in Vietnam was not different from the short-run own-price elasticity of the coffee supply in

the Sub-Saharan African countries in the sample (Kenya, Tanzania, and Uganda). However, coffee production in Vietnam showed a robust increasing linear trend.

4. Cotton supply in the sample Asian countries (China and India) was *less* responsive to real producer price changes in the short run than in Zambia. The difference in elasticity estimates is 0.53.
5. Tobacco production in Tanzania responded to changes in fertilizer prices, converted to real domestic currency units. The elasticity estimate is –0.47. Including fertilizer prices increased the tobacco supply own-price elasticity estimate by 0.20.
6. Following the introduction of Bt cotton, the trend cotton production increased after 1999 in China and 2002 in India.

In addition to examining individual crop supply response to real producer price changes, this study also tries to understand the effects of support on the sample crop production and own-price elasticity. Support to an individual crop may be direct or indirect, and may be provided by the state or by private stakeholders. Agricultural policy reforms may also be seen as a form of support that changes the incentive structure in favor of producers and/or reduces transaction costs.

In this study, three measures are used to define support. One is the nominal rate of assistance (NRA) that Anderson and Masters (2009) define as "the percentage by which government policies have raised gross returns to farmers above what they would have been without the government's intervention" (p. 11).

Table 3.2 shows that the timing of the agricultural policy reforms coincided with positive changes in the NRA in seven cases. The remaining

Table 3.2 NRAs for Sample Sub-Saharan African Country/Commodity Pairs

Commodity	*Country*	*Pre-reform (5-year average)*	*Post-reform (5-year average)*	*Recent trend (5-year average)*
Cashew	Mozambique	–0.73	–0.14	–0.10
Cashew	Tanzania	–0.53	–0.19	–0.10
Coffee	Tanzania	–0.44	0.00	0.00
Coffee	Uganda	–0.28	–0.03	–0.01
Cotton	Zambia	–0.48	–0.11	–0.55
Tea	Kenya	–0.32	–0.23	0.00
Tobacco	Tanzania	–0.50	–0.38	–0.55
Coffee	Kenya	–0.15	–0.14	–0.03
Tea	Tanzania	–0.91	–0.91	–0.91

Source: Author's calculations based on Anderson and Valenzuela 2008.

two cases are coffee in Kenya and tea in Tanzania. The NRA for Tanzania tea remained almost the same throughout the 1990s and 2000s. The NRA for coffee in Kenya, on the other hand, decreased before the reforms and increased again right after the reforms, such that the mean remained the same in the immediate post-reform period but reached a higher level after that. Even though the NRA initially increased in response to the reforms for cotton in Zambia and tobacco in Tanzania, a marked decline occurred in the NRA for both cases in the 2000s.

No robust effect of the NRA on the sample crop production was observed after controlling for real producer price changes, as well as for producer price changes for the substitute crops and fertilizer price changes (all in real local currency units) at the individual commodity level. In this case, only the short-run own-price elasticity of the sample cashew supply increased by 0.28, which might indicate that the changes in the NRA for cashew in Mozambique and/or Tanzania mitigated the effects of real producer changes on production. At the aggregate level, a 1 percent increase in the NRA increased the sample crop production by 0.21 percent. Using the NRA for each case in the sample relative to NRA for all agricultural products covered in Anderson and Valenzuela (2008) for the same country (defined in that work as "relative rate of assistance" [RRA], instead of NRA) did not significantly change the findings. In tobacco, a 1 percent increase in the RRA increased the sample tobacco production by 1.12 percent. In this case, the short-run own-price elasticity of the tobacco supply became insignificant. However, a similar effect was not observed for other commodities or at the aggregate level.

The second measure of support used in this study is a binary variable and is based on the judgment of the authors of the case studies in this book. Sample country/commodity pairs that are considered to provide more extensive research, input extension, and credit services, as well as having fewer transaction costs, are identified as "supportive" to the commodity in question. The control groups in the sample (China and India for cotton and Vietnam for coffee) are identified as supportive. In addition to these three cases, Zambia for cotton, Kenya and Tanzania for tea, and Tanzania for tobacco are judged as supportive countries compared to the rest. The case studies indicate that those supplies in the instances considered unsupportive are more responsive to price changes. It was not found, however, that supply response to real producer changes in these cases was different from that observed for the remaining seven supportive cases in the sample.

The third support variable is another binary variable that indicates post-reform periods. The degree of implementation of the agricultural policy reforms varied across the cases. For instance, Zambia liberalized its cotton sector in 1994 in one comprehensive act, but cashew reforms in Mozambique generated much opposition and, subsequently, an incomplete implementation, and Tanzania experienced frequent reversals of cashew sector reforms. It is, however, possible to identify those periods during which the core of the reform programs was implemented. Table 3.1 shows these core periods.

At the aggregate, neither supply response to real producer changes nor trend production in the post-reform period was different from that seen before the agricultural policy reforms. Only for those five cases that are considered unsupportive of the commodity in question does the own-price elasticity change—by *decreasing*—following the reforms.

The next section of this chapter reviews empirical studies on agricultural supply response, focusing on the sample country/commodity pairs, and a description of the empirical model follows. The subsequent two sections present the results and conclusions.

A Review of Relevant Studies

Econometric estimation of agricultural supply response to price changes has been subject to much debate in terms of both model specification (Mamingi 1996) and preferred estimation technique (Schiff and Montenegro 1997; Thiele 2000). Most of the existing literature defines the dependent variable—acreage, yield, or production—either at the individual crop level or at the level of aggregate agricultural supply. There are also some studies on subsector output (e.g., export vs. food crops).

The key independent variable of interest in all agricultural supply models is price. The estimated price elasticity of agricultural supply is not only interesting in itself, but also used to capture the effects of exchange rate devaluations and policy and institutional reforms. Aggregate and subsector agricultural supply response studies necessarily define a price index. For instance, Bond (1983), in a frequently cited paper, estimated the price elasticity of aggregate agricultural supply for nine Sub-Saharan African countries, including Kenya, Tanzania, and Uganda, for the 1963–81 period. Bond used average producer prices of the major agricultural products, deflated by consumer price index. In addition to the price variable, a linear time trend captured the effects of structural changes, and dummy variables controlled for unusual weather patterns. Only for two of the sample countries, Ghana and Kenya, were the short-run price elasticity estimates statistically significant, with the average for the overall sample at 0.18 and the long-run average only slightly higher at 0.21.[3]

The seemingly low response of aggregate agricultural supply to price changes, especially in developing countries,[4] may very well be an artifact of omitted nonprice variables, such as infrastructure, access to credit and technology, or transaction costs in general, that cannot be controlled for through a linear time trend. On the other hand, time-series single-equation models such as Bond's (1983) are argued to be inherently prone to producing rather low estimates of price elasticity for aggregate agricultural supply (Schiff and Montenegro 1997; Thiele 2000). Peterson (1979), for instance, argued that cross-country analysis can better capture the long-run dynamics of aggregate agricultural supply than can time-series analysis. He estimated elasticity for a 53-country sample to be between 1.27 and 1.66. However, his estimates also suffer from omitted variable bias. For instance, by including a research and irrigation variable to the Peterson model, Chhibber (1989) reduced the estimated price elasticity to 0.97.

Binswanger et al. (1985) tried to address these concerns about the estimation methodology and model specification. They estimated within-country and between-country price elasticity of aggregate agricultural supply using a panel dataset of 58 countries, covering the period 1969–78. They aggregated individual output and price data using the Fisher indices. The aggregate price index for each country then was normalized by the urban wage rate. Robustness was tested by using the purchasing power parity exchange rate as the deflator instead of the urban wage rate. They specified an extensive set of nonprice variables to control for the effects of research, extension, irrigation, human capital, agricultural potential, endowment, and infrastructure, in addition to fertilizer and tractor prices. Their estimate of short-run price elasticity did not exceed 0.06, and the long-run price elasticity was, at most, 0.33. They found that much of the variation in output was explained by capital endowments, population density, irrigation, education, and life expectancy.

Schiff and Montenegro (1997) estimated short-run price elasticity of agricultural gross domestic product (GDP) for a panel of 18 countries covering the period 1960–85. They used the agricultural price index relative to the nonagricultural price index as the price variable and also specified another independent variable, the share of agriculture in total public expenditures, to proxy the effects of public goods on agricultural production. Controlling for country coefficients, they found a price elasticity of 0.47 and that public expenditures on agriculture complemented the price effects. Their latter conclusion supports Chhibber's (1989) finding that the long-run price elasticity of aggregate agricultural supply in poorer least developed countries (LDCs) was between 0.3 and 0.5, but between 0.7 and 0.9 in more advanced LDCs with better provision of public goods.

In the same study, Schiff and Montenegro (1997) also argued that elasticity estimates generated by single-equation time-series aggregate agricultural supply models have a downward bias because input movements across sectors are not factored in. General equilibrium models designed to overcome these biases provide larger long-run price elasticity estimates (Cavallo and Mundlak 1982; Coeymans and Mundlak 1993; Mundlak, Cavallo, and Domenech 1993). However, they, too, suffer from static expectations and are subject to the "Lucas critique," that any shift in the policy regime alters the estimated system parameters (Lucas 1976; Schiff and Montenegro 1997; Thiele 2000).

In response, recent studies of the aggregate agricultural supply response improve on the use of time-series techniques with cointegration analysis and error correction models.

McKay, Morrisey, and Vaillant (1998) studied food and export crop supplies in Tanzania for the period between 1964 and 1990. Using an error correction model, they estimated the price (relative to export crop price) elasticity of the food supply to be 0.39 and statistically significant. They failed, however, to find a cointegrating vector for export crops. In the estimated short-run dynamic equation, a *negative* linear time trend seemed to dominate in explaining export crop production.

McKay et al.'s (1998) findings may very well be an artifact of the period under investigation, reflecting a period when export crops were subject to high taxation. Addressing this issue, Thiele (2003) studied aggregate agricultural supply in 10 Sub-Saharan African countries (Tanzania being one of them), from 1965 through 1999. He found a cointegrating relationship for seven out of 10 countries. Within these seven cases, in which an error correction model is used, the aggregate agricultural supply in Tanzania was estimated to have a price elasticity of 0.72.

Even though exact estimates vary, a consensus seems to have emerged, as Binswanger and Deininger (1997) summarized: "While the short-run supply response of agriculture is inelastic, the long-run response is highly elastic, as the literature unambiguously shows."

Individual crop price elasticity estimates are usually higher than for aggregate agricultural supply because factors of production can more easily be transferred across crops than from the residual economy to agriculture. For instance, in a well-cited paper, Bapna, Binswanger, and Quizon (1984) found individual price elasticity for seven agricultural products in India to range from near 0 to as high as 0.77, whereas the aggregate supply elasticity was 0.1.

In individual crop supply estimations, availability of reliable data is a more binding constraint. Elasticity of individual crop supplies is ideally estimated with respect to domestic producer prices. However, studies particularly focusing on LDCs rely on world prices instead of domestic producer prices, in some instances due to data unavailability. The use of world prices is problematic, however, since their transmission to domestic sectors is a product of multiple variables, such as market structure and geography, that need to be controlled for.

Production decisions are determined by not only nominal domestic prices, but also input prices and prices for substitute production possibilities, as well as by consumption. Individual crop studies require the researcher to more distinctly identify alternative agricultural products and control for their prices. In addition, structural changes that affect individual crops and are of particular interest to studies usually cannot be identified through a linear time trend. Therefore, individual crop elasticity estimations are scarce, especially for this chapter's sample country/commodity pairs.

In one of the few studies confronting this issue, Degaldo and Minot (2000) studied the performance of individual agricultural commodities in Tanzania over the decade covering the late 1980s and found that the short-run price elasticity of cotton supply was 1.00. Coffee supply, on the other hand, did not respond to short-run price changes, but had long-run price elasticity of 1.19. Interestingly, for cashew, both short- and long-run price elasticity was significant, with values of 0.84 and 1.69, respectively.

In examining the effects of structural changes on specific crop markets, usually descriptive statistics are preferred. Baffes (2006), for instance, showed that coffee producers in Uganda on average received 30 percent of the coffee export price before 1990, and their share went up to 70 percent following reforms. Correspondingly, coffee exports from Uganda exceeded 4 million bags in two consecutive years (1995 and 1996) following liberalization.

Degaldo and Minot (2000), looking at producers' share of the free on board (f.o.b.) price, argued that taxation of four out of five commodities in the sample decreased in Tanzania following liberalization. The exception was tea, which was not fully liberalized at the time of the study. In another study, Baffes (2003) argued that even though coffee producer prices in Tanzania increased from 60 percent in the nine seasons prior to reforms in the first half of the 1990s to 73 percent in the five seasons following the reforms, no supply response was noted.

Tschirley and Zulu (2007) documented an increase in cotton output in Zambia since its privatization in 1994.

McMillan, Rodrik, and Welch (2002), critics of cashew market reforms in Mozambique, pointed to the increase in prices received by cashew producers in Mozambique following the reforms.

Finding that cotton output exceeded 20,000 tons in just two years after reforms in Uganda, Baffes (2009) called well-deserved attention to an important point. As Belshaw, Lawrence, and Hubbard (1999) also suggested, these descriptive supply response statistics should be taken with the caveat that, in most instances, positive shocks to world commodity prices coincided with the timing of reforms.

In such cases, panel data relax data limitations to deal more effectively with exogenous factors while examining the effects of policy reforms. Bussolo et al. (2006), for instance, found a sustained positive supply response from Ugandan coffee farmers to price increases using three household surveys collected in 1992/93, 1995/96, and 1999/00. From 1992/93 to 1999/00, they found a 65 percent increase in the prices received by farmers. The share of the world price received by farmers increased from 15 percent to 25 percent between 1992/93 and 1995/96 and remained the same through 1999/00, even though the international price in 1999/00 was the same as in 1992/93. The population share of coffee farmers increased from 22 percent in 1992/93 to 38 percent in 1995/96 and 39 percent in 1999/00. From 1995/96 to 1999/00, coffee production in Uganda also went up.

Empirical Model

A simple Nerlovian partial adjustment model describes the desired level of agricultural production,

$$\log Q_t^* = \alpha + \beta \log P_{t-1} + \varepsilon_t, \tag{3.1}$$

and defines an adjustment equation,

$$\log Q_t - \log Q_{t-1} = (1 - \lambda)(\log Q_t^* - \log Q_{t-1}). \tag{3.2}$$

Q_t^* in equations (3.1) and (3.2) represents the desired level of production in the tth period. P_{t-1} is the real price received by producers in the

t–1th period. β defines the long-run price elasticity of the agricultural supply. Q_t in equation (3.2) represents actual agricultural production in the tth period, and (1–λ) is the adjustment coefficient. Therefore, β(1–λ) gives the short-run price elasticity of agricultural supply. Substituting equation (3.1) into equation (3.2) yields,

$$\log Q_t = \alpha(1 - \lambda) + \beta(1 - \lambda)\log P_{t-1} + \lambda \log Q_{t-1} + (1 - \lambda)\,\varepsilon_t,$$

or,

$$\log Q_t = \alpha' + \beta' \log P_{t-1} + \lambda \log Q_{t-1} + \varepsilon_t'. \tag{3.3}$$

In equation (3.3), β' is the short-run price elasticity of agricultural supply, and $\frac{\beta'}{(1-\lambda)}$ gives the long-run price elasticity.

Equation (3.3) is the basic functional form used in the time-series analysis of agricultural supply response. It can be expanded to include substitute product and input prices, as well as other variables, to control for unusual weather patterns, technological changes, and support to agricultural production. The most common expansion includes a linear time trend to proxy technological changes:

$$\log Q_t = \alpha' + \beta' \log P_{t-1} + \lambda \log Q_{t-1} + \rho t + \varepsilon_t'. \tag{3.4}$$

Equation (3.4) can be estimated using ordinary least squares (OLS) if the producer price and production series are stationary. In the presence of nonstationarity, equation (3.4) can be transformed into differences.

Most of the country/commodity pairs in the sample have only 19 observations. In the cases of coffee in Vietnam and tea in Tanzania, as few as 15 observations were made. Using lags and differencing further reduces the number of observations. Even though the model is very simple as it stands, degrees of freedom are still limited to draw robust inferences from individual regressions. Extending the model and trying to control for structural changes would further reduce the degrees of freedom. A potential way of addressing these limitations is to pool the data and control for individual country/commodity heterogeneity with the following transformation:

$$\log Q_{it} = \sum_j \beta_j' \log P_{it-1} + \sum_j \lambda_j \log Q_{it-1} + \rho_i t + \alpha_i + \varepsilon_{it}'. \tag{3.5}$$

Here, individual country/commodity pair effects are represented by the time-invariant disturbance term α_i, as well as by ρ_i, the coefficient for the time trend. j represents the jth commodity. Such a specification allows the panel dimension of the data to be exploited to estimate commodity-specific short- and long-run own-price elasticity.

Equation (3.5) can be extended to include input prices as well as substitute product producer prices. A binary variable, BtCotton, is also included and set to 1 for the periods after 1999 in China and after 2002 in India, to control for the effects of Bt (*Bacillus thuringiensis*) cotton on trend production.

$$\log Q_{it} = \sum_j \left(\beta_j' \log P_{it-1} + \lambda_j \log Q_{it-1} + \varphi_j \log P_{it-1}^S + \phi_j \log P_{it-1}^I \right) + \rho_i t + \rho^{\text{BtCotton}} (\text{BtCotton}_{\text{it}} * t) + \alpha_i + \varepsilon_{it}'. \quad (3.6)$$

In this study, understanding the effects of support to individual commodities on crop production and its short-run own-price elasticity is also important. Three measures were used for this purpose. One is the NRA, which measures the taxation of the commodity in question (Anderson and Masters 2009). In equations (3.7) and (3.8), an attempt was made to estimate the effects of NRA changes on the sample supplies at the aggregate level and for each commodity individually:

$$\log Q_{it} = \sum_j [\left(\beta_j' \log P_{it-1} + \lambda_j \log Q_{it-1} + \varphi_j \log P_{it-1}^S + \phi_j \log P_{it-1}^I \right)] + \delta \text{NRA}_{it} + \rho_i t + \rho^{\text{BtCotton}} (\text{BtCotton}_{it} * t) + \alpha_i + \varepsilon_{it}' \quad (3.7)$$

$$\log Q_{it} = \sum_j [\left(\beta_j' \log P_{it-1} + \lambda_j \log Q_{it-1} + \varphi_j \log P_{it-1}^I + \phi_j \log P_{it-1}^I + \delta_j \text{NRA}_{it} \right)] + \rho_i t + \rho^{\text{BtCotton}} (\text{BtCotton}_{it} * t) + \alpha_i + \varepsilon_{it}'. \quad (3.8)$$

Equations (3.9) and (3.10) examine whether those country/commodity combinations identified as providing better research, extension, and credit services (as well as having lower transaction costs) have indeed higher short-run own-price elasticity than the rest. *Support* is the binary variable; it is set to 1 for Vietnam for coffee; China, India, and Zambia for cotton; Kenya and Tanzania for tea; and Tanzania for tobacco:

$$\log Q_{it} = \beta' \log P_{it-1} + \lambda \log Q_{it-1} + \beta'^{\text{Support}} \log P_{it-1} * \text{Support}_i + \rho_i t + \rho^{\text{BtCotton}} (\text{BtCotton}_{it} * t) + \alpha_i + \varepsilon_{it}' \quad (3.9)$$

$$\log Q_{it} = \sum_j \left(\beta_j' \log P_{it-1} + \lambda_j \log Q_{it-1} + \varphi_j \log P_{it-1}^{S} + \phi_j \log P_{it-1}^{I}\right] \\ \left[+ \beta_j'^{\text{Support}} \left(\log P_{it-1} * \text{Support}_i\right)\right) \\ + \rho_i t + \rho^{\text{BtCotton}} \left(\text{BtCotton}_{it} * t\right) + \alpha_i + \varepsilon_{it}'. \quad (3.10)$$

In equation (3.10), $\beta_j'^{\text{Support}}$ measures the difference between the own-price elasticity of coffee supply in Vietnam, considered to be supportive of coffee production, and the own-price elasticity estimates for the remaining three coffee countries in the sample. Other supportive cases encompass the whole sample group for the commodity in question.

Agricultural policy reforms were implemented by varying degrees in each of the Sub-Saharan African countries in the sample. Table 3.1 shows those periods identified as the points at which the core of each reform program was implemented. *Reform* is the binary variable that is set to 1 for the periods after the reform periods shown in table 3.1. Equations (3.11) and (3.12) estimate the effects of agricultural policy reforms on the own-price elasticity of the aggregate sample supply, as well as on aggregate trend production. The analysis is limited to aggregate effects since the period of analysis, 1990–2008, limits the pre-reform sample.

$$\log Q_{it} = \beta' \log P_{it-1} + \lambda \log Q_{it-1} + \beta'^{Reform} \log P_{it-1} * Reform + P_{it-1} \\ + P^{BtCotton} \left(BtCotton_{it} * t\right) + \alpha_i + \varepsilon_{t'}. \quad (3.11)$$

$$\log Q_{it} = \sum_j (\beta_j' \log P_{it-1} + \lambda_j \log Q_{it-1} + \varphi_j \log p_{it-1}^{s} + \varphi_i \log p_{it-1}^{I} + \rho_i t) \\ + \rho_i t + \rho_i^{\text{Reform}} \left(\text{Reform}_{it} * t\right) + \rho^{\text{BtCotton}} \left(\text{BtCotton}_{it} * t\right) + \alpha_i + \varepsilon_{it}'. \quad (3.12)$$

Estimation Results

Table 3.3 shows the regression results corresponding to equations (3.6) through (3.12).[5] These are taken as the main functional forms.[6] The sample includes 12 country/commodity combinations, as listed in table 3.1, and covers the period from 1990 to 2008. When the NRA is included, the sample period is through 2004 for all cases, except 2005 for China cotton.

It is found that the sample cashew, coffee, cotton, and tobacco supplies are responsive in the short and long run to real producer price

Table 3.3 FGLS Panel Regression Results

	Dependent variable: ln(Q_t)												
	(6)	*(6A) Annual crops*	*(6B) Asia*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(11A) without support*	*(11B) with support*	*(12)*	*(12A) without support*	*(12B) with support*
$\ln(P_{t-1})_{\text{Cashew}}$	0.46**	..	0.46**	..	0.74***	..	0.46**	..	..	..	0.45**	0.45**	..
	(0.19)		(0.19)		(0.22)		(0.19)				(0.19)	(0.19)	
$\ln(P_{t-1})_{\text{Coffee}}$	0.13***	..	0.14***	..	0.13***	..	0.14***	..	..	..	0.14***	0.14***	..
	(0.04)		(0.04)		(0.05)		(0.04)				(0.05)	(0.05)	
Asia*$\ln(P_{t-1})_{\text{Coffee}}$	..	..	–0.02	..	..	..	..	..	..	..	..	..	..
			(0.14)										
Support* $\ln(P_{t-1})_{\text{Coffee}}$	..	..	..	..	..	..	–0.02	..	..	..	..	..	..
							(0.14)						
$\ln(P_{t-1})_{\text{Cotton}}$	0.37***	..	0.82***	..	0.30**	..	0.37***	..	..	..	0.40	..	0.40
	(0.09)		(0.20)		(0.13)		(0.09)				(0.36)		(0.36)
Asia*$\ln(P_{t-1})_{\text{Cotton}}$	..	..	–0.53**	..	..	..	..	..	..	..	..	..	..
			(0.21)										
$\ln(P_{t-1})_{\text{Tea}}$	–0.06	..	–0.06	..	–0.06	..	–0.06	..	..	..	–0.06	..	–0.06
	(0.08)		(0.08)		(0.09)		(0.08)				(0.09)		(0.09)
$\ln(P_{t-1})_{\text{Tobacco}}$	0.71***	..	0.71***	..	0.66**	..	0.71***	..	..	..	0.69***	..	0.69***
	(0.20)		(0.20)		(0.33)		(0.20)				(0.21)		(0.21)
$\ln(P_{t-1})$	..	0.13***	..	0.14***	..	0.16***	..	0.24***	0.43***	0.13	..	..	..
		(0.04)		(0.04)		(0.04)		(0.09)	(0.13)	(0.13)			
Annual*$\ln(P_{t-1})$	..	0.34***	..	..	..	..	..	..	..	..	..	..	..
		(0.09)											
Support*$\ln(P_{t-1})$	..	..	..	..	..	0.04	..	..	..	..	..	..	..
						(0.07)							
Reform*$\ln(P_{t-1})$	..	..	..	..	..	..	..	–0.11	–0.27**	0.04	..	..	..
								(0.08)	(0.12)	(0.14)			

NRA_{t-1}	..	..	..	0.21**	..	..	..	..	..	..	..	..	..
				(0.08)									
$(NRA_{t-1})_{Cashew}$	..	..	..	..	0.38	..	..	..	..	..	..	..	..
					(0.36)								
$(NRA_{t-1})_{Coffee}$	..	..	..	..	–0.20	..	..	..	..	..	..	..	..
					(0.19)								
$(NRA_{t-1})_{Cotton}$	..	..	..	..	0.10	..	..	..	..	..	..	..	..
					(0.13)								
$(NRA_{t-1})_{Tea}$	..	..	..	..	0.03	..	..	..	..	..	..	..	..
					(0.15)								
$(NRA_{t-1})_{Tobacco}$	..	..	..	..	0.11	..	..	..	..	..	..	..	..
					(0.48)								
$\ln(Q_{t-1})_{Cashew}$	0.18	..	0.18	..	–0.11	..	0.18	..	..	..	0.18	0.19	..
	(0.16)		(0.16)		(0.17)		(0.16)				(0.16)	(0.16)	
$\ln(Q_{t-1})_{Coffee}$	0.46***	..	0.45***	..	0.42***	..	0.45***	..	..	..	0.27**	0.25**	..
	(0.10)		(0.10)		(0.12)		(0.10)				(0.12)	(0.12)	
$\ln(Q_{t-1})_{Cotton}$	0.25**	..	0.21**	..	0.16	..	0.25**	..	..	..	0.50**	..	0.50**
	(0.11)		(0.10)		(0.12)		(0.11)				(0.19)		(0.19)
$\ln(Q_{t-1})_{Tea}$	–0.25	..	–0.25	..	–0.22	..	–0.25	..	..	..	–0.26	..	–0.25
	(0.16)		(0.16)		(0.17)		(0.16)				(0.16)		(0.16)
$\ln(Q_{t-1})_{Tobacco}$	0.41***	..	0.41***	..	0.40**	..	0.41***	..	..	..	0.42***	..	0.42***
	(0.15)		(0.15)		(0.16)		(0.15)				(0.15)		(0.15)
$\ln(Q_{t-1})$	..	0.33***	..	0.22***	..	0.31***	..	0.34***	0.25**	0.45***	..	..	..
		(0.06)		(0.07)		(0.06)		(0.07)	(0.10)	(0.10)			
t	0.04**	0.03*	0.04**	0.04*	0.03	0.03**	0.04**	0.02	0.02	..	0.04*	0.04**	..
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)		(0.02)	(0.02)	
$t_{Cashew, Tanzania}$	0.03	0.02	0.03	0.02	0.08**	0.02	0.03	0.02	0.02	..	0.03	0.03	..
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)		(0.02)	(0.02)	
$t_{Coffee, Kenya}$	–0.04**	–0.03*	–0.04**	–0.06**	–0.03	–0.03*	–0.04**	–0.02	–0.02	..	–0.04**	–0.04*	..
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)		(0.02)	(0.02)	

(continued next page)

Table 3.3 *(continued)*

	Dependent variable: ln(Qt)												
	(6)	*(6A) Annual crops*	*(6B) Asia*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(11A) without support*	*(11B) with support*	*(12)*	*(12A) without support*	*(12B) with support*
$t_{\text{Coffee, Tanzania}}$	–0.03	–0.02	–0.03	–0.05**	–0.02	–0.02	–0.03	–0.01	–0.01	..	–0.03	–0.02	..
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)		(0.02)	(0.02)	
$t_{\text{Coffee, Uganda}}$	–0.04**	–0.04**	–0.04**	–0.05**	–0.04	–0.04**	–0.04**	–0.03**	–0.03**	..	–0.04**	–0.04**	..
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)		(0.02)	(0.02)	
$t_{\text{Coffee, Vietnam}}$	0.06**	0.09***	0.06*	0.09***	0.08**	0.10***	0.06*	..	..	..	..	..	..
	(0.03)	(0.02)	(0.03)	(0.03)	(0.04)	(0.02)	(0.03)						
$t_{\text{Cotton, China}}$	–0.04**	–0.04**	–0.04**	–0.05**	–0.03	–0.04**	–0.04**	..	..	..	..	..	..
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)						
$t_{\text{Cotton, India}}$	–0.01	–0.01	–0.01	–0.02	–0.01	–0.01	–0.01	..	..	..	..	..	..
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)						
$t_{\text{Cotton, Zambia}}$	0.02	0.02	0.03	0.06**	0.07**	0.02	0.02	0.05**	..	0.06***	0.02	..	0.05
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)		(0.02)	(0.03)		(0.03)
$t_{\text{Tea, Kenya}}$	0.00	–0.00	0.00	–0.02	0.01	–0.00	0.00	0.00	..	–0.04**	0.00	..	–0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)		(0.02)	(0.02)		(0.02)
$t_{\text{Tea, Tanzania}}$	–0.04**	–0.02	–0.04**	–0.04	–0.03	–0.02	–0.04**	–0.01	..	–0.06***	–0.04**	..	–0.06**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)		(0.02)	(0.02)		(0.02)
$t_{\text{Tobacco, Tanzania}}$	0.02	0.02	0.02	0.01	0.02	0.01	0.02	0.02	..	–0.03*	0.01	..	–0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)		(0.02)	(0.02)		(0.03)
Reform*t	..	..	..	..	..	..	..	..	..	..	–0.00	–0.01	0.01
											(0.01)	(0.01)	(0.02)
BtCotton*t	0.06***	0.05***	0.06***	0.05***	0.06***	0.05***	0.06***	..	..	..	..	..	..
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)						
$\ln(P_{t-1})_{\text{Cashew}}^{\text{Substitute}}$	0.96**	0.77*	0.96**	1.42***	1.50***	0.80*	0.96**	0.85**	1.01**	..	0.97**	0.96**	..
	(0.43)	(0.41)	(0.43)	(0.49)	(0.51)	(0.41)	(0.43)	(0.41)	(0.42)		(0.43)	(0.44)	
$\ln(P_{t-1})_{\text{Cotton}}^{\text{Substitute}}$	0.09	0.08	0.09	–0.02	–0.08	0.14	0.09	0.40**	..	0.37**	0.28	..	0.28
	(0.10)	(0.10)	(0.10)	(0.11)	(0.12)	(0.10)	(0.10)	(0.18)		(0.16)	(0.18)		(0.18)

$\ln(P_{t-1})_{Tobacco}^{Substitute}$	0.08	0.16	0.08	0.23*	0.09	0.27**	0.08	0.27*	..	0.39***	0.10	..	0.12
	(0.15)	(0.11)	(0.15)	(0.13)	(0.15)	(0.13)	(0.15)	(0.14)		(0.13)	(0.16)		(0.16)
$\ln(P_{t-1})_{Cashew}^{Fertilizer}$	−0.12	−0.09	−0.12	0.02	−0.28	−0.10	−0.12	−0.07	−0.07	..	−0.12	−0.12	..
	(0.19)	(0.18)	(0.19)	(0.30)	(0.31)	(0.18)	(0.19)	(0.17)	(0.18)		(0.19)	(0.19)	
$\ln(P_{t-1})_{Coffee}^{Fertilizer}$	0.02	0.00	0.02	−0.25*	−0.15	−0.01	0.02	0.06	0.04	..	0.08	0.07	..
	(0.07)	(0.08)	(0.07)	(0.13)	(0.11)	(0.08)	(0.07)	(0.08)	(0.07)		(0.08)	(0.09)	
$\ln(P_{t-1})_{Cotton}^{Fertilizer}$	0.22**	0.17*	0.23**	0.29***	0.26**	0.26***	0.22**	1.29***	..	1.37***	1.07	..	1.07
	(0.10)	(0.10)	(0.10)	(0.10)	(0.11)	(0.09)	(0.10)	(0.44)		(0.44)	(0.76)		(0.76)
$\ln(P_{t-1})_{Tea}^{Fertilizer}$	−0.07	0.01	−0.07	−0.02	−0.04	0.01	−0.07	0.01	..	0.01	−0.07	..	−0.06
	(0.11)	(0.10)	(0.11)	(0.13)	(0.12)	(0.11)	(0.11)	(0.11)		(0.13)	(0.11)		(0.11)
$\ln(P_{t-1})_{Tobacco}^{Fertilizer}$	−0.47**	−0.47**	−0.47**	−0.42*	−0.45**	−0.42**	−0.47**	−0.37*	..	−0.36*	−0.46**	..	−0.46**
	(0.20)	(0.18)	(0.20)	(0.22)	(0.22)	(0.21)	(0.20)	(0.22)		(0.19)	(0.19)		(0.19)
BtCotton	−1.06***	−0.98***	−1.11***	−1.03***	−1.11***	−0.86***	−1.06***	..	..	..	..	..	..
	(0.32)	(0.30)	(0.31)	(0.36)	(0.37)	(0.29)	(0.32)						
Support	..	..	..	..	..	..	10.30***	..	..	..	..	..	..
							(2.61)						
Annual	..	2.35	..	..	..	..	..	..	..	..	..	..	..
		(2.46)											
Asia	..	..	5.30**	..	..	..	..	..	..	..	..	..	..
			(2.57)										
Reform	..	..	..	..	..	..	..	0.54	1.29**	−0.15	0.03	0.05	−0.04
								(0.41)	(0.60)	(0.66)	(0.14)	(0.15)	(0.31)
Intercept	−3.57	−1.91	−3.57	−5.26	−5.45*	−2.04	−3.57	−2.86	−4.13*	−0.75	−3.64	−3.61	−4.44
	(2.33)	(2.19)	(2.33)	(3.21)	(3.07)	(2.19)	(2.33)	(2.24)	(2.32)	(1.14)	(2.34)	(2.34)	(4.40)
N	210	210	210	182	182	210	210	157	93	64	157	93	64

Source: Author's calculations.

Note: Individual country/commodity pair intercepts are available from the author. Nominal rate of assistance series are through 2004, except 2005 in the case of cotton in China. Standard errors in parentheses. *p < .10, **p < .05, ***p < .01. Variables that are not included to the regression are indicated as "..". FGLS = feasible generalized least squares.

changes. The own-price elasticity estimates for these four commodities are positive, as expected.

At the aggregate level, the short-run own-price elasticity of the annual crops in the sample (cotton and tobacco) is estimated to be greater than the short-run own-price elasticity of the sample perennial crops (cashew, coffee, and tea). The difference is 0.34.

We also find that the Asian cotton-producing countries in the sample, China and India, have *lower* own-price elasticity than does the only Sub-Saharan African cotton-producing country in the sample, Zambia. The difference is 0.53. We do not observe a similar difference between Vietnam and the remaining three Sub-Saharan African coffee-producing countries in the sample. However, a robust increasing linear trend is observed for coffee production in Vietnam.

An increasing linear trend is also observed in cashew production in Mozambique and cotton production in Zambia, as well as a decreasing linear trend in coffee production in Kenya and Uganda, cotton production in China (after Bt cotton introduction is controlled for), and tea production in Tanzania, but these latter findings are not robust to different model specifications.

Trend production in the sample cotton-producing countries increases after the introduction of Bt cotton (1999 in China and 2002 in India). The effect is robust across different specifications.

The regression results are discussed in more detail in the next section.

Own-Price Elasticity of Agricultural Supply

1. *Cashew.* Mozambique and Tanzania are the two cashew-producing countries in the sample. Between 1990 and 2008, the estimated short-run elasticity of the sample cashew supply, with respect to real producer prices, is 0.46 and the corresponding long-run elasticity is the same. Groundnuts are substitutes for cashew consumption in Mozambique. Indeed, the estimate of elasticity in the cashew supply with respect to groundnut producer prices is *positive*, 0.96, which is a puzzling finding that needs further investigation. In Mozambique, an increasing linear trend is observed in cashew production since 1990, after controlling for own and substitute product prices. The trend is less robust when support variables are included to the regression.

2. *Coffee.* The most extensive commodity-specific subsample is coffee, with four countries: Kenya, Tanzania, Uganda, and Vietnam. Kenya, Tanzania, and Uganda coffee data cover the period from 1990 through

2008, whereas Vietnam coffee data also begin in 1990 but extend only through 2004. The estimated short-run own-price elasticity of coffee supply is 0.13 for the period 1990–2008. The long-run own-price elasticity estimate for the same period is 0.24.

An increasing linear time trend is seen in Vietnam coffee production. The trend is robust across different specifications. On the other hand, decreasing trends are observed for coffee production in Kenya and Uganda. Similar to the increasing trend observed for cashew production in Mozambique, the decreasing trends observed for Kenya and Uganda coffee become less robust when support variables are included in the regression.

3. *Cotton*. Three cotton-producing countries are included in the sample: China, India, and Zambia. Over the period 1990–2008, the short-run elasticity of the sample cotton supply with respect to real producer changes is 0.37. The corresponding long-run own-price elasticity is 0.49. Maize is an important substitute for cotton production. Indeed, including maize prices to the regression increases the short-run own-price elasticity of cotton supply, even though the coefficient for the real maize producer price is not statistically significant, but is negative.

   A puzzling finding is that elasticity of the sample cotton supply with respect to fertilizer prices is *positive*. The magnitude of the coefficient, however, is smaller when the change in trend production following the introduction of Bt cotton in China (1999) and India (2002) is controlled for. Relative to this, another surprising finding is a decreasing trend in cotton production in China when the introduction of Bt cotton is controlled for. This trend becomes less robust with the inclusion of support variables.

4. *Tea*. Kenya and Tanzania are the two tea-producing countries in the sample. Both Kenya and Tanzania tea data begin in 1990, but the former extend to 2008 and the latter to 2004. Between 1990 and 2008, we fail to find a robust tea supply response to real producer price changes.

5. *Tobacco*. The sample contains only one tobacco-producing country, Tanzania. Over the period 1990–2008, the short-run own-price elasticity of the tobacco supply is 0.71. With an estimated adjustment coefficient of 0.59, the long-run own-price elasticity is 1.20.

The estimated coefficient for fertilizer prices is –0.47. Indeed, controlling for fertilizer prices increases the short-run own-price elasticity of tobacco supply by 0.2.

Effects of Support to Agriculture on Agricultural Output

Three measures are used to define support to agricultural production. The first is the NRA, which measures the degree of sector taxation and is also a proxy for agricultural policy reforms.

The second measure is binary, more suggestive, and reflects the extent to which research, extension, and credit services are available and transaction costs are lower. Cotton production in China, India, and Zambia; coffee production in Vietnam; tea production in Kenya and Tanzania; and tobacco production in Tanzania are considered to be better supported compared to the rest of the sample.

Finally, a second binary variable is defined and set to 1 for the periods following the implementation of agricultural policy reforms in the sample Sub-Saharan African countries.

Overall, a robust effect of the three support variables on the sample crop production and own-price elasticity was not found. Including the support variables only marginally changed the own-price elasticity estimates, if at all, except for the reform binary variable and the NRA for cashew.

The NRA has a statistically significant effect on the sample supply only in one case: when the own-price elasticity of the sample crops is controlled for *at the aggregate level*, a 1 percent increase in the NRA is associated with an almost 0.21 percent increase in the aggregate sample crop production.

When the effects of NRA on the sample crop production are disaggregated at the individual crop level, we fail to find statistically significant coefficients for the NRA variables. However, the short-run own-price elasticity estimate for the sample cashew supply increases from 0.46 to 0.74.

The NRA does not seem to add any further information to that already conveyed through real producer prices. The analysis is presented in the annex. Using the RRA for each country/commodity pair in the sample with respect to all of the agricultural products in the same country instead of the NRA does not lead to a major change in the findings. The methodological description is in the annex. In this case, the RRA coefficient is statistically significant only for the sample tobacco supply: a 1 percent increase in the RRA to tobacco increases its supply by 1.12 percent, rendering the producer price coefficient insignificant.[7]

Own-price elasticity of the sample supplies is not different in those sample countries considered to provide more extensive input extension, research, and credit services compared to the rest of the sample.

The short-run elasticity of the sample supply with respect to real producer prices does not change after the agricultural policy reforms, except when the sample is restricted to those country/commodity pairs considered unsupportive in terms of providing easier access to research, extension, and credit services, or lower transaction costs in general. In this case, the short-run own-price elasticity decreases after the agricultural policy reforms from 0.43 to 0.16. The reforms have no discernible effect on trend production.

Conclusions

In this chapter, the short- and long-run price elasticity of individual agricultural commodity supplies were estimated over a sample of 12 country/commodity pairs: China cotton; India cotton; Kenya coffee and tea; Mozambique cashew; Tanzania cashew, coffee, tea, and tobacco; Uganda coffee; Vietnam coffee; and Zambia cotton. The effects of support to individual crop production were also estimated.

The Nerlove partial adjustment model was used. As an improvement over the method's shortcomings, estimations in this chapter were based not on individual time series, but on panel data, allowing ease of comparability across commodities and countries.

Cashew, coffee, cotton, and tobacco supplies were found to show a somewhat limited but positive response to real producer price changes in the short run. With one exception, the long-run elasticity estimates were higher, as expected (they were the same as the short-run estimate for cashew). The sample tea production did not show any response to real producer prices.

The annual crops in the sample—cotton and tobacco—were found to be more responsive to real producer changes in the short run than were the sample perennial crops—cashew, coffee, and tea—at the aggregate.

Agricultural supply response is considered to be particularly low in Sub-Saharan Africa due to lack of complementary inputs and missing markets. However, for this particular sample, no evidence to that effect was found. When the Asian cotton-producing countries in the sample were compared to the only Sub-Saharan African cotton-producing country in the sample, the short-run own-price elasticity estimate for the former was indeed found to be *smaller*. For coffee-producing countries in the sample, no difference was found, except a linear increasing trend for coffee production in Vietnam.

Bt cotton introduction was found to have increased trend cotton production, and the effect was robust across various specifications. Indeed, after controlling for Bt cotton introduction, a decreasing linear trend was observed in cotton production in China.

None of the three support variables defined were found to have a robust effect on the sample crop production. For instance, the NRA increased the sample crop production at the aggregate level, but the effect disappeared when the effects were disaggregated at the individual crop level. In the latter case, an increase in the short-run own-price elasticity of the cashew supply was observed. When the NRA estimates received for each commodity—relative to the NRA for all agricultural products covered in Anderson and Valenzuela (2008) for the same country, defined as the RRA—were included, only in the case of tobacco was the RRA found to increase production. In other cases, no effect was found. For tobacco, the short-run own-price elasticity estimate became statistically insignificant when the RRA was included.

The effects of agricultural policy reforms on the sample supply were discernible only when the sample was limited to those countries considered unsupportive of the commodity in question. Then, the short-run own-price elasticity of supply decreased after reforms.

Annex

Robustness Tests

Preliminary to the panel analysis, equation (3.4) was individually estimated for each country/commodity combination in the sample. Due to the limited number of observations, the individual regressions were run over the post-1980 period, except for cashew in Mozambique, coffee in Uganda and Vietnam, and cotton in Zambia. In these instances, the series begin in 1990. Estimates are presented in table 3A.2.

Production and producer price series are nonstationary for all sample pairs, except that nonstationarity can be rejected at 10 percent for coffee in Uganda. Augmented Dickey-Fuller (ADF) test results are given in table 3A.3.

Therefore, in order to address nonstationarity, equation (3.4) was estimated in differences for the individual country/commodity combinations. Table 3A.4 shows the regression results.[8]

Table 3A.1 Data Sources

	Production	*Main crop producer price*	*NRA*	*Substitute crop producer price*	*Exchange rate*	*CPI*	*GDP deflator*	*World energy price*	*World fertilizer price*
Cashew									
Mozambique	COMTRADE (2010)	Anderson and Valenzuela (2008); Aksoy and Yagci (2012)	Anderson and Valenzuela (2008)	FAOSTAT (2010)	WDI (2010)	WDI (2010)	N/A	GEM (2010)	GEM (2010)
Tanzania	Mitchell and Baregu (2012a)	Mitchell and Baregu (2012a)	Anderson and Valenzuela (2008)	N/A	WDI (2010)	WDI (2010)	N/A	GEM (2010)	GEM (2010)
Coffee									
Kenya	Mitchell (2012)	Mitchell (2012)	Anderson and Valenzuela (2008)	N/A	WDI (2010)	WDI (2010)	N/A	GEM (2010)	GEM (2010)
Tanzania	ICO (2010)	ICO (2010)	Anderson and Valenzuela (2008)	N/A	WDI (2010)	WDI (2010)	N/A	GEM (2010)	GEM (2010)
Uganda	ICO (2010)	ICO (2010)	Anderson and Valenzuela (2008)	N/A	WDI (2010)	N/A	WDI (2010)	GEM (2010)	GEM (2010)
Vietnam	ICO (2010)	ICO (2010)	Anderson and Valenzuela (2008)	N/A	WDI (2010)	N/A	WDI (2010)	GEM (2010)	GEM (2010)
Cotton									
China	ICAC (2008)	Anderson and Valenzuela (2008), FAOSTAT (2010)	Anderson and Valenzuela (2008)	Anderson and Valenzuela (2008), FAOSTAT (2010)	WDI (2010)	N/A	WDI (2010)	GEM (2010)	GEM (2010)

(continued next page)

Table 3A.1 *(continued)*

	Production	*Main crop producer price*	*NRA*	*Substitute crop producer price*	*Exchange rate*	*CPI*	*GDP deflator*	*World energy price*	*World fertilizer price*
India	ICAC (2008)	Anderson and Valenzuela (2008), FAOSTAT (2010)	Anderson and Valenzuela (2008)	Anderson and Valenzuela (2008), FAOSTAT (2010)	WDI (2010)	WDI (2010)	N/A	GEM (2010)	GEM (2010)
Zambia	Anderson and Valenzuela (2008); Yagci and Aksoy (2012)	Anderson and Valenzuela (2008); Yagci and Aksoy (2012)	Anderson and Valenzuela (2008)	Yagci and Aksoy (2012)	WDI (2010)	N/A	WDI (2010)	GEM (2010)	GEM (2010)
Tea									
Kenya	Mitchell (2012)	Mitchell (2012)	Anderson and Valenzuela (2008)	N/A	WDI (2010)	WDI (2010)	N/A	GEM (2010)	GEM (2010)
Tanzania	Anderson and Valenzuela (2008)	Anderson and Valenzuela (2008)	Anderson and Valenzuela (2008)	N/A	WDI (2010)	WDI (2010)	N/A	GEM (2010)	GEM (2010)
Tobacco									
Tanzania	Mitchell and Baregu (2012b)	Mitchell and Baregu (2012b)	Anderson and Valenzuela (2008)	Anderson and Valenzuela (2008)	WDI (2010)	WDI (2010)	N/A	GEM (2010)	GEM (2010)

Note: CPI = consumer price index, N/A = not applicable.

Table 3A.2 Individual OLS Levels Regression Results

	Dependent variable: ln(Q_t)											
	Cashew		*Coffee*				*Cotton*			*Tea*		*Tobacco*
	Mozambique	*Tanzania*	*Kenya*	*Tanzania*	*Uganda*	*Vietnam*	*China*	*India*	*Zambia*	*Kenya*	*Tanzania*	*Tanzania*
ln(P_{t-1})	0.33	0.21	0.28	0.15*	0.13*	0.15	0.25	0.31**	0.34	–0.003	0.09	0.52***
	(0.43)	(0.18)	(0.13)	(0.08)	(0.07)	(0.14)	(0.20)	(0.11)	(0.26)	(0.12)	(0.12)	(0.15)
ln(Q_{t-1})	0.23	0.76***	0.38**	0.20	0.42**	0.78**	0.25	0.25	0.21	0.54***	0.36*	0.59***
	(0.27)	(0.13)	(0.18)	(0.23)	(0.19)	(0.25)	(0.18)	(0.19)	(0.24)	(0.18)	(0.20)	(0.12)
t	0.02	0.01	–0.01	0.002	–0.01	0.04	–0.001	0.03***	0.09**	0.02**	0.02***	0.03***
	(0.02)	(0.01)	(0.01)	(0.004)	(0.01)	(0.05)	(0.01)	(0.01)	(0.03)	(0.01)	(0.01)	(0.01)
BtCotton * *t*	..	..	..	..	..	..	0.06***	0.09***	..	..	..	..
							(0.02)	(0.03)				
BtCotton	..	..	..	..	..	..	–1.15**	–2.06***	..	..	..	..
							(0.46)	(0.69)				
Intercept	1.08	–0.01	1.97	2.31**	2.38**	0.27	5.91***	4.64**	0.88	2.19*	2.18*	–1.69**
	(1.60)	(0.82)	(1.19)	(0.97)	(0.94)	(1.51)	(1.84)	(1.72)	(1.55)	(1.07)	(1.12)	(0.78)
N	18	28	28	28	18	15	28	28	18	28	24	27
Adj. R^2	.11	.79	.72	.08	.33	.93	.70	.93	.66	.93	.73	.90

Source: Author's calculations.
Note: Standard errors in parentheses. *p < .10, **p < .05, ***p < .01. Variables that are not included to the regression are indicated as "..".

Table 3A.3 Individual Augmented Dickey-Fuller Test Statistics

				With trend			
		ln(Qt)	*ln(Pt)*	*ln(Qt)*	*ln(Pt)*	*Δln(Qt)*	*Δln(Pt)*
Cashew	Mozambique	−2.57	−2.85*	−2.81	−2.59	−4.33***	−5.50***
	Tanzania	−1.09	−2.64*	−2.09	−2.56	−5.59***	−5.66***
Coffee	Kenya	−1.27	−1.08	−3.52**	−2.55	−6.27***	−5.39***
	Tanzania	−3.59***	−1.94	−3.20*	−1.70	−7.16***	−4.80***
	Uganda	−2.69*	−2.68*	−2.52	−2.45	−5.72***	−3.65***
	Vietnam	−1.88	−1.70	−1.41	−2.16	−4.62***	−3.24**
Cotton	China	−1.96	−2.58*	−2.92	−2.50	−5.29***	−6.25***
	India	−0.35	−1.92	−2.43	−2.91	−5.67***	−6.52***
	Zambia	−1.49	−1.69	−3.00	−3.50**	−5.27***	−6.69***
Tea	Kenya	−1.19	−0.86	−2.66	−2.89	−7.52***	−5.09***
	Tanzania	−1.31	−1.62	−3.25*	−1.58	−6.47***	−3.59***
Tobacco	Tanzania	−0.54	−2.45	−2.63	−2.41	−4.20***	−5.68***

Source: Author's calculations.
Note: 1%(***), 5%(**), and 10%(*) critical values are −3.75, −3.00, and −2.63; and −4.38, −3.60, and −3.24 with trend.

After individual regressions, the estimated short-run own-price elasticity was found to be statistically significant at 5 percent in three out of 12 cases: coffee in Tanzania (0.33), cotton in China (0.39), and tobacco in Tanzania (0.59). The adjustment coefficient was statistically significant at 5 percent only in one case, coffee in Tanzania. For this case, the adjustment coefficient was *greater than 1*, implying a larger supply response to price changes in the short run than in the long run. A linear time trend was found to explain the behavior of tea production in Kenya and coffee production in Vietnam.

That only one of the 12 estimated adjustment coefficients is statistically significant is a puzzling finding. In partial adjustment models such as the Nerlove's, estimated long-run behavior is usually more robust than short-run relationships. In an attempt to make more robust inferences, panel estimation was used. After pooling the data, the panel was first tested for stationarity, since it is of the long form.

A few alternatives are available to test panel data for stationarity, but almost all of them require a balanced dataset. One exception is the Fisher's test suggested in Maddala and Wu (1999). The test basically integrates p-values from individual ADF tests to produce a chi-squared statistic. Table 3A.5 lists p-values from the individual ADF tests.

The chi-squared test statistic is defined as $\lambda = -2\sum_{i=1}^{N} \ln \pi_i$, where π_i is the p-value from the ADF for the ith country/commodity pair, with $2N$ degrees of freedom. N is the number of country/commodity pairs. For

Table 3A.4 Individual OLS Differences Regression Results

	Dependent variable: ∆ln(Qt)											
	Cashew		*Coffee*				*Cotton*			*Tea*		*Tobacco*
	Mozambique	*Tanzania*	*Kenya*	*Tanzania*	*Uganda*	*Vietnam*	*China*	*India*	*Zambia*	*Kenya*	*Tanzania*	*Tanzania*
$\Delta\ln(P_{t-1})$	0.64	0.32	–0.01	0.33***	0.01	0.05	0.39**	0.20	–0.06	0.01	0.14	0.59***
	(0.45)	(0.21)	(0.18)	(0.11)	(0.10)	(0.15)	(0.19)	(0.13)	(0.23)	(0.12)	(0.22)	(0.21)
$\Delta\ln(Q_{t-1})$	–0.13	–0.11	–0.24	–0.43**	–0.36	–0.04	–0.12	0.02	–0.21	–0.37*	–0.33	0.23
	(0.25)	(0.19)	(0.21)	(0.17)	0.26)	(0.31)	(0.19)	(0.22)	(0.24)	(0.19)	(0.21)	(0.19)
Intercept	0.07	0.01	–0.04	0.01	0.03	0.18**	0.04	0.06*	0.07	0.07***	0.03	0.04
	(0.11)	(0.06)	(0.04)	(0.03)	(0.05)	(0.08)	(0.03)	(0.03)	(0.10)	(0.02)	(0.03)	(0.04)
N	17	27	27	27	17	14	27	27	17	27	23	26
Adj. R^2	.01	.02	–.02	.35	.02	–.17	.08	.02	–.08	.07	.04	.20

Source: Author's calculations.
Note: Standard errors in parentheses. $^*p < .10$, $^{**}p < .05$, $^{***}p < .01$.

Table 3A.5 Individual ADF *P*-Values for the Fisher's Panel Stationarity Test

		ADF p-value		*ln(p-value)*	
Commodity	*Country*	*ln(Q)*	*ln(P)*	*ln(Q)*	*ln(P)*
Cashew	Mozambique	0.10	0.05	−2.30	−2.95
Cashew	Tanzania	0.72	0.08	−0.33	−2.47
Coffee	Kenya	0.04	0.72	−3.29	−0.32
Coffee	Tanzania	0.01	0.31	−5.12	−1.16
Coffee	Uganda	0.08	0.08	−2.57	−2.56
Coffee	Vietnam	0.34	0.43	−1.07	−0.84
Cotton	China	0.30	0.10	−1.19	−2.32
Cotton	India	0.92	0.32	−0.09	−1.13
Cotton	Zambia	0.54	0.04	−0.62	−3.23
Tea	Kenya	0.68	0.80	−0.39	−0.22
Tea	Tanzania	0.07	0.47	−2.60	−0.75
Tobacco	Tanzania	0.88	0.13	−0.12	−2.06

Source: Author's calculations.
Note: *P*-values are MacKinnon approximate *p*-values. Production series for Kenya coffee and Tanzania tea, and producer price series for Zambia cotton are de-trended.

this dataset, λ = 39.36 for the production series and λ = 40.06 for producer prices.[9] The 95 percent critical value is 36.42. Therefore, we can reject the null hypothesis of nonstationarity for the sample panel and estimate equation (3.5) using OLS, with individual country/commodity pair fixed effects and time trends.

OLS fixed effects estimation requires the assumption that heterogeneity takes the form of varying intercepts with constant and uncorrelated variances across the panels. Even further, autocorrelation is assumed away, which might have to be a part of the specification since the sample panel is long. Wooldridge's (2002) test for autocorrelation gives an F statistic of $F(1,11) = 198.36$. The 95 percent critical value is 4.84. Therefore, the null hypothesis of no first-order autocorrelation is rejected. Wald's test (Greene 2003, 331) for groupwise heteroskedasticity gives a chi-squared test statistic of $W = 300.17$ with 12 degrees of freedom. The 95 percent critical value is 21.03. Therefore, the null hypothesis of constant variance across panels—*groupwise homoskedasticity*—is rejected. Testing the fixed effects estimator for contemporaneous correlation across panels, the Breusch-Pagan LM test produces a chi-squared statistic of $\lambda_{LM} = 76.83$ with 66 degrees of freedom. The 95 percent critical value is 85.97. Therefore, the null hypothesis of independence across panels cannot be rejected. In the presence of groupwise heteroskedasticity and first-order autocorrelation, a feasible generalized least squares (FGLS) estimator was used instead of OLS.

As a part of the preliminary data exploration, supply response regressions over a panel of all of the cotton-producing countries in Anderson and Valenzuela (2008) were run. These regressions showed that maize is the main substitute for cotton production. Also, the case studies in this volume have shown that groundnuts are substitutes for cashew marketing in Mozambique, and maize is the substitute for tobacco production in Tanzania.

World fertilizer and energy prices, converted to real domestic currency units, were used as proxies for input prices. The correlation between the two price series is high, 0.96. Therefore, only fertilizer prices were included to the regressions.

Alternative NRA Specifications

The NRA is computed as a function of prices received by the producers plus (minus) the subsidies (taxes) provided to agricultural production. Indeed, when a new series was constructed from world prices (converted to real domestic currency units) by multiplying them with 1+NRA, this new series and the real producer prices were found to move together. Table 3A.6 shows the correlation statistics.

Using world prices converted to real domestic currency units and the NRA instead of the real producer prices, positive effects of the NRA on the sample crop production were observed for cashew, cotton, and tobacco. The increase in the sample cashew and tobacco supplies resulting from the 1 percent increase in the NRA was almost 1 percent.[10]

In production decisions, the key variable may not only be the absolute price and/or support received for the commodity in question but also, or more so, the price and/or support received relative to other production possibilities. The substitute product information contained in this dataset, quite possibly, may not reflect all of these alternative production opportunities. Therefore, in an attempt to overcome this potential shortcoming, the RRA was used instead of the NRA.

Anderson and Valenzuela (2008) included the RRA estimates for the aggregate agricultural production in each of their sample countries. These estimates reflected the nominal rate of assistance received by agricultural production relative to nonagricultural production in the same country. Using the same approach, a measure of the RRA was constructed for each country/commodity pair in the sample. This RRA reflects the NRA received by the commodity in question, relative to the NRA for all agricultural products covered in Anderson and Valenzuela (2008) for the same country. Even though this measure of the RRA showed relatively low

Table 3A.6 Correlation between NRA and Price Variables

		Post-1980							*Post-1990*						
		Pw_t*(1+NRA_t)	PEX_t*(1+NRA_t)	NRA_t					Pw_t*(1+NRA_t)	PEX_t*(1+NRA_t)	NRA_t				
		P_t	P_t	P_t/Pw_t	P_t/PEX_t	P_t	Pw_t	PEX_t	P_t	P_t	P_t/Pw_t	P_t/PEX_t	P_t	Pw_t	PEX_t
Mozambique	Cashew	0.78	0.83	0.78	0.87	0.69	–0.18	–0.49	0.78	0.83	0.78	0.87	0.69	–0.18	–0.49
Tanzania	Cashew	0.78	0.78	0.79	0.78	0.43	–0.51	–0.64	0.64	0.77	0.42	0.62	–0.19	–0.67	–0.68
Kenya	Coffee	0.90	0.92	–0.04	0.49	–0.24	–0.23	–0.33	0.81	0.94	–0.21	0.50	–0.11	–0.04	–0.31
Tanzania	Coffee	0.38	0.58	–0.46	0.04	–0.22	–0.01	–0.37	0.79	0.77	–0.19	–0.12	–0.06	–0.06	–0.07
Uganda	Coffee	0.72	0.72	0.53	0.48	0.45	–0.02	0.19	0.72	0.72	0.53	0.48	0.45	–0.02	0.19
Vietnam	Coffee	0.90	0.89	–0.40	–0.22	–0.33	–0.20	–0.27	0.90	0.89	–0.40	–0.22	–0.33	–0.20	–0.27
China	Cotton	0.89	0.80	0.63	0.66	0.37	–0.08	–0.33	0.90	0.80	0.61	0.64	0.13	–0.21	–0.36
India	Cotton	0.91	0.64	0.83	0.67	0.51	–0.16	–0.23	0.92	0.80	0.70	0.71	0.51	0.07	–0.35
Zambia	Cotton	0.53	0.48	0.38	0.40	0.44	0.35	0.25	0.53	0.48	0.38	0.40	0.44	0.35	0.25
Kenya	Tea	0.66	0.46	0.27	0.35	0.20	0.13	–0.42	0.53	0.45	0.59	0.24	–0.29	–0.51	–0.36
Tanzania	Tea	0.35	0.65	–0.23	0.41	0.23	0.47	0.07	0.74	0.75	0.50	0.54	0.56	0.29	0.17
Tanzania	Tobacco	0.86	0.66	0.87	0.50	0.55	–0.22	0.01	0.86	0.71	0.87	0.67	0.55	–0.22	–0.15

Source: Author's calculations.
Note: For all sample cases, export price series begin in 1988. Nominal rate of assistance series, on the other hand, do not extend beyond 2004, with the exception of China cotton.

correlation with the real producer prices in most cases, its effects on the sample crop production were not statistically significant, except for tobacco. The RRA coefficient for the tobacco supply was statistically significant and relatively large: a 1 percent increase in the RRA increased the sample tobacco supply by 1.12 percent, and, in this case, the short-run own-price elasticity of the sample tobacco supply became statistically *insignificant*.[11]

Notes

1. Meerman (1997), for instance, indicates that short-run price elasticity of aggregate agricultural supply ranges between 0.1 and 0.3, whereas the long-run elasticity exceeds unity for Argentine, Chile, and the United States, among others. On the other hand, the International Cotton Advisory Committee assumes the price elasticity of the world cotton supply is 0.47 (Poonyth et al. 2004). Shepherd (2006) estimates price elasticity of the cotton supply to lie between near 0 and 1.08 in his sample of 30 countries. Tokarick (2003) estimates an elasticity of 1.5 for world cotton exports.
2. Incorporating the literature on agricultural supply response into a political economy/external shock framework provides further insights into understanding the agricultural supply response in low-income countries. First, the magnitude and sign of the price shock become important. Not only does responding to a major decline in agricultural prices require a change in the existing production function, but also now political consensus becomes a key variable that determines the presence and magnitude of a supply response. This supports the spirit of the Lucas critique directed toward the common time-series analysis of supply response (Schiff and Montenegro 1997; Thiele 2000).
3. The adjustment coefficient used to estimate long-run price elasticity is statistically significant for only one country in the sample: Ghana.
4. Rouis, Razzak, and Mollinedo (1994) mention that aggregate agricultural supply response to price changes in Sub-Saharan Africa is comparable to those in other developing countries.
5. A detailed description of the data is available from the author upon request. Data sources are indicated in table 3A.1 in the annex.
6. Regression results from the variations on the main functional forms are available from the author upon request.
7. Regression results are available from the author upon request.
8. As is evident in table 3A.1, the data sources vary. In some instances, production data are for the crop year, whereas the corresponding prices are collected for the calendar year. Therefore, while running the individual regressions, different lag structures were experimented with to make sure that equation (3.4) has the most potential to explain these data.

9. Kenya coffee and Tanzania tea production series and Zambia cotton producer price series were de-trended.
10. Regression results are available from the author upon request.
11. Regression results are available from the author upon request.

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CHAPTER 4

How Africa Missed the Cotton Revolution

John Baffes

Although agricultural commodity prices may diverge from each other for short periods of time, they are expected to converge over the longer term since they respond to the same fundamentals and exogenous shocks. Moreover, when supply and demand conditions force prices to deviate, producers will shift land and other resources from lower to higher priced crops while consumers will shift from higher to lower priced products, thus balancing the market and inducing price convergence. Yet, during the past decade, the cotton market defied that logic. Between 2000–04 and 2005–09, the real agricultural commodity price index increased by 38 percent while real cotton prices declined 4 percent (figure 4.1). More surprisingly, world cotton production increased 13 percent. That is,

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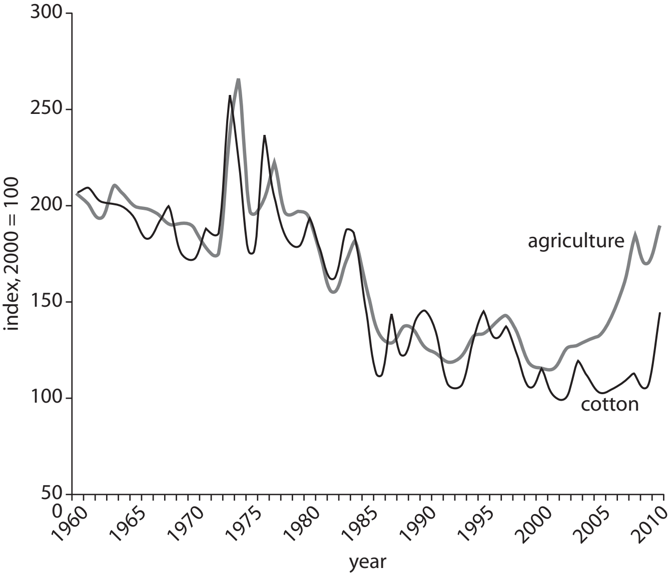
Figure 4.1 Agriculture and Cotton Price Indices (Real, *MUV*-deflated, 2000 = 100)



Source: World Bank.

despite declining cotton prices and sharply increasing prices of competing crops, growers supplied more cotton. Why?

For the most part, the gap between cotton and other agricultural prices is explained by the use of biotechnology. Indeed, econometric evidence presented in annex 4.2 shows that the historically strong co-movement between cotton and other agricultural prices began weakening during the early part of the past decade, and such weakening is explained by the use of biotechnology, especially in China and India. In other words, biotechnology-induced productivity improvements in China and India generated supply response that was large enough to keep cotton prices in check.

Between the first and second half of the past decade, China and India increased their combined cotton production by 47 percent (table 4.1). During the same period, cotton production in the rest of the world declined 7 percent while it declined 22 percent in Africa. Not coincidentally, Africa did not adopt biotech cotton varieties. In short, early (and heavy) users of Bt (*Bacillus thuringiensis*) cotton increased their market share at the expense of—and causing welfare losses to—nonusers of biotechnology.

Table 4.1 Cotton Production

	1990–94	*1995–99*	*2000–04*	*2005–09*	*1990–94*	*1995–99*	*2000–04*	*2005–09*
	World							
	Thousand tons				*Share of world (%)*			
China	4,483	4,311	5,314	7,269	24.4	22.3	24.9	29.9
India	2,149	2,767	2,864	4,742	11.7	14.3	13.4	19.5
United States	3,649	3,708	4,123	3,844	19.9	19.2	19.4	15.8
Pakistan	1,591	1,646	1,869	1,986	8.7	8.5	8.8	8.2
Brazil	556	462	1,013	1,285	3.0	2.4	4.8	5.3
Africa	904	1,316	1,422	1,142	4.9	6.8	6.7	4.7
Uzbekistan	1,356	1,095	994	1,061	7.4	5.7	4.7	4.4
Others	3,692	3,993	3,703	2,952	20.1	20.7	17.4	12.2
World	18,380	19,300	21,303	24,282	100	100	100	100
	Africa							
	Thousand tons				*Share of Africa (%)*			
Burkina Faso	65	102	178	210	7.2	7.8	12.5	18.4
Mali	116	194	198	130	12.9	14.8	14.0	11.4
Zimbabwe	55	109	93	105	6.0	8.3	6.5	9.2
Nigeria	54	75	89	91	6.0	5.7	6.3	8.0
Benin	82	144	148	90	9.1	11.0	10.4	7.9
Tanzania	62	59	62	89	6.8	4.5	4.4	7.7
Côte d'Ivoire	101	133	129	68	11.2	10.1	9.1	6.0
Cameroon	51	78	99	63	5.7	6.0	6.9	5.5
Others	317	421	426	298	35.1	31.9	29.9	26.1
Africa	904	1,316	1,422	1,142	100	100	100	100

Source: United States Department of Agriculture (http://www.fas.usda.gov/psdonline).
Note: All figures in this table (and the book) refer to cotton lint.

In addition to advances in biotechnology, the cotton market has been subjected to considerable domestic support, which encouraged more production, thus exerting downward pressure on world prices. Although the effect of subsidies has been a hotly debated subject, the literature review discussed in annex 4.1 reveals that such effect is in the order of 10 percent; that is, cotton prices are 10 percent lower than they would have been in the absence of domestic support. This is a relatively small impact that by no means accounts for the large deviations between cotton and other agricultural prices—especially if one takes into account the fact that other commodity sectors have been subjected to policy distortions as well.

This chapter examines the deeper reasons behind the uneven adoption of biotechnology in the cotton market. The next section places biotechnology in the context of the global cotton market and reaches the following conclusions: First, some countries have reached full conversion to biotech cotton while others have not introduced the necessary legal and regulatory framework. Second, when cotton biotechnology is introduced, conversion takes place quickly. Third, the benefits appear to be relatively large, especially in developing countries, where between 15 and 20 percent yield increases and 50 percent reduction in insecticide use have been observed. "The Biotechnology Controversy" section discusses the reasons surrounding the biotech controversy and notes that opposition to biotechnology not only has blocked its adoption in Africa and other low-income countries but also may have slowed down the development of second-generation technologies. "The Collateral Damage" section explains how Africa missed the opportunity to embrace this technology. The last section concludes the chapter and discusses policy implications and lessons that go beyond cotton and Africa.

Biotechnology and the Cotton Market

As in most aspects of life, the rules of allocating non-free resources are dictated by market forces or battles. Crops, including cotton, are no exception. Humans grow cotton for clothing while insects use it for food. Cotton growers win the battle by spraying the cotton plant with toxins. When the insects attempt to eat the plant (and, hence, the toxin), they die before inflicting irreversible damage. Here is where biotechnology comes in handy. Instead of the grower spraying the cotton plant, the toxin is inserted into the plant by genetically modifying the seed—a process similar to human vaccination.

Early stages of biotechnology made use of a family of soil organisms Bt that produced certain toxins. Research by several public and private institutions in the early 1980s focused on inserting the Bt gene into tobacco plants. Although initial results had limited success, a major breakthrough was achieved in 1988 by Monsanto—a biotechnology company—and, by 1990, the first Bt cotton varieties were fully developed (see Tripp 2009 for an extensive discussion of the development of biotech cotton varieties).

Biotech cotton was introduced commercially in 1996 in Australia, Mexico, and the United States. China followed suit a year later, as did Argentina and South Africa in 1998. As of 2009, 10 countries have used the technology, accounting for more than half of the world cotton area and 55 percent of production, a figure that may be higher if one accounts for illegal use of biotech varieties—illegal biotech is widespread in Pakistan, as it was in India a few years ago.

At least three countries have adopted fully biotech cotton (Australia, South Africa, and the United States). Argentina, China, Colombia, India, and Mexico are heavy users as well, where biotechnology accounts for two-thirds of cotton area. Brazil, which introduced the technology in 2006, currently allocates 20 percent of cotton area to biotech varieties. In Burkina Faso, almost one-third of its cotton area was under biotech varieties in the first year of its commercial release (table 4.2). At a global level, James (2009) reported that, as of 2009, 29 countries had used biotechnology. Soybeans accounted for more than half of global biotech area (52 percent), followed by maize (31 percent), cotton (12 percent), and canola (5 percent). Several other commodities are also using biotech seeds, but their share in total biotech area is very small.

Because of high research and development (R&D) expenditures, biotech seeds are more expensive than conventional ones. At the outset, if the costs of buying these seeds are lower than the savings realized due to fewer chemical applications, biotechnology will displace conventional seed technology. Otherwise, the technology will be abandoned. So far, it appears that the former is the case.

Although the costs of the biotechnology are straightforward, in the sense that they only reflect the costs of purchasing seeds, the benefits are more complex to evaluate because they are affected by several factors that go beyond the reduction in the number of chemical applications. To see this, consider the following, purely hypothetical, scenarios (table 4.3). Suppose that growing one hectare of cotton requires 10 chemical applications at a cost of US$50 each or a total of US$500.

Table 4.2 Area under Biotech Cotton Varieties (Percentage of Area Allocated to Cotton)

	United States	*Australia*	*Mexico*	*China*	*South Africa*	*Argentina*	*India*	*Colombia*	*Brazil*	*Burkina Faso*	*World*
1996/97	12.7	7.7	0.8	—	—	—	—	—	—	—	2.0
1997/98	25.5	14.0	7.8	0.7	—	—	—	—	—	—	4.4
1998/99	45.0	15.4	14.3	2.4	12.0	0.8	—	—	—	—	6.6
1999/00	58.7	22.7	12.5	14.2	28.0	3.9	—	—	—	—	12.1
2000/01	71.1	30.0	33.4	25.0	24.0	6.1	—	—	—	—	15.7
2001/02	76.7	30.0	27.4	32.0	74.0	4.6	—	—	—	—	18.1
2002/03	75.4	30.0	37.6	48.7	84.0	8.0	0.5	—	—	—	20.2
2003/04	75.1	60.0	41.4	51.6	86.0	10.0	1.1	0.5	—	—	20.8
2004/05	78.0	60.0	60.6	59.1	75.0	10.0	6.1	23.0	—	—	24.3
2005/06	81.0	90.0	57.4	62.2	84.0	20.0	14.1	40.0	—	—	28.4
2006/07	85.4	90.0	59.0	66.6	91.0	25.0	41.5	44.0	0.5	—	36.5
2007/08	90.2	95.0	60.0	61.0	95.0	25.0	66.3	57.0	13.0	—	43.5
2008/09	92.6	95.0	65.0	65.7	95.0	25.0	74.0	71.0	20.0	1.6	47.1
2009/10	95.0	95.0	62.0	68.0	95.0	85.0	79.3	61.0	20.0	30.5	52.0

Source: James 2009.
Note: — = not available.

Table 4.3 A Hypothetical Experiment on the Costs and Benefits of Biotech Cotton

	Scenario I: Optimal use of chemicals		*Scenario II: Suboptimal use of chemicals*	
	Conventional	*Biotech*	*Conventional*	*Biotech*
Number of sprays/hectare	10	5	5	5
Cost of chemicals, $50/spray	500	250	250	250
Cost of biotech seeds, $	0	150	0	150
Yield, kgs/hectare	1,000	1,000	500	1,000
Revenue, $1.50/kg	1,500	1,500	750	1,500
Profit, $	1,000	1,100	500	1,100
Incremental profit, $	100 (= 1,100 – 1,000)		600 (= 1,100 – 500)	

Source: Author's calculations.

Assuming yield of one ton of lint per hectare, priced at US$1.50 per kilogram, it would imply revenue of US$1,500 and a profit of US$1,000. If the use of biotech seeds (at the cost of, say, US$150 per hectare) reduces the number of chemical applications to five, it increases the grower's profit to US$1,100, thus yielding an incremental net gain of US$100 (the difference between US$1,100 and US$1,000), which is the incentive to switch to biotechnology. Assume now another scenario, whereby the use of insecticides is suboptimal, with an effectiveness equivalent of, say, 5 applications per season achieving half the yield compared to the 10-application scenario; this generates revenue of US$750 per hectare, with a profit of US$500.[1] If biotech seeds are used, in which case the five applications per season become optimal, the profit increases to US$1,100 (same as in the earlier scenario), generating an incremental net gain of US$600 (the difference between US$1,100 and US$500).

Thus, the adoption of biotechnology can be viewed as a move along the production possibilities frontier (scenario I) or a move to the production possibilities frontier (scenario II) depending on whether optimal or suboptimal use of chemical applications took place prior to its introduction. In some respects, these two scenarios can be mapped to developed and developing countries, where the input intensity may roughly correspond to the numbers used in this hypothetical experiment. Thus, the difference in incremental profit under the two scenarios (US$100 vs. US$600), which reflects productivity increases, can be seen as the driving force behind China's and India's adoption of biotechnology and subsequent increase in cotton production.

The pros and cons of biotech cotton (and biotechnology in general) have been discussed extensively in a broad context and in terms of specific costs and benefits, the latter mostly from survey-based research. Despite early signs regarding the benefits of biotechnology, institutions were at first reluctant to engage in the debate (or take an "official position"), not only in terms of policy or financial assistance but also in terms of a general policy discussion. Such reluctance reflected, most likely, the controversial nature of the subject.

Perhaps the first institutional study to discuss and explicitly acknowledge the broader benefits of biotechnology in developing countries was the United Nation's Food and Agriculture Organization (FAO)'s 2004 *The State of Food and Agriculture* report, which showed that, on balance, biotech cotton growers were better off than were growers of conventional seed varieties. Individual authors followed suit. Baffes (2005) argued that, in addition to subsidy elimination and domestic policy reforms, adoption of biotech varieties should be a priority among policymakers in low-income, cotton-producing countries. Falck-Zepeda, Horna, and Smale (2007) and Anderson, Valenzuela, and Jackson (2008) warned that the downward pressure on world cotton prices caused by the large-scale adoption of biotech cotton is likely to force other countries to adopt the technology in order to compete in the global market.

Numerous survey-based, country-specific papers have evaluated the costs and benefits of biotech cotton. An earlier review by Smale, Zambrano, and Cartel (2006) surveyed 47 peer-reviewed articles published between 1996 and mid-2006. Although they concluded that the evidence is promising, in the sense that biotechnology is beneficial to producers, they also noted that it was too early to reach definite conclusions, in part due to methodological limitations and in part because the longer term economic impact is often shaped by institutional and political considerations, the effects of which cannot be discerned within a limited timeframe.

Later reviews, however, reached more definite conclusions. Qaim (2009) summarized the evidence from 11 studies representing seven countries (table 4.4). The results show that, on average, introduction of biotech cotton varieties is consistent with a 50 percent reduction in insecticide use, 19 percent increase in effective yield, and 160 percent increase in gross margin (measured in US$/hectare). Although insecticide reduction varies little among the cases reviewed, considerable variation was

Table 4.4 The Economic Effects of Biotech Cotton

	Insecticide reduction (%)	*Effective yield increase (%)*	*Gross margin increase ($US/ha)*	*Number of surveys*
Argentina	47	33	23	2
Australia	48	0	66	1
China	65	24	470	1
India	41	37	135	2
Mexico	77	9	295	1
South Africa	33	22	91	2
United States	36	10	58	2
Average/sum	50 [53]	19 [31]	163 [303]	11

Source: Qaim 2009, 672, table 1.
Note: The average reported in the last row has been calculated by the author. Numbers in square brackets show the India/China average.

noted in yield increase (from no change in Australia to a 37 percent increase in India). Large variation was reported in the gross margin as well (from a low of US$23 per hectare in Argentina to a high of US$470 per hectare in India).

A more extensive review undertaken by Tripp (2009) covered six countries but was based on a broader survey coverage (table 4.5). His results are remarkably similar to those of Qaim (2009). For example, the average reduction in insecticide costs is 41 percent, with relatively little variation among countries. The average change in yields is 15 percent, ranging from a 2 percent reduction in Australia to a 35 percent increase in South Africa.

Gruère and Sengupta (2011) reviewed 51 estimates based on 23 studies that focused exclusively on India and found even larger benefits. They concluded that, on average, use of biotech cotton reduces the number of chemical applications and pesticide costs by 36 percent each, increases yields by 34 percent, and raises net returns by 84 percent, while it increases the costs of production by 15 percent.[2]

Numerous other models have evaluated the welfare gains from biotech cotton varieties. Depending on assumptions regarding adoption rates and methodology, global welfare gains range from a low of US$1.5 to a high of US$3.6 billion annually (see Bouët and Gruère 2011). Welfare gains in Africa vary from a low of US$20 million annually (Bouët and Gruère 2011) to a high of US$214 million (Anderson, Valenzuela, and Jackson 2008). Again, such range depends on numerous factors, including modeling framework, country composition, and more importantly, price assumptions.

Table 4.5 Changes in Yield and Insecticide Costs from Biotech Cotton

	Insecticide cost reduction (%)	*Yield change (%)*	*Number of surveys*
Australia	51	–2	2
China	65	25	3
India	27	15	10
Mexico	77	10	2
South Africa	38	35	9
United States	47	9	1
Average/sum	41 [46]	15 [20]	27

Source: Tripp 2009, 74, table 1.
Note: The country averages reported in the last row have been calculated by the author. The original table reports results from individual surveys. Numbers in square brackets show the India/China average.

The Biotechnology Controversy

Despite its benefits, biotechnology remains a highly controversial subject, which becomes evident when considering how unevenly countries responded. Some have fully embraced the technology, whereas others have not even introduced the necessary legal and regulatory framework. From the perspective of high-income countries, the United States and Europe have taken different stances, with the United States being the leader in both development and use of biotechnology and Europe taking a cautious approach. Other countries fall into one or the other camp, with most African countries taking the precautionary approach.

Graff, Hochman, and Zilberman (2009) argued that adoption of biotechnology has been affected by the alignment of rent-seeking behavior that influences the policy-making process. They also note that because companies in the United States have a relative advantage in biotech innovation, whereas Europe has dominance in agricultural pest-control markets, biotechnology advanced in the United States while conventional seed technology (which requires higher use of pesticides) dominated in Europe. Paarlberg (2008, 119) argued that, initially, "Europe's precautionary principle had honorable origins" and reflected sensitivities related to environmental problems that took place during the 1970s and 1980s.[3] However, public opinion in Europe shifted against biotechnology—more so than in North America—in part because of pressure by the nongovernmental organization (NGO) community (see next section). Paarlberg (2008) also noted that, instead of using existing laws and regulations, Europe created a new and very demanding regulatory regime, thus erecting obstacles rather than creating opportunities for the development and use of biotechnology.

At the time that governments were engaging in the debate of whether to adopt and how to regulate biotechnology, a strong antibiotech movement emerged in developed and developing countries alike. For example, following the FAO's publication of 2004 *State of Food and Agriculture*, a coalition of 670 NGOs and 816 individuals sent a letter ("FAO Declares War on Farmers Not on Hunger") to FAO's Director General, expressing their disagreement with the findings of the report and their dissatisfaction because they were not consulted (Genetic Resources Action International, 2004). Interestingly, a year later, the *American Agricultural Economics Association* honored a key contributor of the FAO's publication with its 2005 Quality of Communication award.

A telling illustration is how opposition to biotech cotton has unfolded in India. Its logic is based on the following arguments: In order for growers to buy biotech seeds, they often borrow funds from financial institutions. If the crop fails, they will not have the money to pay back the funds, and thus the financial institutions will not lend them again. Then, they turn to private moneylenders. If the crop fails again, the growers will not repay the private lenders, who, in turn, will exert a lot of pressure on the growers. Some growers cannot take such pressure and commit suicide.[4]

Various media outlets argued, often with graphic illustrations, that biotechnology has been the key cause of suicides in the cotton-growing areas of India. The issue was picked up by Western media outlets as well. The *New York Times* published the article "On India's Farms, a Plague of Suicide" on September 19, 2006, whereas the U.S. Public Broadcasting Service (PBS) television channel aired the episode "The Dying Fields" on August 28, 2008. On the more sensational side, reports have gone as far as naming India's cotton-growing region the "suicide belt" (with a nod to the term "cotton belt" in the United States). Gruère, Mehta-Bhatt, and Sengupta (2008) reviewed the Indian cotton biotechnology industry in detail and focused on the suicide issue. They concluded (p. 38):

> Therefore, it is not only inaccurate but simply wrong to blame the use of Bt cotton as the primary cause of farmer suicides in India. In fact, our overview of the evidence suggests that Bt cotton has been quite successful in most states and years in India, contributing to an impressive leap in average cotton yields, as well as a decrease in pesticide use.

Herring (2008) argued that biotechnology has been subjected to framing by its opponents for at least two reasons. The first reason has to do with the possibility that biotech seeds may, in the future, incorporate "terminator technology." In other words, plants from biotech seeds will not be able to reproduce, thus raising fears that the entire food system would be dominated by multinational corporations that may manipulate the biotech seed market. Second, biotechnology has been stigmatized because the introduction of insect-resistant traits into plants involved genetic engineering.

The logic behind the first argument is, at best, weak and, at worse, flawed, simply because the "terminator technology" concern can be applied to all aspects of modern agriculture (or any other sector of the economy for that matter). Most of today's agricultural production depends on commercial inputs such as irrigation equipment, fertilizers, chemicals, fuel, electricity, tractors, and trucks, which certainly do not have the ability to reproduce—in fact, most of these inputs have been instrumental to the success of the Green Revolution. If some (or, even one) of those inputs are not available, output from commercial agriculture will disappear. Although there may be imperfections in the way in which some of these markets function, plenty of companies are willing and able to supply these inputs, and no concerns have been expressed that the markets of, say, fertilizers or tractors have been subjected to manipulation. It is unclear why the biotechnology industry will act any differently compared to all other input-supply industries. But, even if the industry acted in a worrisome manner, regulation to ensure that anticompetitive behavior does not take place or funding of public research institutions to supplement private research would prevent likely problems.

Yet, the framing has been successful, in large part because of the way in which biotechnology was marketed. Biotechnology was commercialized in the mid-1990s as a genetically engineered technology with the stated objective of increasing yields and generating higher profits for farmers in developed countries. However, at that time, consumers were becoming more sensitive to food health and environmental considerations, were shifting to organic products, and were becoming aware of the negative impact of the Organisation for Economic Co-operation and Development (OECD) agricultural subsidies on producers of low-income countries (the latter became apparent during the failed attempt to launch what would have been the Seattle round of trade negotiations in December 1999). In short, a "transgenic," "genetically modified," or "genetically engineered" product was promoted at a time when consumers were already tuned to "organic," "fair trade," and "environmentally sustainable" products.[5] Indeed, in 2004, I met with two senior managers of a seed company, one of whom strongly believed that the negative reaction against biotechnology reflected, for the most part, its name. One of the managers argued: “Unfortunately, the name [transgenic crops] was left up to the engineers. In retrospect, it appears that cultural anthropologists or sociologists could have assisted the industry with a much better choice of name.” He further noted that “biotech cotton” or “enhanced seed technology” would have been much better alternatives.

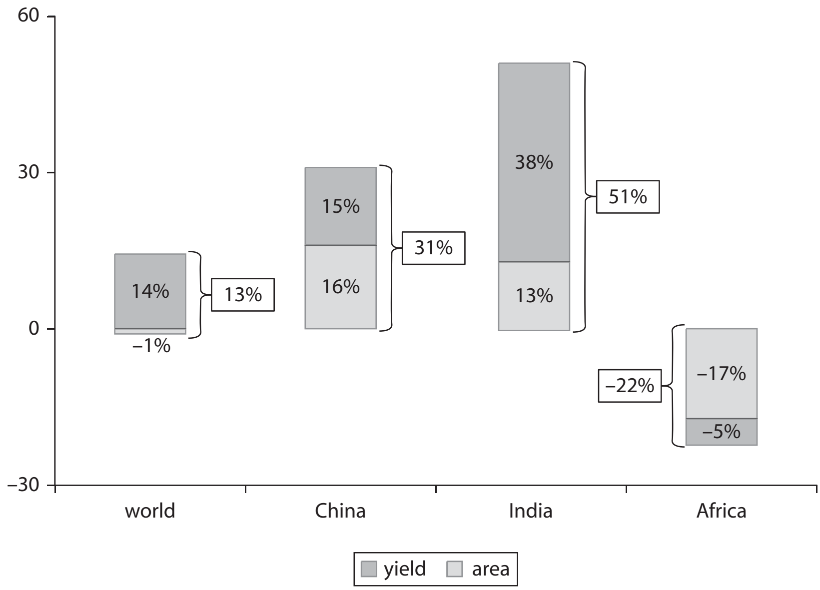
The Collateral Damage

Despite organized opposition, India’s use of biotech cotton increased every single year since its introduction in 2002 and, by 2009, had reached 80 percent adoption rate. Biotech cotton was initially used in India on an illegal basis. According to Herring (2007), it was the illegal use of biotech seeds that pushed the Indian government to put the legal and regulatory framework in place and eventually approve cotton biotechnology. In China, biotech cotton’s share reached 70 percent in 2009. Between the first and second half of the past decade, cotton production in China increased 31 percent with similar contributions from yield increases and area expansion (figure 4.2). India experienced a 51 percent output increase during this period, with yield increases contributing almost three-quarters to that expansion. These yield increases are in line with those reported in the literature reviews. Today, these two countries dominate the global cotton market, accounting for half of the world’s cotton output, up from one-third during the 1990s.

Cotton production in Africa declined 22 percent (17 percent due to area contraction and 5 percent due to yield losses). It was only in 2008 that Burkina Faso introduced biotechnology, and the second year, almost 30 percent of its cotton area was under biotech varieties. James (2009) estimated that biotech cotton in Burkina Faso is likely to generate economic benefits of about US$100 million per annum, based on yield increases and reductions in chemical applications experienced elsewhere. Again, these gains are very much in line with the benefits reported in the literature discussed earlier. Anderson and Valenzuela (2007) showed that the benefits from full adoption of biotech cotton varieties by African cotton-producing countries could be even greater than the benefits of the removal of all cotton subsidies by the United States and the European Union.

In view of these gains, a simple (and relevant) question is: What if Africa had matched India’s and China’s cotton expansion record during the past decade? Africa’s output would have been 2.1 million tons instead

Figure 4.2 Production Growth Decomposition into Yield and Area, 2000–04 to 2005–09



Source: Author's calculations based on USDA data.
Note: Growth decomposition has been calculated as the following: $\log(Q_{2005–09}/Q_{2000–04}) = \log(A_{2005–09}/A_{2000–04}) + \log(Y_{2005–09}/Y_{2000–04})$, where *Q*, *A*, and *Y* denote production, area, and yield.

of 1.1 million tons. Even at past decade's low prices of US$1.30 per kilogram, that would have generated an additional US$1.3 billion in export revenues per year. Moreover, if the realignment of cotton prices with other agricultural commodities that began during the second half of 2010 persists, the additional revenue could top US$2.0 billion.[6] Although such gains would have required other policies and investments to have taken place as well, they are so large that officials and policymakers in charge of agricultural policies and investment strategies should take notice.

Yet, concerns regarding biotechnology have been expressed at high levels of policy-making in many African countries. For example, Uganda's Cotton Development Organization—the regulatory body of the cotton industry—chose to proceed cautiously, examining the pros and cons of this technology despite the Cotton Research Institute's repeated emphasis on the need to venture into the area of biotechnology (Baffes 2009). Similarly, Zambia's cotton development trust attempted to set up the institutional structure and eventually introduce biotech cotton, but the president of the country halted its activities in response to pressure by various groups, including the Council of Churches. It was only in 2010 that the subject of biotechnology reemerged in the public policy-making arena (Yagci and Aksoy 2012).

Many authors have noted that Africa's cautionary stance toward biotechnology reflects more external influence rather than domestic concerns. For example, Paarlberg (2008) argued that the views regarding biotechnology of some African countries and their subsequent actions have been influenced directly or indirectly by many European governments or its citizens through mechanisms that include financial and technical assistance, activities through international organizations, NGO activity campaigns, and import marketing arrangements.

Regardless of the nature, origins, and degree of the opposition to biotechnology, commodity markets—and, perhaps, development—have been affected in at least two ways. First, because of the opposition, biotechnology adoption by developing countries was limited—ironically, just where the technology is most effective and most needed. Second, the opposition may have slowed down the development of second-generation biotechnology since private companies are unwilling to invest in relevant R&D technologies because of uncertainty, whereas publicly funded (national and international) institutions limit their engagement in biotechnology-related research due to inadequate funding.

Conclusions and Policy Implications

During the second half of the past decade, commodity prices experienced the broadest and most sustained boom since the end of World War II. However, cotton prices remained stagnant, only recovering towards the end of 2010. This chapter conjectures that cotton prices were kept in check in large part due to the biotechnology-induced expansion of supplies by China and India. Yet, Africa has a poor record, not only in terms of biotech adoption, but also in terms of having the necessary legal and regulatory framework in place. Only one African country—Burkina Faso—had utilized biotechnology as of 2011. Not coincidentally, the region's cotton industry has performed poorly. Between the first and second half of the past decade, Africa's cotton output declined 22 percent. World cotton output increased 13 percent—and India and China increased their production by 51 and 31 percent, respectively.

Against this background, this chapter highlights a number of stylized facts. First, the use of the technology at a global level has increased on a continuous basis since it was first introduced 15 years ago—on average, each year, an additional 4 percent of global cotton area is converted to biotech varieties, and, with a few exceptions, this has been the case at a country level as well. Such adoption rates imply that biotechnology is cost-saving to producers (since they adopt the technology), welfare-improving to consumers (because they buy cotton at lower prices), profitable to seed companies (since they expand their business), and beneficial to the environment (because of less chemical applications). On a global basis, the use of biotech cotton varieties implies a 40–50 percent reduction in chemical applications and a 15–20 percent increase in yields, with relatively larger benefits accruing to cotton growers in developing countries. Second, if historical trends continue, almost all cotton will come from biotech varieties within a decade. Third, in addition to legal and regulatory framework, the largest obstacle to introducing the technology appears to be political will. When the technology is introduced, it takes off quickly, including in low-income countries such as Burkina Faso, the only African country to embrace it.

Despite such adoption rates and its good cost–benefit record, biotech cotton is still surrounded by controversy. The most ferocious debate takes place in India, where numerous reports in the local (and international) press and other news outlets have argued repeatedly and continuously that biotech cotton is the key cause of suicides among cotton growers in the so-called "suicide belt," despite strong evidence to the contrary. Although such opposition did not prevent India from utilizing the technology, it has caused irreversible damage elsewhere, especially in Africa.

Such outcomes not only expose a gap between developmental objectives and results on the ground but also provide some valuable lessons. On the one hand, cotton growers in the United States and Europe received a considerable amount of domestic support and, in the case of the former, access to biotechnology. On the other hand, emerging economies, such as India and China, gained access to biotechnology (despite strong opposition in the former) and, on some occasions, support. At the other end of the spectrum, African cotton growers not only did not use biotechnology or support but also were not given the opportunity to evaluate the technology. Thus the paradox: African countries, such as Uganda and Zambia, with annual per capita incomes of US$1,000 are not using biotechnology to improve production of a raw material destined for export, whereas high-income countries, such as Australia, Canada, and the United States, with annual per capita incomes of US$40,000, are using biotechnology for domestically consumed food commodities.

The development implications of biotechnology extend beyond cotton. As noted earlier, commodity prices are experiencing one of the broadest and most sustained booms of the post–World War II period. Such increases, initially seen as welcome developments, have alarmed government officials and policymakers alike. It is becoming increasingly apparent that although a host of factors fueled the boom, higher production costs due to increases in energy prices have played a key—and, perhaps, the most important—role (Baffes 2011b).

High energy prices will present challenges and may transform the way in which agricultural commodities are produced, especially in view of environmental sensitivities. Therefore, investment and policy strategies in response to a cost-driven boom should be consistent with cost-saving alternatives. Biotechnology clearly meets this challenge. Indeed, researchers (e.g., Thompson 2011) are increasingly recognizing the role that these technologies could play, not only in alleviating temporary price pressures but also in shaping longer term price trends.

Annex 4.1

The Determinants of the Gap between Cotton and Other Agricultural Prices

In addition to the biotechnology-induced supply response by China and India, two other factors have contributed to the gap between cotton prices and the broader index of agricultural prices: domestic support (with a negative impact on cotton prices) and biofuels (with a positive impact on food commodities). Both are discussed here.

The cotton market has been subjected to considerable domestic support, which encourages more production, thus exerting downward pressure on world prices. Distortions due to subsidies are not limited to the cotton market. Most commodity sectors are affected by import tariffs and many also by domestic supports, export subsidies, and export taxes (Aksoy and Beghin 2005; Anderson 2009). During the first half of the past decade, the United States (which accounts for one-third of world exports) supported its cotton sector to the tune of US$2–4 billion annually. The European Union provided considerable support as well—around US$1 billion annually—although applied to much less cotton and hence had a lower impact on world prices. Numerous other countries subsidize their cotton sectors as well. However, these have received less attention either because their subsidies are small and indirect (e.g., India, Turkey, and some West and Central African countries) or because the accuracy of the statistics has been questioned (e.g., China). See ICAC (2010) for the latest update on cotton subsidies.

The effect of subsidies on the world price of cotton has been a hotly debated subject, and the estimates vary widely. After reviewing the literature, Baffes (2005) concluded that a simple average over all models implied that world cotton prices would have been 10 percent higher without support. Sumner (2006) reached a remarkably similar conclusion. Based on evidence from various sources, he found a 10 percent increase in the world price of cotton to be a reasonable estimate if the cotton subsidy programs were removed under the cotton initiative and other farm production subsidies were also reduced substantially. Jales (2010) found that reforms consistent with the December 2008 Doha Development Agenda (DDA) draft modalities would imply world cotton prices 6 percent higher over 1998–2007 (ranging between a high of 10 percent in 2001 and a low of 2 percent in 2007). Reforms by the United States consistent with full implementation of the World Trade Organization (WTO) Dispute Settlement Body (DSB)'s recommendations would have increased cotton prices by 3.5 percent (ranging between a high of 6.5 percent 2001 and a low of 1 percent in 2007). The Cotton Initiative goes back to 2002, when four African cotton producers (Benin, Burkina Faso, Chad, and Mali, the so-called C-4) argued that cotton subsidies caused world prices to decline and reduce their export revenue. In turn, the C-4 asked for financial compensation by bringing their case to the WTO. At about the same time, Brazil brought a case against the United States on cotton subsidies (see Baffes 2011b).

The 2006–08 food price boom was partly aided by growth in demand for biofuel production—albeit much less than originally thought. Although the direct impact of biofuel demand is felt only by maize, sugarcane, and some edible oils, the indirect impact is felt by most agricultural crops because of the strong substitutability both on the input side and on the output side—especially in animal feed and vegetable oils, which are highly substitutable commodities. Because cotton is not a close substitute to any other commodity, there is no substitutability on the output side. There is substitutability only on the input side as land allocated to cotton can be used for other crops. But, even there, it is quite limited, at least in the short term, because other inputs, primary processing facilities, picking machinery, and other equipment are cotton-specific. Thus, converting cotton land to other crops and vice versa takes more time compared to converting land from, say, wheat to maize. Indeed, between 2000–04 and 2005–09 (two periods that can be viewed as without and with biofuel as well), global area allocated to cotton declined by less than 1percent. For example, although cotton area in the United States declined by almost 20 percent during these two periods, global (non-U.S.) cotton area increased by 3 percent. By contrast, maize area (both globally and in the United States) increased more than 10 percent during this period.

Last, it should be noted that because cotton competes with synthetic fibers, which are by-products of crude oil, it is often argued that crude oil prices affect cotton prices above and beyond the impact of production costs. Baffes (2007) estimated transmission elasticities from crude oil price to the prices of other commodities, including food and cotton. The average elasticity for food commodities was 0.18, whereas that for cotton was 0.14. Therefore, on that count, cotton does not respond to oil prices any differently than do food commodities.

Annex 4.2

The Divergence between Cotton and Other Commodity Prices

Commodity price co-movement has been discussed extensively in the literature. Pindyck and Rotemberg (1990) analyzed price movements of seven seemingly unrelated commodities (cocoa, copper, cotton, crude oil, gold, lumber, and wheat) and concluded that these prices co-moved in excess of that explained by macroeconomic fundamentals. Explanations given included incomplete model, endogenicity, rejection of normality assumption, and bubbles or market psychology. Subsequent research, however, challenged the excess co-movement hypothesis on data and methodological grounds (see Ai, Chatrath, and Song 2006; Cashin, McDermott, and Scott 1999; Deb, Trivedi, and Varangis 1996; LeyBourne, Lloyd, and Reed 1994). Although historically cotton prices have tracked other agricultural prices very closely, during the past decade, they diverged considerably from each other (figure 4.1). Only during the second half of 2010 did the two indices begin reconverging.

To evaluate the degree of such divergence, the following regression is used (see also Baffes 2011a):

$$\log\left(P_t^{C}\right) = \mu + \beta_1 \log\left(P_t^{AG}\right) + \beta_2 \log(MUV_t) + \beta_3 t + \varepsilon_t . \qquad (4A2.1)$$

P_t^C and P_t^{AG} denote the price of cotton and the agricultural commodity price index in year t (both expressed in nominal dollar terms), MUVt denotes the deflator, t is the time trend, and ε_t denotes the error term; μ, β_1, β_2, and β_3 are parameters to be estimated. The agricultural commodity price index consists of 24 commodities, including grains, edible oils, beverages, and raw materials. Cotton's weight in that index is 2.9 percent. Details regarding composition of indices, weights, and price data can be found at World Bank (2011).

The first two columns of table 4A2.1 show estimates for the 1960–2009 and 1960–2010 periods, respectively. The exclusion or inclusion of 2010 was motivated by the desire to capture the effect of the recovery in cotton prices that took place during the second half of 2010. The estimate of β_1 at 0.61 (excluding 2010) and 0.66 (including 2010) is highly significant, with adjusted-R^2s equal to 0.91 and Augmented Dickey-Fuller

Table 4A.2.1 Comovement between Cotton and Agricultural Commodity Prices

	— [1] —		—[2] —		—[3] —	
	1960–2009	*1960–2010*	*1960–2009*	*1960–2010*	*1960–2009*	*1960–2010*
μ	–0.23	–0.23	–0.02	0.02	0.39	0.17
	(1.14)	(1.14)	(0.07)	(0.05)	(1.29)	(0.61)
D	—	—	2.32**	1.47*	—	—
			(2.63)	(1.68)	—	—
β_1	0.61***	0.66***	0.87***	0.89***	0.85***	0.86***
	(5.97)	(6.34)	(7.62)	(7.34)	(6.62)	(6.64)
$\beta_1 D$	—	—	–0.51***	–0.34*	—	—
			(2.80)	(1.86)		
γ	—	—	—	—	–1.11***	–0.80**
					(4.40)	(2.27)
β_2	0.67***	0.60***	0.26	0.22	0.16	0.20
	(5.16)	(4.49)	(1.63)	(1.31)	(0.80)	(0.97)
100*β_3	–2.29***	–2.11***	–0.97*	–0.86	–0.35	–0.63
	(7.31)	(6.29)	(1.84)	(1.52)	(0.58)	(0.96)
Adj-R^2	.91	.91	.93	.92	.93	.92
ADF	–6.03***	–6.21***	–7.17***	–7.00***	–7.01***	–6.78***

Source: Author's estimates based on World Bank (prices) and International Cotton Advisory Committee (cotton biotechnology area).

Note: The dependent variable is the logarithm of cotton price. The numbers in parentheses denote absolute *t-values* while asterisks denote parameter estimates significant at 10 percent (*), 5 percent (**), and 1 percent (***) levels, respectively. ADF is the Augmented Dickey-Fuller (Dickey and Fuller 1979) statistic for unit root and corresponds to the MacKinnon one-sided *p-value*. The lag length of the ADF equations was determined by minimizing the Schwarz-loss function. The standard errors and covariance matrix have been estimated in a heteroskedasticity-consistent manner using White's method. — means that the variable was not included in the regression.

(ADF) statistics of –6.03 and –6.21, respectively, in turn implying strong co-movement between cotton and other agricultural prices.

To examine the divergence between agriculture and cotton prices, equation (4A2.1) was reformulated by introducing a dummy variable, D = 0, 1960–2001 and D = 1, 2002–10, applied to both μ and β_1. The break is expected to capture the introduction of biotech cotton in China and India. Hence, equation (4A2.1) becomes:

$$\log\left(P_t^{C}\right) = \mu + D + \beta_1 \log\left(P_t^{AG}\right) + \beta_1 D * \log\left(P_t^{AG}\right) + \beta_2 \log(MUV_t) + \beta_3 t + \varepsilon_t . \quad (4A2.2)$$

Results from equation (4A2.2) are reported in columns 3 and 4 of table 4A2.1. The econometric evidence shows that the long-run relationship between the price of cotton and the other agricultural commodities was even stronger up to the early 2000s, but weakened considerably during the past eight years. During 1960–2002, real agricultural prices were 4 percent higher than real cotton prices (2000 = 100); during 2003–10 the gap widened to almost 60 percent. Even in 2010, when cotton prices enjoyed a spectacular recovery, their annual average was 30 percent lower than the overall agricultural price index. The estimates show that the recent recovery of cotton prices induced some degree of convergence ($\beta_1 D$ increased from –0.51 to –0.34 when the observation for 2010 is included).

Finally, equation (4A2.1) was re-estimated by adding biotech cotton area as a share of global cotton area, B_t^{SHARE}, as follows.

$$\log\left(P_t^{C}\right) = \mu + \beta_1 \log\left(P_t^{AG}\right) + \gamma \beta_t^{\text{SHARE}} + \beta_2 \log(\text{MUV}_t) + \beta_3 t + \varepsilon_t . \quad (4A2.3)$$

Results from equation (4A2.3) are reported in the last two columns of table 4A2.1. As in equations (4A2.1) and (4A2.2), the adjusted-R^2s are very high, and the ADF statistics confirm stationarity of the error term at a 1 percent level of significance. The estimate of β_1 is 0.85 and highly significant, remarkably similar to the estimate of regression in equation (4A2.2). The parameter estimate of the biotechnology share, γ, was negative and highly significant in both regressions, by implying that the use of biotechnology explains the post-2000 gap between cotton and other agricultural prices. Interestingly, the parameter estimate of the time trend—used as a proxy of technical change differential between cotton and other agricultural commodity sectors—is not significantly different from zero. This should not be surprising because the share of land allocated to biotechnology is, indeed, the best proxy for technical change.

To conclude, the econometric evidence shows that, while for the four decades starting in 1960 cotton and other agricultural prices moved in a synchronous manner, they began diverging in the early part of the past decade. Such divergence is accounted for by the use of biotech cotton.

Notes

1. The notion of suboptimality used here is much broader than simply fewer chemical applications. It could include other aspects, such as use of low-quality chemicals or not spraying at the right time, the proper amount, or the required type of chemical. These are common problems in developing countries due to poor research and extension services.
2. It should be noted that some studies appear in more than one review.
3. The Foreword of Paarlberg's book, *Starved for Science: How Africa Biotechnology Is Being Kept out of Africa*, was written by Norman E. Borlaug (agricultural scientist, often called the father of the Green Revolution) and Jimmy Carter (former president of the United States). They are both Nobel Peace Prize Laureates (1970 and 2002).
4. Although the logic of these arguments is correct, the probability of each event occurring (conditional on occurrence of the previous event) becomes progressively lower, especially in view of the spectacular performance of the Indian cotton sector during the relevant period.
5. Not surprisingly, opponents of biotechnology took the name issue to extremes by calling biotechnology products "death seeds," "seeds of suicide," "frankencrops," and "frankenfoods."
6. To put these gains into perspective, consider that during 2009, International Development Association (IDA) net inflows to Africa were US$3.2 billion whereas Official Development Assistance (ODA) flows reached US$28 billion.

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CHAPTER 5

Coffee in Uganda and Vietnam: Why They Performed So Differently

John Baffes and Anil Onal

During the 1980s, Vietnam exported no coffee at all, whereas Uganda was one of Africa's largest coffee producers, accounting for a little over 2 percent of global coffee supplies. Uganda also had the reputation of producing the world's best robusta coffee. Since the early 2000s, Vietnam has become the world's second largest coffee producer after Brazil and the top supplier of robusta coffee, accounting for 15 percent of the world's coffee in 2006. Uganda's coffee production has stagnated, averaging about 3 percent of global coffee supplies, barely matching its 1980s production levels (see figure 5.1). This chapter focuses on the likely reasons behind such a performance gap. It argues that the gap reflects, in part, the way that these countries respond to shocks, both positive and negative, external and internal.

The coffee (and agricultural) sectors of Uganda and Vietnam share a number of similarities but are also characterized by numerous differences. Both countries produce the same type of coffee—robusta—primarily by smallholders. The agricultural sectors in both countries were highly regulated initially, but later went through substantial policy reforms. On numerous occasions, both countries' agricultural sectors

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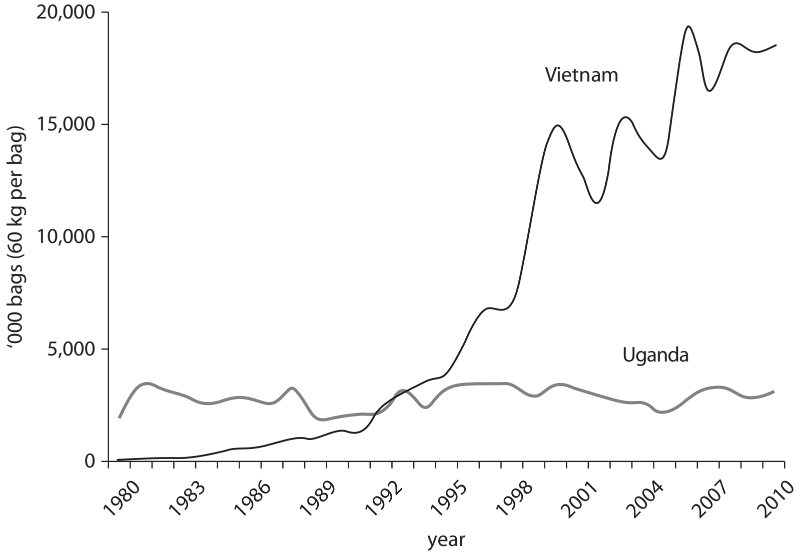
The views presented in this chapter do not reflect those of the World Bank. The authors would like to thank Ataman Aksoy for helpful comments and suggestion on earlier drafts of this chapter.

Figure 5.1 Coffee Production in Uganda and Vietnam



Source: International Coffee Organization 2012.

have received considerable state support. However, Vietnam's coffee (and agricultural) sector is much more capital-intensive than is Uganda's. Consider, for example, that in the 1990s, Vietnam used 85 tractors per 100 square kilometers while Uganda used only nine; during 2005–08, Vietnam used 257 tractors while Uganda still used nine. Vietnam uses almost four tons of fertilizer per hectare of arable land; only 13 kilograms per hectare were applied in Uganda. On "doing business" indicators, Vietnam is far ahead of Uganda as well. It costs US$756 to export one container from Vietnam, with a lead time of 22 days; it costs US$3,190 in Uganda, with a lead time of 37 days (see tables 5.1 and 5.2). Numerous conclusions emerge from this comparison. On the policy front, Uganda has been more supportive than Vietnam, according to the nominal rate of assistance (NRA) measure. On average, Ugandan coffee growers receive a higher share of export prices than do their Vietnamese counterparts. However, during various shocks, Vietnam has supported its coffee sector in a much more efficient manner than has Uganda. And, as already mentioned, the business environment in Vietnam is much friendlier than in Uganda. In short, prices and policies alone cannot explain the difference in performance. It appears that the overall investment and business

Table 5.1 Economic, Agricultural, and Coffee Sector Indicators

	1980–84	*1985–89*	*1990–94*	*1995–99*	*2000–04*	*2005–08*
GDP growth (% per annum)						
East Asia and Pacific	7.4	8.0	9.5	7.0	8.0	9.6
Sub-Saharan Africa	1.7	2.7	0.7	3.4	4.1	5.8
Vietnam	—	4.5	7.3	7.5	7.2	7.8
Uganda	2.7	3.1	6.0	7.7	6.1	8.8
Per capita GDP growth (% per annum)						
East Asia and Pacific	5.7	6.2	7.9	5.7	7.1	8.8
Sub-Saharan Africa	−1.2	−0.2	−2.0	0.7	1.5	3.2
Vietnam	—	2.1	5.2	5.8	6.0	6.5
Uganda	−0.5	−0.5	2.5	4.5	2.7	5.3
Agricultural GDP growth (% per annum)						
Vietnam	—	3.1	3.3	4.5	4.0	3.9
Uganda	1.6	2.5	3.6	3.8	1.1	5.4
Coffee production growth (% per annum)						
Vietnam	38.9	38.8	31.4	29.0	5.8	5.2
Uganda	12.0	−2.4	6.5	4.9	−1.4	7.6
Merchandise exports as share of GDP (%)						
Vietnam	—	—	17.2	27.0	39.9	55.7
Uganda	—	—	6.8	9.1	6.5	7.4
Agricultural exports as share of merchandize exports (%)						
Vietnam	—	—	62.4	38.4	26.5	23.4
Uganda	—	—	97.6	96.4	90.9	80.8
Coffee exports as share of agricultural exports (%)						
Vietnam	—	—	10.0	23.5	14.6	17.9
Uganda	—	—	74.5	78.9	40.8	34.6
Agricultural machinery (tractors per 100 sq. km of arable land)						
Vietnam	—	—	85	208	251	257
Uganda	—	—	9	9	9	9
Fertilizer consumption (kilograms per hectare of arable land)						
Vietnam	—	—	—	—	3,532	3,954
Uganda	—	—	—	—	16	13
Agriculture value added per worker (constant 2000 US$)						
Vietnam	—	—	234	266	304	339
Uganda	—	—	177	189	198	193

Source: International Coffee Organization 2012; UN COMTRADE 2012; World Development Indicators 2012.
Note: — = not available.

environment, along with the way in which the sectors (and the governments) accommodate shocks, matter most.

The next two sections of this chapter review the Ugandan and Vietnamese coffee industry, respectively, paying particular attention to historical developments and policy reforms undertaken during the early 1990s. "The Policy Environment in Uganda and Vietnam" section then

Table 5.2 Doing Business Indicators

	2007	2008	2009	2010	Average
Cost to export (US$ per container)					
East Asia and Pacific	932	943	953	943	943
Sub-Saharan Africa	1,642	1,868	1,923	1,959	1,850
Vietnam	468	533	555	555	528
Uganda	2,940	3,090	3,190	2,780	3,000
Lead time to export (days)					
East Asia and Pacific	25	25	25	25	25
Sub-Saharan Africa	36	35	33	32	34
Vietnam	24	24	22	22	23
Uganda	39	39	37	37	38
Ease of doing business (1 = most business-friendly regulations)					
East Asia and Pacific	—	—	—	97	97
Sub-Saharan Africa	—	—	—	137	137
Vietnam	—	—	—	90	90
Uganda	—	—	—	119	119
Time required to start a business (days)					
East Asia and Pacific	50	48	45	44	47
Sub-Saharan Africa	53	48	45	43	47
Vietnam	50	50	50	44	49
Uganda	28	25	25	25	26

Source: World Development Indicators 2012.
Note: — = data not available. The regional figures refer to developing countries only (for example, Sub-Saharan Africa excludes South Africa and East Asia and Pacific excludes Singapore).

discusses how the two countries handled various internal and external shocks. The last section concludes the chapter with insights into why these two coffee-producing countries perform so differently.

Uganda's Coffee Industry

Arabica coffee was introduced to Uganda in 1900 as an estate crop, but poorly performing seeds and diseases discouraged its expansion. The introduction of robusta coffee, however, a less input-intensive crop that could be grown at lower elevations where there was better access to transportation facilities, turned out to be successful. Uganda's coffee sector became exclusively smallholder, with the typical farm size ranging between 0.1 and 0.5 hectares, a structure that remains the same today. By 1925, coffee accounted for 5 percent of Uganda's merchandise exports. Responding to government extension services and the introduction of better varieties, coffee production continued to increase, becoming an important source of income to rural households and a major contributor to the country's foreign exchange earnings. By 1958, coffee overtook cotton as the country's chief export crop. In the early 1970s, coffee accounted for most of the total merchandise exports, averaging about 3 million 60-kilogram bags annually, or 4 percent of global coffee supplies.

On the policy side, Uganda's coffee industry followed a typical path, one characterized by most commodity subsectors in Africa (Akiyama et al. 2003). The first coffee-related institution, the Coffee Industry Board, was established in 1930, to address quality control issues; it was followed by the creation of the Department of Crops (created in 1946), whose key responsibility was robusta's expansion. Shortly thereafter, the functions of the Industry Board were expanded to include price setting responsibilities and, later (under a new name, the Coffee Marketing Board), marketing activities. Following independence in 1962, the Coffee Board assumed full control of the industry. The Coffee Act of 1969 gave the Board full responsibility over all aspects of the coffee industry, including exports. This setting remained virtually unchanged until 1990, when the coffee sector was subjected to comprehensive policy reforms.

For most of the time, especially after independence, the coffee sector was heavily taxed. That was especially the case in the 1970s and the early 1980s, when Ugandan coffee growers missed the benefits of high global coffee prices; in some years, the coffee growers' share of export prices was as low as 15 percent (Bibangambah 1996). The government-owned railway system had a monopoly on coffee transportation to ensure that no coffee was marketed outside official channels. Furthermore, to retain a firm grip on foreign exchange earnings, the government introduced the practice of selling coffee at f.o.t. (free on truck) Kampala instead of f.o.b. (free on board) Mombasa, thereby requiring international buyers to undertake the risk of transporting coffee to Mombasa, a practice that continues today.

Despite all distortions, the coffee industry did not fare as poorly as other industries (or the entire economy, for that matter). During the Idi Amin regime (1971–79), the assets of foreign-owned companies were confiscated, including tea factories and cotton ginneries, leading to the collapse of the respective sectors. The coffee industry, however, escaped collapse, primarily for two reasons. First, about one-quarter of the coffee output was marketed through neighboring coffee-producing countries, outside official channels (Henstridge 1996, cited in Collier 1997). This was aided by the fact that coffee does not require rapid primary processing (as, for instance, does tea); thus, it could leave the country unprocessed. Second, because coffee requires only limited purchased inputs, the collapse of input markets did not affect the sector.

Policy reforms in agriculture were first discussed in the mid-1980s, during the implementation of an International Development Association (IDA) Agricultural Rehabilitation Project, when the government begun preparing proposals for coffee marketing reforms (World Bank 1983). However, restructuring the coffee marketing chain or reducing the Coffee Board's responsibilities was not part of the project. Comprehensive coffee sector reforms began in 1990, as part of a structural adjustment program (Akiyama 2001). In January 1991, the Coffee Board was split into two entities: the Coffee Marketing Board, Ltd., which assumed the trading and processing functions of the former Board, and the Uganda Coffee Development Authority (UCDA), with responsibilities for monitoring and regulating the industry and advising the government on policy issues. Further reforms were undertaken a year later by unifying the exchange regime. The Board gradually liquidated all its assets and withdrew from the industry, marking the end of government's involvement in marketing and trade activities (see table 5.3 for the key coffee-related institutions in Uganda and table 5.4 for statistics).

Table 5.3 Institutions in the Ugandan Coffee Industry

Institution/entity	*Status*	*Main functions and responsibilities*
Uganda Coffee Development Authority (UCDA)	Statutory Body	Established by the Uganda Coffee Development Authority Statute of 1991 to take over some of the functions of the Coffee Marketing Board. Its objective is to "promote and oversee the coffee industry as a whole by developing research and controlling the quality and improving the marketing of coffee. . . . " It is financed by a 1% cess imposed on all coffee exports.
Coffee Research Institute (CORI)	Statutory Body	Headquartered at Kituza in Mukono, about 40 km east of Kampala, its mandate is to "conduct research necessary to solve priority constraints that limit the production of arabica coffee, robusta coffee, oil palm, cocoa, and tea." The Institute is part of NARO, which, along with the donors, are the main sources of its funding.
Uganda Coffee Trade Federation (UCTF)	Private Sector	Established in 1996 to "protect, promote and safeguard the business interests of persons engaged in the coffee trade and industry (whether as growers, processors, agents, brokers, roasters, or exporters) and persons connected with the industry in Uganda." It is financed by its members.

(continued next page)

Table 5.3 *(continued)*

Institution/entity	*Status*	*Main functions and responsibilities*
National Union of Coffee Agribusiness and Farm Enterprises (NUCAFE)	Private Sector	Founded in 1995 as the Ugandan Coffee Farmers Association, it changed its name and mandate in 2003, as a result of strategic planning carried out in 2003 with the support of a U.S. Agency for International Development-funded project. Its mission is to "establish a sustainable and profitable farmer operated organization for the benefit of coffee farmers."
Uganda Coffee Roasters Association (UCRA)	Private Sector	Represents the interests of Ugandan Roasters, who supply the local market. Uganda consumes some 100,000 bags per annum, accounting for 3% of Uganda's output.
National Organic Agricultural Movement of Uganda (NOAGMU)	Private Sector	Created in 2001, its objective is to promote organic farming through training, development of standards, promotion (local and international), and lobbying and advocating.
National Agricultural Advisory Services (NAADS)	Statutory Body	Established by the National Agricultural Advisory Services Act of 2001 as a statutory corporation, its mission is to promote market-oriented agriculture through provision of extension services.
Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)	Government	Its mandate is to promote, support, and guide the agricultural sector. Most of its coffee-related activities are performed through National Agricultural Research Organization and CORI.
Ministry of Finance, Planning and Economic Development (MFPED)	Government	It oversees the planning of national strategic development initiatives to facilitate growth, efficiency, and stability, and eradicate poverty. It also mobilizes resources for public expenditure programs.
Ministry of Tourism, Trade, and Industry (MTTI)	Government	Three departments within Ministry (Trade, Cooperatives, and Industry) deal with coffee-policy issues, such as export promotion, value addition, enhancement of competitiveness, and extension services.

Sources: Coffee Sector Restructuring Taskforce 2003; Uganda Trade Coffee Federation; and author's interviews.

By most accounts, the reforms have been successful. Producers' share of export prices increased considerably, and growers began receiving payments promptly (Akiyama 2001; Baffes 2006; Krivonos 2003). Entrepreneurial activity increased enormously as the number of active

Table 5.4 Coffee-Related Statistics in Uganda

	Production ('000 bags)	*Producer price (U Sh/kg)*	*Export price (U Sh/kg)*	*Producer's share (%)*	*Exchange rate (U Sh/US$)*	*GDP deflator (2005 = 100)*
1990	1,955	N/A	N/A	N/A	637	22
1991	2,088	420	927	45	1,058	28
1992	2,185	568	1,092	52	1,204	41
1993	3,142	1,292	1,684	77	1,039	53
1994	2,393	1,685	2,343	72	941	57
1995	3,244	1,254	1,606	78	1,036	62
1996	3,419	1,146	1,480	77	1,065	65
1997	3,440	1,430	1,900	75	1,190	67
1998	3,386	1,433	1,899	75	1,415	73
1999	2,862	1,100	1,580	70	1,566	73
2000	3,401	700	997	70	1,778	79
2001	3,158	520	778	67	1,771	83
2002	2,890	1,080	1,386	78	1,930	82
2003	2,599	1,090	1,420	77	1,869	88
2004	2,593	1,488	1,632	91	1,755	102
2005	2,159	1,962	2,055	95	1,837	100
2006	2,700	2,254	2,451	92	1,746	102
2007	3,250	2,701	2,920	92	1,676	110
2008	3,197	2,741	3,130	88	2,034	117
2009	2,797	2,653	3,308	80	2,078	134
2010	3,100	2,846	3,588	79	2,441	146

Sources: Uganda Coffee Development Authority, 2003/04 *Annual Report* (table 2.9, p. 9), International Coffee Organization, *Historical Prices to Growers Data,* United Nations *COMTRADE Database,* World Bank, *Commodity Price Data,* and International Monetary Fund, *International Financial Statistics*.
Note: Data are for crop year starting in the given calendar year except the GDP deflator. Producer and export prices between 2004 and 2010 are estimates using the growth rates from the ICO and COMTRADE, series respectively. For the prior years, 1991–2003, these series show similar trends to the estimates from the Uganda Coffee Development Authority. GDP = gross domestic product; N/A = not applicable.

exporters reached more than 70 just four years after the reforms, and thousands of small traders entered the industry. A large supply response occurred, in part aided by the price boom of 1994/95; Uganda surpassed 4 million bags of coffee for two years in a row.

Deterioration of coffee quality, reported numerous times, appeared to be a temporal phenomenon only, since quality later recovered without loss of reputation (Ponte and Kawuma 2003, 45). And, unlike in many other sectors, no backtracking of reforms has taken place. Yet, despite the success of reforms, the sector did not perform as originally expected. During the past few years, coffee production has fluctuated around 3.5 million tons.

Currently, the UCDA is in charge of all regulatory aspects of the industry, including monitoring quality, enforcing regulations, collecting statistics, undertaking promotion efforts, and managing a coffee replanting program. Often, the UCDA's functions are carried out in cooperation with other institutions with broader mandates (table 5.3). The UCDA is financed by a 1 percent levy imposed on all coffee exports.

Vietnam's Coffee Industry

Coffee was introduced to Vietnam by the French in 1857. Following 40 "trial" years, coffee was grown mainly as an estate crop. Coffee production during colonial rule was limited. After World War II, coffee trees in Vietnam became infected with disease, and support of the sector by the French declined considerably. By the end of the 1950s, coffee production was minimal, limited to only a few large plantations (Stockman 2010). As was the case in Uganda, initially, arabica coffee was grown but, because of diseases, robusta proved more resilient. Coffee production continued in South Vietnam until the mid-1970s. Following reunification, coffee production expanded, with state support and exports to other Communist countries on a barter-trade basis. Regular trade in coffee began after the demise of the International Coffee Agreement (ICA) in 1989 (of which Vietnam was not a member). The demise of the ICA coincided with a large devaluation of the Vietnamese currency, thus setting the stage for a surge in coffee production and exports (Athukorala et al. 2007; Luong and Tauer 2006).

In addition to the ICA and devaluation, numerous market-oriented policy initiatives, as well as support from the state, put the coffee sector (and the entire economy, for that matter) on a sustainable growth path. Following the introduction of property rights reforms in 1981, farmers were allowed to keep and sell their farm production in excess of the amount contracted with their cooperatives. Even though work exchange teams were maintained, each farmer was responsible for crop management and husbandry on his own land. The contract system resembled the Chinese household management system (Pingali and Xuan 1992).

In 1988, the government gave farmers renewable leases on their assigned land. Even though transfers of land became possible, they were not fully guaranteed legally (Ravallion and van de Walle 2004). A second Land Law was passed later, even though its implementation suffered from numerous conflicts of interest (Pingali and Xuan 1992; Ravallion and van de Walle 2004). However, the second Land Law allowed titleholders to exchange, lease, mortgage, and inherit land, even though land ownership still remained with the state. Shortly thereafter, a third Land Law legitimized the use and exchange of unregistered land by issuing titles to the current land users; it also brought transparency to the Land Administration System.

Prior to these reforms, agriculture was heavily taxed in Vietnam through artificially low prices paid to producers by the state. In the early 1980s, before state procurement ended in 1989, the state increased producer prices, so that, by the late 1980s, the output-to-input price ratio increased more than 35 percent from its pre-reform level, even in the face of high input prices (Rozelle and Swinnen 2004).

State-owned enterprises (SOEs) enjoyed a monopoly position in trading until 1989, when restrictions on private entry were relaxed. As of 1989, farmers did not have to contract with the state and could keep and sell their production—after deducting land taxes and commissions—to private traders—"assemblers"—that were licensed by the SOEs. However, the necessary conditions to obtain a trade license were still considered restrictive by 1997. Finally, in 1998, trade licenses were abolished and, in 2002, foreign investors were allowed to export products other than their production. From 1998 to 2004, the number of enterprises registered for trading activities increased from 2,400 to about 18,000 (Thanh 2005).

While constraints on private entry into coffee trading were being relaxed, the number of SOEs was simultaneously reduced. In 1995, contracting within SOEs changed. Farmers working for SOEs were allowed sharecropping leases. State-owned enterprises still are considered to have easier access to credit. For instance, Thanh (2005) mentions that the subsidized institutional credit facilities offered under the Development Assistance Fund, which was established in 1999, have been rarely used by private firms. In 1998, trade licenses were abolished, thus allowing private traders to import inputs (see table 5.5 for the main coffee-related institutions in Vietnam).

Vietnam is currently the world's second largest coffee producer and exporter, after Brazil, accounting for almost 15 percent of the world's coffee output in 2009. In turn, coffee became the country's largest export revenue generator, reaching US$1.9 billion in 2007, surpassing rice for the first time, and accounting for 34 percent of total agricultural exports (see table 5.6 for coffee-related statistics).

As of 2008, an estimated 531,000 hectares in Vietnam are planted with coffee (Government Statistical Office [GSO] 2010). Between 85 percent and 90 percent of the planted area is cultivated by small

Table 5.5 Institutions in the Vietnamese Coffee Industry

Institution/entity	*Status*	*Main functions and responsibilities*
Ministry of Agriculture and Rural Development (MARD)	Government	The primary regulator for the coffee industry, it also provides research and extension services through the following institutions.
Vietnam Coffee Corporation (VIENCAFE)	Government	Established in 1995, its mandate is to manage SOEs. There are 59 SOEs under VINACAFE that produce, process, and export coffee, as well as providing research and extension services
Vietnam Coffee and Cocoa Association (VICOFA)	Statutory Body	A government-affiliated group with members including SOEs, private companies, and scientific institutes. It helps the government to formulate coffee policy and represents Vietnam internationally
Vietnamese Farmers Union (VFU)	Private	Provides extension services and coordinates communication between the farmers and the government.
Vietnamese Bank of Agriculture and Rural Development (VBARD)	Government	VBARD is a state-owned bank accounting for 75% of the credit provided to coffee growers.
Vietnam Bank for Social Policy (VBSP)	Government	It provides financial assistance to small coffee growers that fall outside the eligibility for regular credit.

Sources: World Bank 2004; FAO 2007.

farmers. The remainder is grown by SOEs (Luong and Tauer 2006). About 90 percent of the coffee households cultivate areas of less than 2 hectares (Son 2010). Ninety-five percent of the coffee areas are planted with robusta, which is mainly grown in the Central Highlands between the altitudes of 300 and 500 meters. The four provinces of Kon Tum, Dak Lak, Gia Lai, and Lam Dong in the Central Highlands account for 80 percent of Vietnam's coffee production (Luong and Tauer 2006).

The phenomenal rise of Vietnam as the world's second largest coffee producer and exporter is credited to several factors, including state-sponsored migration after North and South Vietnam's reunification in 1975 (Ha and Shively 2008), state support of the coffee sector in the form of credit and extension services provision, controls on foodstuff prices (Food and Agricultural Organization [FAO] 2007; World Bank 2004), devaluation of the Vietnamese dong (VND) in 1989, the demise of the ICA in 1989, and a 1994 price spike due to weather conditions in

Table 5.6 Coffee-Related Statistics in Vietnam

	Production ('000 bags)	*Producer price (VND/kg)*	*Export price (VND/kg)*	*Producer's share (%)*	*Exchange rate (VND/US$)*	*GDP deflator (2005=100)*
1990	1,390	3,389	6,690	51	9,137	15
1991	1,308	5,751	8,190	70	11,402	26
1992	2,340	6,856	8,816	78	10,645	34
1993	3,020	8,139	9,609	85	10,912	40
1994	3,532	8,952	20,528	44	11,041	47
1995	3,938	17,800	26,613	67	11,015	55
1996	5,705	12,150	15,545	78	11,430	60
1997	6,915	12,908	14,838	87	12,817	64
1998	6,970	11,000	20,618	53	13,915	69
1999	11,631	8,600	16,913	51	14,065	73
2000	14,841	7,900	9,677	82	14,568	76
2001	13,093	4,526	6,185	73	15,198	77
2002	11,574	2,952	6,853	43	15,449	80
2003	15,337	3,226	10,450	31	15,705	85
2004	14,370	4,883	11,022	44	15,827	92
2005	13,842	5,671	12,992	44%	15,952	100
2006	19,340	N/A	17,449	N/A	16,094	107
2007	16,457	N/A	23,214	N/A	16,199	116
2008	18,500	N/A	23,942	N/A	16,856	142
2009	18,200	N/A	21,572	N/A	18,223	150
2010	18,500	N/A	21,979	N/A	20,049	168

Sources: Anderson and Valenzuela 2008; International Coffee Organization, *Historical Prices to Growers Data;* COMTRADE and International Monetary Fund, *International Financial Statistics*.
Note: Data are for crop year starting in the given calendar year (October–September) except the GDP deflator. Producer price for 2005 and export prices between 2006 and 2010 are estimated using the growth rates from the ICO and COMTRADE series respectively. For the prior years, 1990 to 2004–05, these series show similar trends to the estimates from Anderson and Valenzuela (2008). VND = Vietnamese dong; N/A = not applicable.

Brazil, as well as advances in coffee-roasting techniques that increased the demand for robusta. Most important among them, however, are gradual property rights reform legislation and liberalization reforms that date back to 1981 (Justino, Litchfield, and Pham 2008; Rozelle and Swinnen 2004; World Bank 2004).

The Policy Environment in Uganda and Vietnam

As shown above, the coffee sectors of Vietnam and Uganda exhibit both similarities and differences. However, their performance during the past two decades could not have been more starkly different: Uganda has been in virtual coffee output stagnation for half a century, while Vietnam, starting from almost zero coffee production, has become the world's second largest coffee supplier within two decades. This section focuses on the likely factors behind such an outcome by assessing the reform, pricing, policy, and business environments.

Literature and evidence indicate that reforms undertaken by both countries have been comprehensive, sustained, and, by most accounts, successful. The initial conditions in both countries, although different, were very poor. Uganda's point of departure was one of the worst political environments in Sub-Saharan Africa (SSA). Vietnam's point of departure was extensive conflict and a centrally planned economy. Both countries, however, undertook comprehensive reforms. As the discussion that follows shows, in both countries, although both the pricing and policy environments improved considerably, the resulting picture is rather mixed.

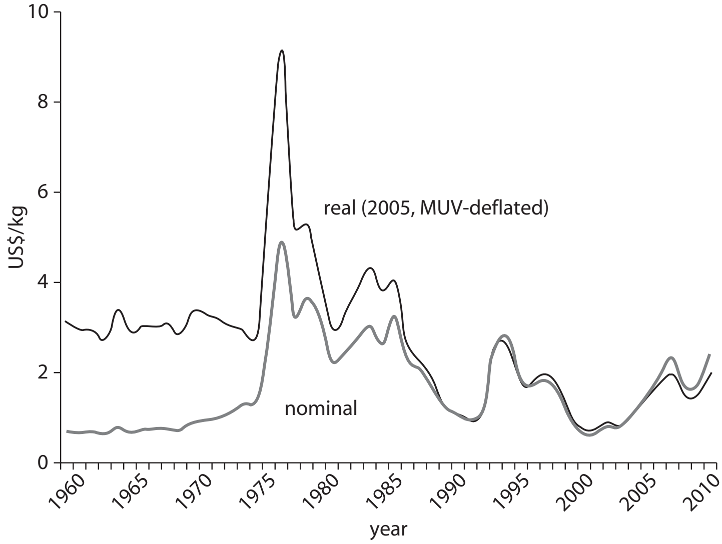
Uganda receives a higher export price for its coffee than does Vietnam. Coffee exporters in Uganda earned, on average, 86 percent of the world coffee price between 1991 and 2003, whereas their Vietnamese counterparts received 80 percent of the world coffee price during the same period. Such difference is accounted for by the fact that Uganda produces a higher quality coffee than Vietnam, and thus receives a premium.

Higher export prices are transmitted to producers as well: Coffee growers in Uganda received higher producer prices on average than did those in Vietnam. Furthermore, they also received a higher share of the export price in Uganda than in Vietnam, an average 70 percent from 1991 through 2003, against 62 percent between 1990 and 2004.

At its maximum, when coffee prices reached their peak in 1995, coffee producers in Uganda reached 78 percent of the export price. At minimum, they received 67 percent of the export price when world coffee prices hit bottom in 2001. On the other hand, coffee producers' share of the export price reached 87 percent in Vietnam in 1997 and fell as low as 31 percent in 2003. This raises the question of counter-cyclicality in producer prices (see figures 5.2 and 5.3 for long- and short-term price movements).

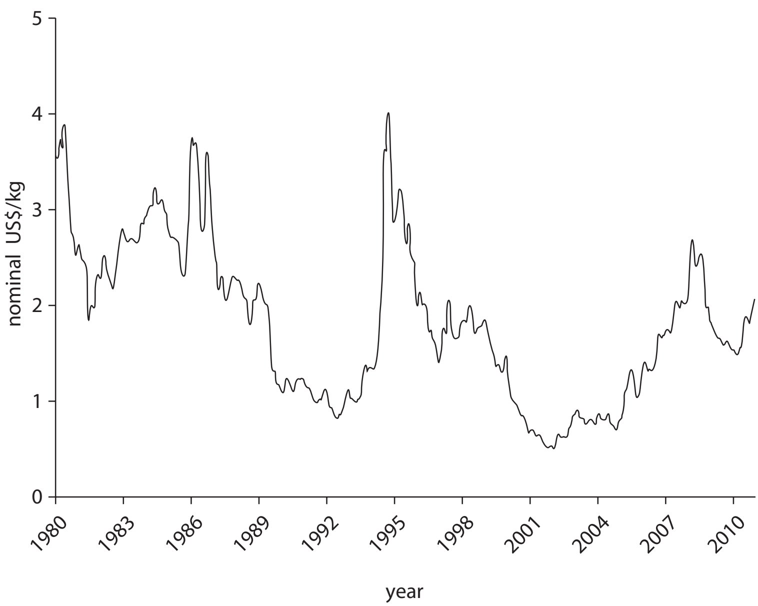
Figure 5.4 plots changes in producers' share of the export price against real domestic currency equivalents of world robusta prices for both Vietnam and Uganda since 1990. In Vietnam, an inverse relationship exists between the two series, showing that when real world robusta prices (expressed in real domestic terms) increase, producers receive a smaller share of the export price, whereas when world prices decline, their share increases.

Figure 5.2 Robusta Coffee Prices (1960–2011, Annual)



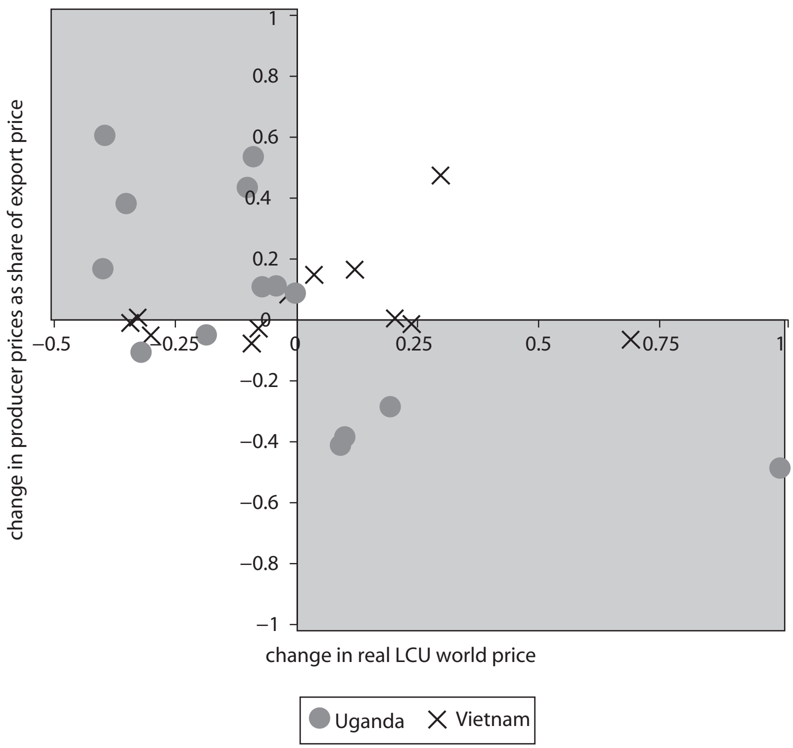
Source: World Bank.
Note: MUV = manufacture unit value.

Figure 5.3 Robusta Coffee Prices (January 1980–December 2011, Monthly)



Source: World Bank.

Figure 5.4 Changes in Producers' Share of Export Price against World Coffee Prices



Source: Authors.
Note: LCU = local currency unit.

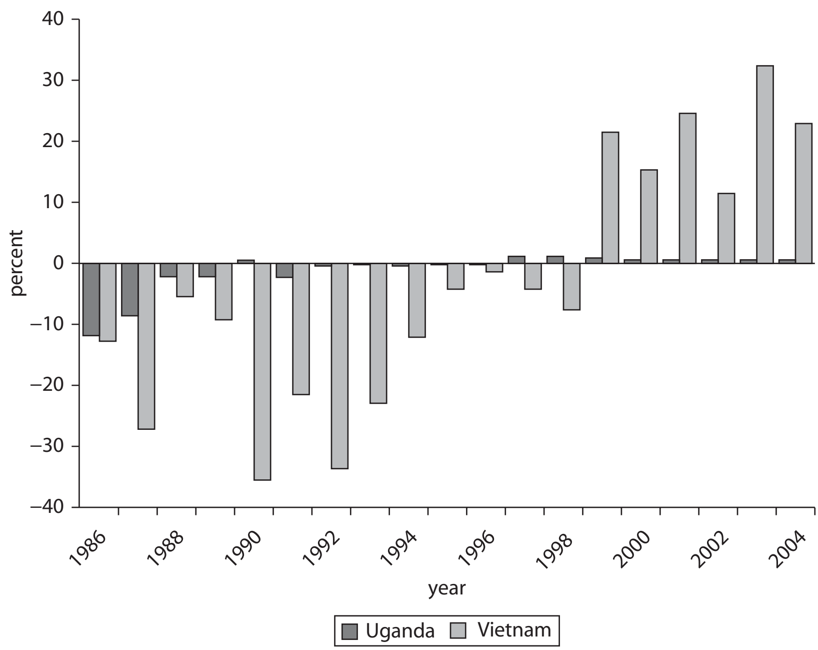
A simple regression analysis confirms this observed relationship. When the producers' share of export price is regressed on world prices (converted to domestic currencies and adjusted by the gross domestic product [GDP] deflator), we fail to find a statistically significant relationship either for Uganda or for Vietnam. However, when first-differences are used, the estimated coefficient for world prices is –0.51 in the case of Vietnam. When producer prices are regressed on the domestic currency equivalent of world prices, the transmission coefficient becomes statistically significant—the coefficients are 0.98 and 0.96 for Uganda and Vietnam, respectively. When differences are used, we find a statistically significant coefficient (of 0.78) only for Uganda.

The NRA is the most frequently used indicator of policies; it measures the effects of government policies on aggregate agricultural production.

The NRA estimates based on Anderson and Valenzuela (2008) show significant differences between Vietnam and Uganda. Figures 5.5 and 5.6 display the NRA for agriculture and coffee, respectively. Through the mid-1990s, agriculture was more heavily taxed in Vietnam than in Uganda. However, since the late 1990s, government assistance to agriculture in Vietnam has far surpassed that in Uganda, even though both have been positive. The NRA for coffee, however, shows that government policies taxed the coffee sector in Vietnam more heavily than in Uganda. This is consistent with the finding that producers have received a higher price for their production in absolute terms, as well as a higher share of the export price in Uganda than in Vietnam.

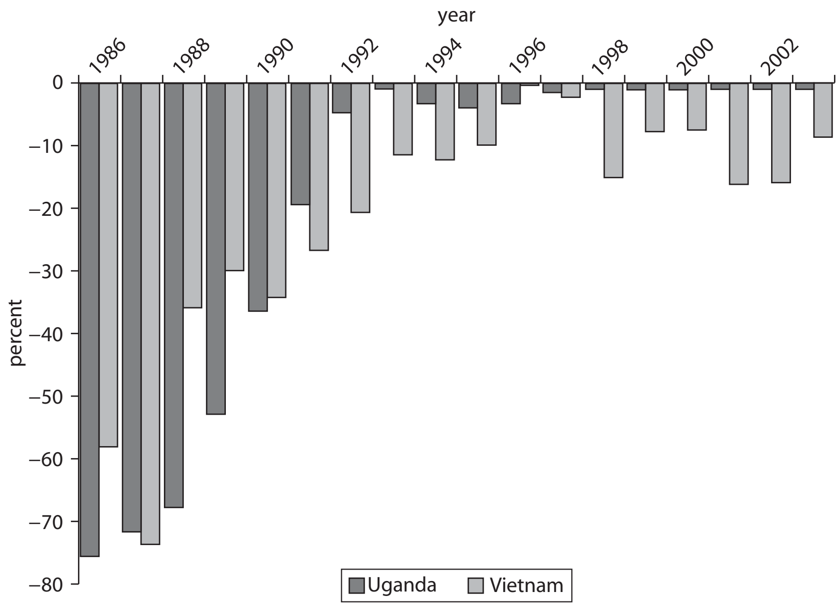
When it comes to the business environment, however, the differences between the two countries are stark. In 2009, the cost of exporting one container was US$555 for Vietnam and US$3,190 for Uganda. Interestingly, Vietnam did much better compared to the rest of Asia and the Pacific region (at US$953 per container), whereas Uganda fared poorly compared to the rest of SSA (at US$1,923 per container). The picture is similar to

Figure 5.5 Nominal Rate of Assistance(+)/Taxation(–) in Agriculture



Source: Anderson and Valenzuela 2008.

Figure 5.6 Nominal Rate of Assistance(+)/Taxation(–) in Coffee



Source: Anderson and Valenzuela 2008.

another business indicator, the lead time to export. Vietnam's lead time averaged 22 days, compared to Uganda's 37 days. And, as was the case with the cost of exporting, Vietnam did better than the rest of Asia and the Pacific (25 days), whereas Uganda performed worse than the rest of SSA (33 days).

Last, levels and trends in input intensity are very different in these two countries. During 1990–94, Vietnam used 85 tractors per 100 square kilometers, whereas Uganda used only 9 tractors (table 5.6). Two decades later, Vietnam's use of tractors increased threefold, whereas Uganda used the same number of tractors. In other words, the ratio of tractor use increased from 9.5 to 28.5 during these two decades. Similar trends are seen in fertilizer use. During 2000–04, Vietnam's fertilizer utilization was 3,532 kilograms per hectare of arable land and increased to 3,954 kilograms 5 years later. In Uganda, fertilizer use declined from 16 to 13 kilograms per hectare of arable land. Not surprisingly, the input use intensity mirrors output growth: In Uganda, coffee production increased by only 20 percent between 1990–94 and 2005–08. Vietnam's coffee production increased 645 percent during the same period.

Response to Shocks and Institutional Support

This section discusses the ways in which these two countries respond to shocks. We examine two shocks in Uganda (coffee tree disease and aging trees) and two issues in Vietnam (the collapse of coffee prices during the early 2000s and aging trees). It should be noted that the term "shock" is used in a broad sense to include both positive and negative events, as well domestic and external events. However, before comparing the two sectors, it is important to reiterate a few facts about the world coffee market. Coffee prices are one of the most volatile of all agricultural commodities. Until the 1990s, the ICA tightly regulated world coffee trade. After the demise of the ICA in 1989, the already declining world price of robusta decreased by 20 percent, from US$2.08 per kilogram in 1988 to US$ per kilogram in 1989 and by a further 29 percent from 1989 to 1990. However, robusta prices almost doubled between 1992 and 1995 when coffee supplies declined due to frost and drought in the coffee-producing areas of Brazil. In response, world coffee production increased by 30 percent from 1995–96 to 2000–01, while coffee production in Vietnam increased by 280 percent. Over the same period, the world price of robusta declined by 78 percent to reach the lowest in the recent history.

Uganda

Wilt disease, first confirmed in Uganda in 1993, has been monitored through field reports and numerous scientific surveys. The disease was the subject of a workshop (hosted by the government of Uganda in July 1997) attended by 60 participants from most East and Central Africa coffee-producing countries (Sewaya 1999, 37). The workshop's resolutions were: (1) immediate action should be taken to contain the disease; (2) a project proposal should be presented to the International Coffee Organization (ICO) and European Union (EU) for funding; and (3) Uganda and the Democratic Republic of Congo (DRC) should take the lead in the investigations. In terms of research, however, it appears that no immediate progress was made. A few years later, for example, Lutakome (2001, 66) noted that "Research work will be intensified to develop a resistant coffee cultivar. Epidemiological study results on the disease will also be made available to farmers."

A UCDA survey confirmed that all robusta-producing districts have been affected by the disease. In some cases, entire coffee fields have been destroyed. Although precise estimates on the impact of the disease are not available, one can gauge the effects of the disease based on a 2003 review study estimating that, of the total of 240,000 hectares in all 21 robusta-growing (traditional) districts, 122,400 hectares have been infected (equivalent to about 136 million robusta trees), representing a 51 percent cumulative infection rate (UCDA/MAAIF 2004/05 *Annual Report*, 29). The impact of the disease is enormous. The UCDA estimated a loss equivalent to 61,200 tons (1.02 million bags) of coffee, which is around 40 percent of the output in recent years. This corresponds to US$42.8 million in export revenue loss per annum at 2003/04 prices (Uganda shilling [U Sh] 1,090 per kilogram. Under different assumptions regarding production (88,240 tons) and prices (U Sh 1,200 per kilogram), the Uganda Coffee Trade Federation (UCTF) put the annual losses at US$51 million. Note that wilt disease had been identified as the key problem for Uganda's coffee industry by Ponte (2002, 260): "Uganda's falling production and changing roaster's blends may marginalize it in the future vis-à-vis cheaper origins, unless coffee wilt disease is tackled."

A replanting program was introduced in 1992/93, with the objective of enhancing the productivity of the sector by replacing old robusta coffee trees with newer, high-yielding varieties (free of charge) at the rate of 5 percent per annum and expanding the area under arabica cultivation. The program has been administered by UCDA, which contracted out the production and delivery of seedlings to about 900 private nurseries. During the past 12 years, a total of 135 million trees have been distributed—101 million robusta and 34 million arabica. The program peaked during the 2002/03 season, when almost 30 million trees were distributed.

Although there have been numerous reports from public and private sectors assessing the program's progress, no thorough independent evaluation has been made, despite the resources that have been spent on it. These reports have questioned the effectiveness of the program, with the most important problem being the low survival rate of new seedlings, believed to be on the order of 50 to 60 percent. Among the main causes of this low rate are poor growing conditions at the nurseries (hence low-quality seedlings) and distribution during the wrong season. These, in turn, have been attributed to delays in reimbursing nursery operators; on some occasions, nurseries have not been paid at all, and they have abandoned their operations. The most recent estimate is that the UCDA owes nurseries some U Sh5–7 billion (equivalent to US$2.7–3.8 million). Further, it appears that the new trees are affected by wilt disease at the same rate as the old, which may explain why, despite the fact that 101 million robusta trees have been distributed under the program, an estimated 136 million robusta trees have been destroyed by wilt disease.

The 2005 UCDA/MAAIF Monitoring and Evaluation Report (21) argued that poor seedling production at the nurseries may have contributed to the incidence of wilt disease. It also argued that only coffee-specific programs, such as the former Farming System Support Programme and Coffee Rehabilitation Programme, should be encouraged to solve the problems of the coffee industry since it is difficult for other current programs, such as the Area Based Agricultural Modernization Programme and National Agricultural Advisory Services (NAADS) to address coffee problems due to their divergent objectives. Interestingly, most of NAADS activities appeared to be ineffective, according to the earlier evaluation (UCDA/MAAIF 2004/2005, 11), because they only consisted of presenting seminars, something that coffee growers did not really need.

Vietnam

Vietnam is one of the lowest-cost producers and exporters of robusta coffee among large producers. The World Bank (2004) estimates the average cost of coffee production in Vietnam to be between US$0.45 per kilogram and US$0.50 per kilogram. The Institute of Policy and Strategy for Agriculture and Rural Development (IPSARD) for the Ministry of Agriculture and Rural Development (MARD) estimates coffee production cost in Vietnam to be US$0.48 per kilogram, below US$0.64 per kilogram in Indonesia, and US$0.67 per kilogram in India. The coffee export cost is estimated to be US$0.1 per kilogram in Vietnam, against US$0.83 per kilogram in India and US$1.78 per kilogram in Indonesia (Son 2010).

Even though production and export cost advantages alleviate the effects of negative price shocks, Vietnamese coffee producers were not completely immune to them. Ha and Shively (2008) found that smallholder coffee producers in the Dak Lak province of Vietnam were not able to cover the variable cost of their production between 1999 and 2002. Therefore, they diversified, reduced input use, and increased liquidity and off-farm employment in response.

Vietnam's robusta production reached its peak—14.8 million bags—in 2000–01. It declined by 22 percent until 2002–03, in the face of declining coffee prices. The World Bank (2004) found that the coffee crisis of the early 2000s caused considerable shocks in the coffee-producing regions of Vietnam.

The Vietnamese government addressed the coffee crisis with several policy measures. The government experimented with a stabilization fund and a buffer stock scheme. As of mid-February 2001, 60 thousand tons of coffee were stockpiled based on a November 2000 decision. An additional 90 thousand tons were stockpiled later. The fund was largely supported by the Vietnamese Bank of Agriculture and Rural Development (VBARD). In July 2001, the government abandoned the regime and released the coffee. At around the same time, the Vietnam Coffee and Cocoa Association (VICOFA) discussed a plan to cut 100,000–150,000 hectares of coffee (Luong and Tauer 2006). In the face of nonperforming loans in mid-2001, the Vietnamese government froze all repayments for three years. At around the same time, import taxes on fertilizers were reduced to 5 percent or less, while exporters were provided government-subsidized loans to purchase and warehouse coffee (MARD 2009).

Robusta production in Vietnam reached 15.3 million bags in 2003–04, increasing 32.5 percent and surpassing even its previous peak in 2000/01. Even though it decreased slightly in the following two years, Vietnamese robusta production reached another peak in 2006–07, with 19.3 million bags. Robusta production in Uganda, conversely, declined from 3.4 million bags in 2000–01 to 2.2 million bags in 2005/06, by 36.5 percent in the face of the coffee crisis. Production did not reach its pre-crisis level even in 2010–11.

At the recent World Coffee Conference organized by the ICO, Vietnam's MARD presented a summary of challenges that the Vietnam's coffee industry has been facing (Bong 2010). This presentation itself highlighted the MARD's active role in Vietnam's coffee industry.

Among all internal risks, the most significant one was the aging of Vietnam's coffee trees. The World Bank/IPSARD (2011) report also sees aging tree stock to be a "looming threat" for the coffee sector in Vietnam. Even though a large-scale result is yet to be seen, the MARD seems to have already identified some strategies to cope with the challenges facing the coffee sector, and some of these strategies have already been implemented. For instance, aging coffee plantations are being replaced with new trees or by cutting and grafting new clones, coffee areas are being stabilized through zoning, and growers have been experimenting with intercropping coffee with cocoa, durian, and black pepper.

Conclusions

During the 1960s and 1970s, Uganda was a major player in the world coffee market, by some accounts producing the world's best robusta.

Although today Uganda still produces coffee, its place in the world market has diminished. Vietnam, on the other hand, exported no coffee until the 1980s. Today, Vietnam is the world's second largest coffee producer, after Brazil. This chapter examined the reasons behind such stark difference in performance.

Although the reasons for such differences are complex, this chapter proposes a number of interesting conclusions. First, in terms of prices received by coffee growers and policy reforms, the countries exhibited very similar behavior. Second, the overall policy and business environment is better in Vietnam than in Uganda, at least in some respects; however, the differences cannot explain the gap in performance. Third, it appears that the gap in performance can be explained, for the most part, by the way in which these two countries respond to shocks, both positive and negative; that, in turn, is a reflection of their supporting institutions.

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PART 2

Case Studies: What Went Wrong, Right, and Why

CHAPTER 6

Mozambique Cashew Reforms Revisited

M. Ataman Aksoy and Fahrettin Yagci

The cashew is a tropical nut grown in developing countries and produced primarily by smallholders. World cashew production and exports have grown rapidly over the last few decades, faster than overall world agricultural trade and output.[1] The value of world cashew exports, raw and processed, was US$532 million in 1990/91, US$1,005 million in 2000/01, and US$2,436 million in 2007/08.

During the 1960s and 1970s, East Africa (mainly Tanzania and Mozambique) was the world's major cashew producer and exporter. It also had a very capital-intensive cashew processing industry, unlike India and Brazil, which used more labor-intensive processing techniques. India and Brazil became the major cashew exporters in the early 1990s, supplying 43 and 22 percent of world exports, respectively.

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By 2007/08, their export shares had declined to 27 and 8 percent, respectively, and these shares were replaced by Vietnam and West Africa, whose world export shares increased from 5.5 and 6 percent in 1990/91 to 26 percent 18 percent in 2007/08, respectively. By 2008, Vietnam had become the largest exporter in value terms. East African countries (Kenya, Mozambique, and Tanzania) saw their shares decline further, from 7.5 percent in 1990/91 to 5.0 percent in 2007/08. India and Vietnam have also become major cashew processing locations, and both import significant quantities of raw cashews from Africa, whereas Africa has primarily specialized in exporting raw cashews to these two countries. More recently, East African countries have resumed processing their cashews.

Mozambique's cashew production and exports collapsed during the 1980s due to the civil war, nationalization of the processing facilities, very low producer prices caused by bans on raw cashew exports, and little nonprice support to producers. By 1990/91, Mozambique only exported cashews worth US$15 million, which was just 2.8 percent of world exports.

A very contentious reform process was initiated during the early 1990s in an attempt return this sector to its pre-independence level of production and to maintain the processing industry.[2] These reforms, which became a cause célèbre of globalization and trade liberalization skeptics, basically involved the elimination of export controls on raw cashews in return for a reasonably high rate of export tax that gradually decreased and was then eliminated. Processors, after having bought privatized cashew processing plants and making new investments, insisted on maintaining the requirement that producers first sell their raw cashews to processors before these raw cashews could be exported by traders. Eventually, export controls were eliminated and replaced with high export taxes, still present today.

These reforms pitted a group of new business elites, closely connected to the political leadership, against another new stakeholder—donors. The fact that the farmers who were meant to be the beneficiaries of the reforms came from locations that voted for the opposition party did not help. The reform program was highly controversial, and there was little consensus on how to move forward. Even as the initial reforms neared their end, little agreement could be reached on the nature of the policy and institutional structure that could accelerate production growth and accommodate future developments. The National Cashew Institute (INCAJU), a parastatal agency supporting the cashew industry, was given autonomy, but continued to act effectively as a quasi-parastatal, delivering little nonprice support to the farmers. Aksoy and Onal (2012), who analyzed nine cases of reform in Sub-Saharan Africa (SSA), classified this reform process as unsuccessful.

An increase in real producer prices during the initial stages of the reforms created an aura of success. These increases also transferred income from processors to farmers, thus creating greater conflict among these stakeholders. Declines in international prices after 2000 led to the collapse of both output and the capital-intensive processing industry. More recent international price increases were not fully passed on to domestic prices because of the serious appreciation of Mozambique's currency.

Little nonprice support was provided to smallholders. A World Bank project for cashew production was terminated because of lack of quality management by the Ministry of Agriculture, and no active program is in place to improve the country's cashew orchards after decades of deterioration. Donors, such as the World Bank, have not focused on the cashew sector, mostly because of the acrimonious debates concerning the reform program. The INCAJU, which was granted autonomy in the early 1990s, has been ineffective in supporting smallholders, despite its spraying and replanting programs.

The capital-intensive processing technology adopted by processors and supported by the government has not been able to compete with older manual systems, despite high export taxes on raw cashews. This has led to the exit of one group of processors, and the entry of another that employs labor-intensive production technologies, is more efficient, and is supported by donors. This new group, like earlier processors, has not been able to establish effective production and support relationships with smallholder producers.

Despite a series of actions, programs, and controversies, cashew exports only increased from an average of 24,000 tons in 1993/94 to an average of 44,000 tons of raw cashew equivalent in 2007/08. Although this is an increase of 86 percent, it also corresponds to a decline from 2.1 to 1.6 percent of world exports. Thus, this sector has performed badly relative to the rest of the world and even to the rest of SSA (annex 6.1). In the process, output, producer prices, and the share of the export price received by producers all increased after the reforms, and exports reached 50,000 tons in 1998. However, a steep fall in international prices in 2000 of some 50 percent led to a collapse in output to below pre-reform levels. A subsequent gradual increase in producer prices, slightly higher support to producers, and new donor support programs for processors led to a recovery in exports, which reached almost 50,000 tons in 2008.

In the section "Background, the Reform Program, Prices, and Output," we summarize the main elements of the reform program and the resulting price and output developments. The sections "Processors: Industrial Restructuring" and "The Cashew Producers" then analyze the two main stakeholder groups—the processing industry and the producers (farmers)—in greater detail. The chapter concludes with an overview of the findings. Annex 6.1 discusses global developments in the cashew sector since 1990, annex 6.2 analyzes data-gathering problems in Mozambique and shows how the numbers used in this chapter are derived, and annex 6.3 summarizes the developments after 1990 and places them in a timeline. The next three annexes analyze some of the critical issues raised during the reform debates and controversies. Annex 6.4 shows the relationship between the processed kernel export prices of India and the raw cashew export prices of Mozambique and argues that the idea of India exerting monopsonistic power over Mozambique is not likely. Annex 6.5 explains the different cashew processing technologies and the state of Mozambique cashew processing plants during the reforms. Annex 6.6 shows that using different deflators to estimate real producer prices does not yield different results.

Background, the Reform Program, Prices, and Output

Mozambique was a major cashew producer during the 1960s and 1970s. The Portuguese actively promoted cashew cultivation during the country's colonial period, and, during the 1960s, Mozambique produced half of the world's cashew nuts. In 1968, there were 45 million cashew trees in Mozambique, and the country at its maximum produced more than 200,000 tons of raw cashew nuts (Abt Associates 1999; McMillan et al. 2002; Mole 2000; Walsh 2002). This production continued to increase until independence.

With the expansion of cashew production during the colonial period, small, manual processing systems were replaced by large, mechanized factories. (See annex 6.5 for a description of cashew processing technology.) By 1973, there were 12 processing factories, with a total processing capacity of 150,000 tons of raw nuts. Mozambique was one of the few developing countries possessing a very mechanized and effective processing industry. At the industry's peak, up to 17,000 workers were employed in 14 large mechanized factories. Taken together, the country's mega-plantations and thriving domestic processing industry led to a strong export market. But this successful colonial production was achieved at great social costs due to poor working conditions and forced cultivation.[3]

In 1975, Mozambique gained its independence, and, as the Liberation Front of Mozambique (FRELIMO) moved to nationalize plantations and processing plants, many Portuguese owners and managers abandoned the industry and fled the country. Despite the FRELIMO government's policy of protecting the industry through an export ban and price supports, the cumulative impact of decolonization and a devastating civil war completely disrupted production and processing (Paul 2008). In 1978, the export of raw cashews was banned, to allow the domestic processing industry to obtain a sufficient quantity of raw nuts, and this led to lower producer prices. The United Nations Food and Agriculture Organization (FAO) report on the cashew industry in Mozambique, undertaken during the late 1980s, summarizes the pre-reform state of the cashew sector succinctly:

> There has been little replanting carried out in the past 15 years or so, and it appears that the average tree age is fast approaching the point where marked decreases in production can be expected.[4]
>
> As a whole the processing sector is operating at less than 25 percent of its rated capacity. It is unlikely that the flow of nuts can be increased to anything near full capacity even in the next 10 years. Under such circumstances it would be uneconomic and impractical to continue operating all factories. All factories show severe deterioration of equipment due to lack of maintenance and non-replacement (FAO 1987).

By 1990–91, Mozambique exported mostly cashew kernels, worth US$15 million, which amounted to just 2.8 percent of world exports. However, this was still a significant part of its nonmineral exports. In an effort to maintain the profitability of an inefficient processing industry, exports of raw cashews had been banned since 1978, and farmers were required to sell their raw cashews to processors at very low prices. By 1993–94, the farmers' share in export prices had declined to almost 15 percent. Along with these very low prices, the supply of raw cashew nuts for processing and direct exports had also declined to about 22,000 tons.

After the civil war ended, and along with the general liberalization and privatization of the economy, a series of developments specific to the cashew industry took place.[5] In 1991, the National Cashew Institute

(*Instituto Nacional do Caju*, or INCAJU) was given autonomy, and privatization of the formerly nationalized processing factories was initiated. The nationalized factories were privatized by 1994, and new factories were built, also mostly using capital-intensive techniques.

Starting in 1991–92, limited quantities of raw nuts were allowed to be exported, but producers were required to sell their raw cashews first to processors. A tax was imposed on the difference between the export free on board (f.o.b.) price and the factory gate price to minimize the reselling of raw cashews by processors rather than processing them.[6] At first, this tax was 60 percent, but it was lowered to 35 percent in 1992/93. These tentative steps were followed by a large policy shift in 1994, in which quantitative restrictions on exports were removed.[7] At the same time, in order to maintain some sort of protection for the domestic processing sector, the government introduced a graduated export tax equivalent to about 30 to 32 percent of the f.o.b. export value.

This reform program was in line with that being implemented by the government for the general economy. The World Bank, along with other donors and groups in Mozambique, tried to accelerate liberalization of cashew marketing as a part of the more general agricultural pricing and marketing reforms undertaken after 1989.[8] This occurred just after the end of the civil war, as many farmers returned to their fields. Along with resettlement support, it was hoped that increasing the price of cashews, which was among the few cash crops available to smallholders, would also facilitate a return to normal agricultural practices.

In the 1995 Country Assistance Strategy (CAS) Report, the World Bank called on Mozambique to further liberalize cashew marketing and exporting in order to satisfy "base case" conditions and qualify for approximately US$400 million of loan assistance (World Bank 1995a). Although accepting the need for liberalization, the government and industry leaders disagreed with the World Bank regarding the extent of and timeframe for liberalization. The government proposed a 10-year time horizon for eliminating the tax, which the World Bank found unacceptable; a five-year time horizon was finally agreed upon by the World Bank and the government.

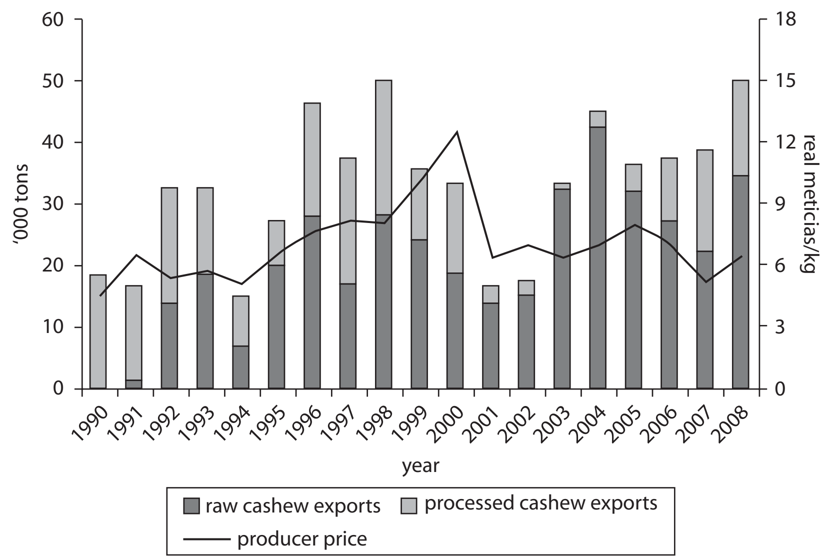
The new tariff plan consisted of an export tax (on f.o.b. value) of 20 percent on the export of raw cashews in the first year, 1995/96 (from 35 percent during 1994/95), and a phased elimination in five years (that is, by 1999–2000). After the first year, the plan was never implemented in its entirety. The new policy met with intense opposition from leaders of the processing industry who had withstood the war years in Mozambique and felt entitled to continued protection. Urban factory owners and workers had greater political power and influence than producers, the producers, despite numbering over 1 million households, were relatively disorganized and dispersed throughout the country's rural areas.[9]

In 1996–97, the export tax was reduced to 14 percent, instead of the 12 percent agreed upon, and then frozen at 14 percent until 1999, when it was raised to 18 percent. The cashew export tax of 18 percent has been maintained since, effectively taxing poor farmers and giving a subsidy of more than 25 percent to processors, compared to their competitors in India and Vietnam.[10]

Figure 6.1 shows the exports of raw cashew and the raw cashew equivalent of processed cashew kernels, and the real producer prices. Given the problems associated with production numbers, exports are treated as officially marketed output (annex 6.2). For the remainder of this chapter, export estimates will be used as equivalent to marketed production and for production itself.

In 1990 and 1991, most exports comprised processed cashews as a result of the ban against exporting raw cashews. An increase occurred in exports (production) after the civil war ended in 1992, to above 30,000 tons; this figure gradually increased almost to 50,000 tons in

Figure 6.1 Cashew Exports from Mozambique



Sources: COMTRADE 2010; INCAJU.

1998. After 1999, a slowdown in exports was caused by policy uncertainties and, more importantly, poor weather conditions. When global cashew prices collapsed in 2001, exports declined further both in value and volume terms. The capital-intensive companies exited the processing industry, and the ratio of processed to raw cashew exports declined. The share of processed cashews began to increase during the late 2000s, with the entry of new labor-intensive factories. Real cashew prices for producers did not recover to their peak levels but remained quite low, although export volumes continued to increase. This may have been due to increased support to producers through subsidies for spraying and seedlings.

Figure 6.2 shows the share of export prices received by producers and real producer prices, deflated by the consumer price index (CPI). A significant increase occurred in the prices received by farmers as a result of reforms. Especially after 1994, when the raw cashew export bans were effectively removed, the competition between raw cashew exporters and processors led to increases in the share of export prices received by farmers. This, and the increase in U.S. dollar prices for raw cashews reflected in local currency prices, was the main cause of the increase in real producer prices. At the end of the 2000s, when real producer prices peaked, real raw cashew producer price were almost double what they were during the early 1990s.

Figure 6.2 Cashew Producer Prices in Mozambique

Sources: INCAJU; COMTRADE 2010.

Table 6.1 summarizes the development of real exchange rates,[11] raw cashew export prices in U.S. dollars, producer prices in U.S. dollars, real producer prices in local currency units (LCUs), shares of producer prices in export prices, and exports of cashews expressed in raw cashew equivalents. Four critical two-year periods are selected to show the key changes. Two-year averages are used because large year-to-year changes in output can occur due to weather and other conditions. The 1993–94 period before the main reforms is used as the baseline, with a value of 100. Numbers for other years are expressed as a percentage of the initial values of the variables. The second period, 1999–2000, marks the last two years before an international price collapse, when both international and domestic cashew price reached a peak. The 2000–01 period marks the international price collapse. The last two years for which we have data—2007 and 2008—are also a period during which international prices recovered.

Real producer prices more than doubled by 1999/2000, following the elimination of export controls and reductions in export taxes. This increase was primarily due to the increase in the share of producer prices in export prices. Furthermore, an appreciation of the currency, in addition to an 18 percent export tax, limited increases in real producer prices. If the exchange rates had not appreciated and the export tax had been abolished as planned, the real producer prices by 1999/2000 could have increased by more than 300 percent. Even with limited price increases, changes in producer prices and exports increased the cash income for cashew producers by 300 percent. Thus, for the initial period, the expected outcome of higher incomes for producers and higher exports occurred, although limited by export taxes and currency appreciation.

This expansion was halted by a dramatic fall in export prices. By 2001 and 2002, export prices declined by more than 40 percent, and losses incurred by producers were even greater. Price collapse, coupled with

Table 6.1 Main Price Developments

	1993/94	*1999/00*	*2001/02*	*2007/08*
Real exchange rate	100.0	82.3	105.1	62.7
Raw cashew export price (US$/kg)	100.0	118.0	67.1	97.0
Producer price (US$/kg)	100.0	248.3	117.1	174.3
Real producer price (Meticais/kg)	100.0	208.4	122.9	107.8
Producers' share of export price	100.0	211.9	173.8	176.2
Export volume (raw cashew equivalent)	100.0	144.8	71.6	186.1

Sources: INCAJU; COMTRADE; WBI.

declines in exported amounts, reduced the cash income of cashew producers by more than half.[12] Compared to the pre-reform period, however, real producer prices were still higher due to currency depreciation and higher producer shares out of the export price.

World prices in U.S. dollars increased during the last period by almost 40 percent, but prices in local currency and real producer prices continued to decline. The most important determinant of this difference was a large currency appreciation (almost 50 percent) and a reduction in the share of producer prices in export prices from 54 percent to 43 percent. Although appreciation is determined by forces working beyond the cashew sector, it is not clear why producer share declined. Especially considering the increased number of local processors, a more competitive environment for the purchase of raw cashew might have been expected between producers and exporters. In this context, the arrangement that allows the INCAJU to delay the export of raw cashew and allow local processors to purchase their raw materials cheaply seems to limit the share of export prices obtained by farmers. This might also show the power and ability of this new class of processors to limit the share of the export price obtained by farmers.

The net result is that real producer prices ended up very close to where they were before reforms. Although this lack of improvement is not related to the design and organization of the reform program itself, it shows the importance of price developments in determining the outcomes of reforms.

In the process, all of the capital-intensive processing factories closed during the late 1990s, and especially after an international cashew price collapse during 2000–02. However, after this period, and mostly aided by international aid agencies and TechnoServe, new and labor-intensive cashew processing factories were established.[13] These new factories require mostly local inputs and capital, imitate Indian manual technologies, and are located close to major rural production areas, thus allowing them to procure their inputs without high transport costs and to hire cheaper rural labor. Currently, 25 such plants are in operation, with some supported by TechnoServe, and they process about 15,000–25,000 tons of cashews, almost one-third of marketed raw cashew output. A donor-supported export credit guarantee system also exists to allow new, smaller processors to obtain credit for processing and exporting cashews.

The INCAJU, now a semi-governmental organization, receives proceeds from the 18 percent export tax and is supposed to use these funds to benefit cashew producers. The INCAJU undertakes research on appropriate new varieties, supplies subsidized seedlings to producers, and subsidizes the pesticides used in disease control. It also adjusts the exporting season to allow local producers to purchase raw nuts before the exports begin.

In the last few years, partially due to public support, slightly higher prices, and subsidies on both spraying and replanting, cashew exports have increased to almost 50,000 tons of raw cashew equivalent. This matches the peak value reached before the collapse of cashew prices in 2000. This increase was achieved despite the fact that real producer prices have not increased substantially from pre-reform levels.

Despite recent improvements, the cashew industry never regained its former glory, and cashew exports stabilized around 40,000–50,000 tons of raw cashew equivalent, much lower than the 100,000 tons forecast for the early 2000s. Although production (which also includes domestic consumption) might be higher, it is very difficult to estimate it precisely. Commercialization and productivity gains in cashew growing did not take place, and the potential for Mozambique to become a major player in the global cashew industry was not realized.

The following sections examine the fate of processors and then discuss developments for smallholder producers in greater detail.

Processors: Industrial Restructuring

Processors formed one of the most important and active groups in the debate over reform, both those that remained private throughout the independence period and, more importantly, those that bought capital-intensive factories in the early 1990s. They continue to argue that they should have been given more time to restructure and that the export ban on raw cashew should have been kept in place, in one form or another, for a much longer period. The World Bank, however, has consistently argued that labor-intensive methods are more appropriate and that capital-intensive factories actually lose value due to very inefficient processing (annex 6.5).

Since the reforms, the capital-intensive cashew processing industry has undergone major downsizing as large-scale, capital-intensive plants have become nonviable. Despite a subsidy of almost 25 percent, all the capital-intensive factories have closed over the last decade. Similar developments have taken place in Tanzania, and, currently, all cashew processing plants use either manual or semi-manual technologies. The exit of traditional processors was completed with the cashew price collapse in 2000. In the face of such low prices, it was impossible to maintain the profitability of such an inefficient industry. However, this collapse also did not automatically translate into the development of alternative processing technologies and more efficient processing.

The interesting question is why industry leaders did not recognize this fact, but rather, in addition to buying privatized factories, invested large sums in new factories.[14] Pitcher (2002) argues persuasively that most new owners were pressured by the government and the FRELIMO party to purchase these factories, so that the cashew processing industry would be owned and controlled by domestic investors and companies. In return, they were promised support and potential profitability. The promised support dwindled after agreements were reached with the World Bank.[15]

Pitcher (2002) also argues that many of the so-called "industrialists" were also traders, following trends in world prices and raw cashew availability and were either exporting raw cashews or processing them locally. The older regime, which allowed local processors to obtain raw cashews before exporters, allowed many of these trader/processors to make excess profits during the 1992–95 period through the export of raw cashews. Data also show a large share of raw cashew exports during prereform years when raw cashew exports were officially banned. These were probably undertaken by processors that bought the raw cashews for processing.

From a very low base of processed nut production, the cashew processing industry began to recover in the 2000s. New private sector entrants began to invest in processing facilities that were more economically scaled, required only manual inputs, and were located near sources of raw nuts.[16] Since the industry's renaissance began, private investors have gradually refined alternative business models, adapted them in ways appropriate to the Mozambican business environment, and developed new systems for product quality control.

"New-generation" factories employ manual processing technologies similar to those found in India and Brazil. They tend to be located within high cashew production areas (Nampula province in Mozambique), thus minimizing high transport costs. By 2004/05, 16 such units were operational, with a combined processing capacity of about 13,750 tons and employing nearly 3,000 workers, many on a seasonal basis. Five of these units processed cashew nuts for the first time in 2004, and at least four new units became operational in 2005. According to information from TechnoServe, it has supported about 16 labor-intensive factories that employ 4,700 workers (TechnoServe 2009).Today, the industry includes 11 principal processors and a few smaller ones (25 in 2009). One industry participant, the multinational corporation Olam, is active both in processing and in exporting raw nuts. The industry is highly concentrated in the Nacala Corridor, and less so in Inhambane and Gaza. The corridor area incubates new nut processors in Mozambique. The industry is concentrated in the corridor not because the cashew trees are more productive, but because essential competencies and complementary service support are readily available to industry participants.

One of the processors based in the corridor—Miranda Caju—has emerged as the cluster leader. Miranda Caju and other well-established processors have bought out two other companies that eventually exited the business. Debt financing is available to industry participants both for fixed assets and for working capital. Currently, however, financing depends on backup guarantees provided by donors. A group of processors have formed a holding company, the Association of Agribusiness Industries (AIA), which is based in the Nacala Corridor. Through this holding company, the founding members and most other industry participants in Nampula Province market all of their processed kernels. This group monitors quality and health standards, manages transportation, and exports collectively under multiyear contracts with international buyers. They have also created Zambique brand cashews, again with donor support.

Figure 6.3 shows the ratio of raw cashew export prices to processed cashew export prices. It shows a steady decline in the ratio of raw to processed cashew prices, which means higher processing margins for processors. It is not clear why this is taking place. One possibility is the increasing power of the new processors or their easier and cheaper access to raw cashews compared to the exporters of raw cashews. A background paper for the Country Economic Memorandum (World Bank 2009), however, argues the opposite; that despite cost reductions associated with new processing systems, the lower quality of raw cashew and other cost increases have increased costs and therefore processing margins.

Thus, although restructuring eliminated capital-intensive processors and opened the way for labor-intensive factories, it has been a long process, hampered by the uncertainties created by the acrimonious debate. It is now clear that the future lies with smaller, labor-intensive production facilities located close to cashew-producing areas.[17] Thus, the hypothesis advanced by the World Bank that capital-intensive factories were inefficient has been borne out by current results (World Bank 1995b).

Figure 6.3 Mozambique Raw Cashew Export Prices (as a Percentage of Mozambique Processed Cashew Export Prices)

Source: COMTRADE 2010.

Finally, the evidence so far suggests that the industry has adapted to external shocks and restructured itself. This restructuring was also aided by higher processing margins extracted by the industry. Through collective action and support from donors through TechnoServe and export credit guarantees, a more efficient processing system has emerged.

One can interpret these developments as showing the state again offering support to a new class of industrialists and traders. Maintenance of export taxes and trading limitations, coupled with changes in the labor regime, suggest such a bias. Support to smallholders has been more limited, both through a lack of nonprice support and the behavior of exchange rates that have limited the pass-through of higher international prices. A more definitive conclusion, however, requires more research into the cost structures of processors and farmers.

The Cashew Producers

Despite positive developments and effective restructuring of the cashew processing industry, raw cashew output has not increased nearly as much as expected when the reforms were enacted. Although we have analyzed some of the reasons for this slow response, a more detailed look is necessary to understand the economics of smallholder cashew producers. A series of surveys, supported by the World Bank, were undertaken during the late 1990s on the behavior of smallholders (World Bank 2001). Survey findings, at least until 2001, supported the previous conclusion that real cashew producer prices, as well as their share in cashew export prices, increased after reforms.

An important finding of the surveys is that investment in new trees and better treatment of existing trees did not take place to the extent expected when reforms were implemented. The lack of interest in cashew cultivation has, over time, resulted in an aging stock of low-productivity trees. Roughly 13 percent of trees are deemed by surveyed households to be too old. Tree diseases, primarily the powdery mildew *Oidium*, afflict around 25 percent of the average household's tree stock. Analysis of the determinants of disease treatment show that producer prices have no bearing on the decision to treat tree diseases, not even in Nampula, where raw nut commercialization displays relatively strong price responsiveness. Indeed, when asked for reasons for not treating diseases, a large percentage of survey respondents pointed to lack of knowledge and information on disease treatment and the unavailability of chemicals. Thus, there is a large role for agricultural extension services and, in some areas, private sector provision of inputs from processors.

The surveys also showed that cashews are not only a cash crop but also a food crop, meeting some rural households' nutritional requirements. About 85 percent of farmers in Nampula sell any part of their harvest, a figure relatively unchanged between 1996 and 1998. Moreover, only about 64 percent of what they harvest is commercialized. In Gaza, only about 47 percent of cashew producers sell any part of their harvest, and, in Inhambane, less than one-third market their harvest. An even higher percentage of harvested raw nuts—86 percent in Inhambane and 71 percent in Gaza—is retained for home consumption. The question then becomes: Why do cashew producers in Mozambique not sell all the raw nuts they harvest? Several factors contribute to this pattern, but at their core is the fact that even though producer prices have increased in recent years, they were still too low to make it worthwhile for farmers to sell all their raw nuts (see annex 6.6).

The following nicely summarizes the main conclusion of the surveys:

> The pattern of cashew cultivation that appears to have evolved over a long period of unremunerative prices is one wherein households simply collect raw nuts instead of "producing" them. And even this collection of raw nuts is

> irregular and incomplete. Almost one quarter of all households do not harvest their cashew trees, and amongst those that do, raw nut harvests, and cashew incomes, exhibit tremendous variation from one year to the next. These patterns are difficult to explain in terms of production variability, suggesting that during the survey years farmers exhibited little interest in cashew cultivation. (World Bank 2001, v)

Paul (2008) analyzed households in the cashew triangle after labor-intensive factories were established in rural areas and came to the same conclusion: Most farmers do not treat cashews as a commercial crop. The new labor-intensive factories have, however, started to pay higher prices for better quality and, by lowering transport costs, they can afford to pay these higher prices. It is not clear whether the average prices reported here are the same in areas where new processing factories are working. Some of these questions can only be answered by new comprehensive surveys that analyze similar households.

Recent analyses (TechnoServe 2009) show a similar pattern. The vast majority of cashew production is undertaken by small farmers typically owning around 20 trees. Almost 42 percent of farmers in Mozambique own cashew trees, representing about 1 million producers. Average productivity is low—about 2–4 kilograms per tree—although 8–10 kilograms per tree is attainable. As indicated in earlier surveys, between 10 and 35 percent of output is consumed at home. Investment in new trees, which most argue is essential to production growth, was undertaken by only 5 percent of farmers over the last 12 months of the survey.

These averages mask large differences among cashew producers. Better-off farmers own between 100 and 300 trees and constitute 10–15 percent of all farmers. Middle-income farmers own between 40 and 90 cashew trees and constitute 25–35 percent of all farmers. Poorer farmers, by contrast, own 5–25 trees and constitute 50–65 percent of all farmers. Better-off farmers are able to spray their trees, sell later in the season, and receive better prices. Spraying increases yields and improves the quality of cashews. Net income per tree for poorer farmers is estimated to be about US$1.20, whereas better-off farmers earn as much as US$3.42 per tree (TechnoServe 2009).

In addition, three types of commercial cashew farms are emerging. In many of these farms, trees are intercropped with peanuts or other plant varieties. These include: (1) commercial plantations of more than 100 hectares, which processors manage themselves with their own employees[18]; (2) medium-sized cashew farms of 2–3 hectares, with 200–250 trees each; and (3) small farms of 20–25 trees. Both of these latter two categories are organized typically through farmers' organizations. However, cultivation schemes have proved difficult to carry out due, in part, to a lack of effective extension and, in part, to a lack of support at the farm level. Subsistence farmers do not readily identify themselves with the cashew business. Moreover, they lack agronomic training and motivation, which is a prerequisite for the planting and successful cultivation of trees.

Under a Cashew Sector Master Plan, the INCAJU started supporting raw cashew production starting in the early 2000s.[19] The Plan aims to improve yields and quality, and lower disease incidence. It includes programs for spraying, developing new variety of seeds tolerant to infection, replanting, managing model farms, providing extension services, and assisting the commercialization of larger farmers. Farmers Associations were formed to assist farmers, and buying centers were set up to reduce transportation costs to farmers. These programs are necessary for sector recovery that would make both the raw cashew production and processing sectors viable.

The implementation so far shows that the capacity of the INCAJU and the resources available to it fall far short of that needed for an effective and full implementation of such a comprehensive program. The INCAJU's efforts have so far concentrated primarily on spraying and replanting. It has developed four new varieties; these new varieties yield output in three years and produce higher yields. The INCAJU also supplies the first 20–30 seedlings free and the rest at production cost. In particular, the INCAJU now assists with spraying of approximately 4.5 million trees (about 10 percent of total), it provides chemicals to farmers at 50 percent of the cost, and gives sprayers to local service providers. Farmers then engage service providers on a commercial basis. Regarding replanting, an estimated 9 million seedlings need to be planted annually. Only a fraction of this number is bred and distributed at subsidized prices by the INCAJU. Given the large need and questions about the effectiveness of the replanting program, these efforts seem inadequate. Furthermore, because the INCAJU's funding source is the 18 percent export tax, it creates a conflict of interest in increasing the return to farmers.

In addition to weaknesses in support to farmers, another weak link in the industry's value chain exists between processors and suppliers. Most cashew nuts are collected rather than farmed in Mozambique. Changing the way that raw nut suppliers interface with processors is difficult because cashew collection and sale is part of the nation's rural welfare system, more a part of a longstanding social policy than of any commercial or competitive considerations. Significant political support exists to maintain these policies.

Conclusions

The debate over cashew policy was one of the more acrimonious in the World Bank's history. It has been used by commentators to illustrate the errors of judgment made by international financial institutions and has been a cause célèbre for critics of globalization. The net results of those policy changes implemented—and of those not pursued—are difficult to estimate. Nonetheless, a few conclusions can be drawn.

At the time, World Bank economists argued that the industry was highly inefficient and could not be made competitive even if local prices were kept very low (Hilmarsson 1995; World Bank 1995b). At low prices, little supply would be forthcoming, but the capital-intensive nature of the processing technology used by the companies required large amounts to be competitive. Many processors at the time were simply exporting raw cashews at world prices instead of processing them. This generated significant profits even as factories stood idle.[20]

World Bank staff believed that higher prices would elicit a large supply response of raw cashews from farmers, thus increasing the potential viability of the processing industry. Any factory that could not adjust within a five-year period was probably too inefficient to remain in operation. They also believed that, over time, the industry would move toward the Indian system of highly labor-intensive, smaller-scale manual systems. These smaller factories could be located in cashew-producing areas, thus minimizing high transport costs in Mozambique.

The existing processors thought that supply would be forthcoming even at very low prices, as was the case in the period before nationalization. They expected their factories would be viable because a large enough supply of raw nuts would be available at very low prices. Thus, whereas the Bank believed in high price elasticity of supply, the processors believed in low price elasticity.

Following more than a decade of effort, most of the objectives espoused by both parties were not realized. All the capital-intensive factories have closed, and a consensus now agrees that they were inefficient. The anticipated supply response in cashew production has not taken place, however, and producer price increases were not sustained. The outcomes are summarized in an evaluation by Nathan Associates in 2004:

> The fundamental problem of the cashew sector in Mozambique has been the declining volume and quality of cashew nuts produced in the country. Mozambique has found itself in a vicious cycle wherein producers receive prices for their nuts that are too low to justify investments in better care of

> existing trees and/or planting of new trees. Yet at the same time, the prices paid by existing processors are too high for them to make adequate profits and returns on their investments. (Nathan Associates 2004, 2)

The only way to increase yields, improve quality, and lower disease incidence is to replant the cashew orchards. Older trees require much more pesticides and do not yield similar quantities, even with greater care. Replanting and grafting requires farmers to forgo income from cashews for three to five years. Thus, even with increasing prices and the greater availability of new high-yield varieties, it has been difficult to get farmers to replant their cashew orchards, despite the fact that these new plantings are intercropped with other crops.

Improving the quality of nut yields holds out the greatest promise for improving the sector's competitiveness. Younger and better-tended trees greatly improve yield and quality. Both domestic processors and raw nut exporters would be willing to pay a higher price to farmers for higher quality nuts. However, given the industry's organization, which entails arm's length interactions between diffuse farmer groups and equally diffuse processors, any program for replanting trees requires government support to be effective.

Looking back, the only solution would have been large amounts of investment and support to smallholders to increase their yields and lower their costs. By focusing on the profitability of an inefficient processing industry on the one hand, and the capacity of price reforms to lead to increases in cashew nut output on the other, other important dimensions of the issue, in which interventions would have benefited both groups, were neglected. A broader effort could have centered on building a greater consensus on the causes of the problems and an agreement by all the stakeholders on a common institutional framework for pricing and nonprice support.

If recent history is reanalyzed and put in context of the framework advanced by Aksoy and Onal (2011; 2012), the following points stand out. First, as expected, reforms led to producer price increases, and the exported output responded to this price increase. This continued until an external shock occurred—in this case, an international price collapse. The possibility of such an external shock was not built into the reform program, and there was no mechanism to redistribute the losses among stakeholders. Therefore, output decreased and the inefficient processing industry was completely eliminated. The collapse of prices and the exit of processors led to a less competitive environment for the purchasers of raw cashews and lowered the share of the export price received by farmers, further reducing the marketed output. An effective nonprice support for processors was provided by donors, and a more competitive processing technology and corporate structure emerged, aided by the existing export tax and the reduction in the share of the export price going to farmers. Real producer prices did not rise, despite an increase in international export prices due to a lower share of export prices going to farmers and a seriously appreciating currency. During this same period, however, increasing but still weak support was provided to farmers.

The tradeoff between farmers and processors has remained a point of conflict throughout the post-reform period. Recent efforts to establish producer groups are helpful, but the power of processors to affect outcomes has been greater. The ideology in favor of domestic processing and close links between the processors and the political leadership have always dominated political decisions. This has led to underinvestment in cashew farming and thus harmed both sides. Lack of consensus also led to the INCAJU remaining a parastatal, which created much weaker nonprice support and thus led output to depend fully on the levels of real producer prices.

Nonprice support to farmers, which could have been an important intervention, was never effectively supplied. The World Bank developed a cashew project in the late 1990s that was closed due to mismanagement.[21] Other donors did not focus on the farmers, probably because of the controversy about cashew policies. The Ministry of Agriculture has not placed the needs of cashew farming at the top of its agenda, despite the fact that it is among the few cash crops that could help the rural economy to become more commercialized. The INCAJU has been given greater responsibilities for the cashew crop and has initiated support to farmers, but it has limited resources and skills to seriously upgrade the cashew tree stock.

Finally, the behavior of international prices and especially exchange rates plays a very important role in determining outcomes, independent of the design of the reforms. Currency appreciation arguably played an important role. Given the political economy of cashews in Mozambique, the absence of this large appreciation in recent years may have led to a more positive conclusion.

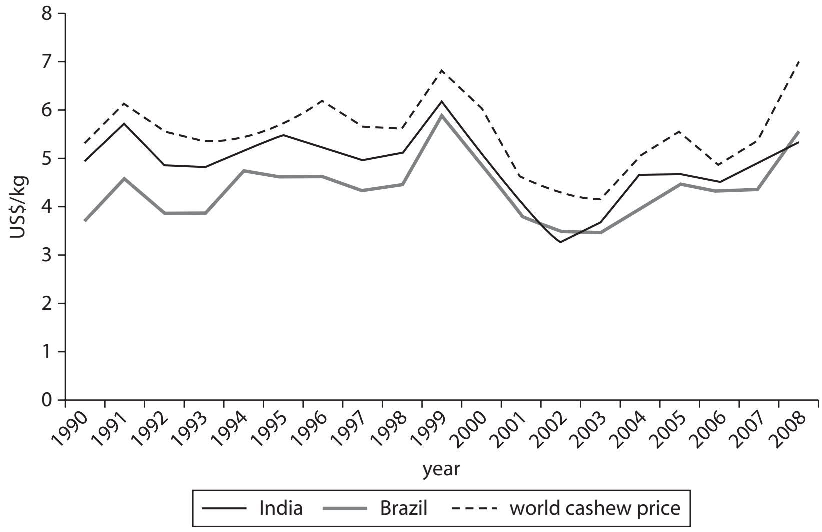
This story is slightly different than the one told earlier. Had there been less controversy, better understanding of the key issues, and a better mechanism to analyze the issues from all sides, the response to the external shock could have been managed better and could have led to greater investment in cashew farming. Despite the intervening events and positive developments, producers did not gain as much as expected, but did realize a threefold increase in cash incomes during the initial phase of the reforms. The original processors that intervened to reverse the reform process ended up losing completely. Although cashew exports did increase, this increase was not as much as expected when the reform program was designed.

Annex 6.1

Global Background

World exports were about US$2 billion in 2008.[22] Over the last two decades, cashew exports denominated in nominal U.S. dollars have increased by about 376 percent. This is much higher than total world exports of agricultural products, which have only increased by 250 percent. Cashew prices have followed international price cycles but have shown much lower volatility than many other tropical agricultural products, such as coffee and cotton (Onal and Aksoy 2012). Figure 6A1.1 shows FAO processed cashew unit export prices for India and Brazil, the two largest exporters for the period in question, and the World Bank's world cashew price index.

Figure 6A1.1 Processed Cashew Export Prices



Source: COMTRADE 2010.

These price movements are very similar to the export unit value indexes from the Commodity Trade Statistics Database (COMTRADE). The World Bank world cashew index shows higher prices than the unit export values for Brazil and India, but the turning points are the same for all three series. Prices increased slightly during the 1990s, with a peak in 1999 and a very rapid price decline until 2002/03. After that, cashew prices began to increase with all other commodity prices, with a large increase in 2008. Thus, the price series are consistent with one another, and any one of them can be used for the international price of processed cashews.[23]

World cashew exports have been dominated by a few countries. During the 1960s and 1970s, East Africa (Mozambique and Tanzania) supplied almost half of world cashew demand. By 1990/91, East Africa's share had dropped dramatically, and Brazil and India became large producers and exporters, accounting for more than 61 percent of world exports. These two were followed by a group of SSA countries: Mozambique and Tanzania in East Africa, and Guinea-Bissau in West Africa. Vietnam, which accounted for only 5.5 percent of world exports in 1990/91, has expanded its production and exports over the last two decades and is now almost the largest exporter. Over the last decade, a group of countries from West Africa—Benin, Cote d'Ivoire, Ghana, and Nigeria—have entered the export markets and now dominate exports from SSA. In 2008, Cote d'Ivoire in particular became the largest exporter from SSA.[24] Table 6A1.1 shows the structure of world exports, supplied by partner data from the United Nation's COMTRADE database.

The values shown are in current U.S. dollars, and the percentages given are the share of that country's exports as a percentage of world exports. In addition to individual countries, the East African category consists of

Table 6A1.1 Cashew Exports
(US$ mil.)

	India	*Brazil*	*Vietnam*	*East Africa*	*West Africa*	*Indonesia*	*World*
1990/91	227	116	29	40	32	18	532
	42.60%	21.80%	5.50%	7.50%	6.00%	3.30%	86.00%
2000/01	475	139	126	85	103	23	1005
	47.30%	13.80%	12.50%	8.50%	10.20%	2.20%	94.50%
2007/08	646	212	642	122	448	109	2436
	26.50%	8.70%	26.30%	5.00%	18.40%	4.50%	89.50%

Source: COMTRADE.

Kenya (a small producer), Mozambique, and Tanzania. West Africa includes Benin, Cote d'Ivoire, Ghana, Guinea-Bissau, and Nigeria. Percentages given under the World column show the total share of country exports covered in the table. For example, in 1990/91, 14 percent of world exports were made by countries not included in these categories.

Table 6A1.1 shows large structural changes, especially after 2000/01, and these can be summarized as follows. Brazil has consistently lost market share, from 21.8 percent in 1990/91, to 8.7 percent in 2007/08. Vietnam and West African countries have consistently increased their market share, from 5.5 and 6.0 percent in 1990/91, to 26.3 and 18.4 percent, respectively, in 2007/08. India and East Africa have increased their world market shares between 1990/91 and 2000/01, but have lost market shares during 2000/01 and 2007/08.

Brazil exports locally produced, processed cashews. India and, more recently, Vietnam import raw cashews in addition to their local production and export these after processing. In SSA, especially during the last decade, exports have been predominantly raw cashews. The values of raw cashew imports to India during these periods were US$91.3, US$179.5, and US$506.7 million U.S. dollars. These constitute 40.2, 37.8, and 78.4 percent of the value of their exports, respectively. Thus, India has become a marginal net importer of cashews and has become a processor of cashews. In terms of raw cashews, India is now almost a net importer. Vietnam is moving in the same direction, having begun importing raw cashews during the late 1990s. In 2000/01 and 2007/08, Vietnam's imports were 14 and 28 percent of their exports, respectively.

To sum up, cashew exports are highly concentrated, with 10 countries accounting for almost 90 percent of world exports. During the last two decades, Brazil, India, and East African countries have lost market shares, whereas Vietnam and West African countries have gained market shares.

Table 6A1.2 summarizes the development of cashew production across the same groups. The countries included in table 6A1.2 account for more than 95 percent of world production. Cashew production has increased rapidly over the last two decades, from 821,000 metric tons in 1990/91, to 3.65 million metric tons in 2007/08. This is a cumulative increase of almost 345.0 percent, corresponding to 7.5 percent growth per annum.

The last two decades have witnessed a larger adjustment in production than in exports, partially due to African countries' exporting raw cashews that are lower priced than processed cashews. India and Brazil, which export processed cashews, have much higher shares in the export markets

Table 6A1.2 Cashew Production
('000 mt)

	India	*Brazil*	*Vietnam*	*East Africa*	*West Africa*	*Indonesia*	*World*
1990/91	291	147	150	60	89	44	821
	35%	18%	18%	7.30%	10.80%	5.40%	95%
2000/01	485	132	282	193	678	81	1924
	25.2%	6.8%	14.7%	10.0%	35.2%	4.2%	96.2%
2007/08	643	191	1200	186	1099	145	3650
	17.6%	5.3%	32.9%	5.1%	30.1%	4.0%	94.9%

Source: FAO.

than in production. Their combined export market share has come down to about 35 percent, whereas their share in world production has declined to almost 23 percent.

A decline in the East African market share is caused not only by exporting mostly raw cashews, but also by a more rapid decline in its share of world production. East Africa is the only region where cashew production has absolutely decreased over the last decade. This decline in production, coupled with rapid increases in production in the rest of the world, has reduced its share of world production from 10 percent in 2000/01 to 5 percent in 2007/08.

Vietnam and West Africa, conversely, have seen their production increase more than 10-fold over the last two decades and now collectively account for 63 percent of world production. The difference in their export market share in nominal dollars and in production is explained by the fact that West Africa exports raw cashews whereas Vietnam exports processed cashews and also imports raw cashews. Thus, its exports are aided by its imports.[25] In 2008, Vietnam exported processed cashews worth about US$650 million and imported raw cashews worth about US$225 million.

By 2007, India exported as much as it produced, producing 620,000 metric tons of raw cashews and importing 590,000 tons of raw cashews. Thus, India is effectively not a net supplier to the rest of the world. In value terms, in 2007, India exported processed cashews worth $US535 million and imported raw cashews worth $US415 million. Its production of cashews increased after 2000/01, but not as rapidly as the increase in world production.

The world cashew market is being driven by production growth in Vietnam and West Africa, with India becoming a smaller player. India's production is not growing as rapidly as the world market, and it must proportionately import more and more raw cashews to satisfy its domestic and export market. Vietnam is also competing with India to become a major processor, but has the added advantage of a much faster growing domestic output and smaller domestic market. East Africa, along with Brazil, has become a minor player in world cashew markets. West Africa, conversely, is the major producer and exporter of raw cashews and is expanding its output at a much faster rate than world demand and supply.

Annex 6.2

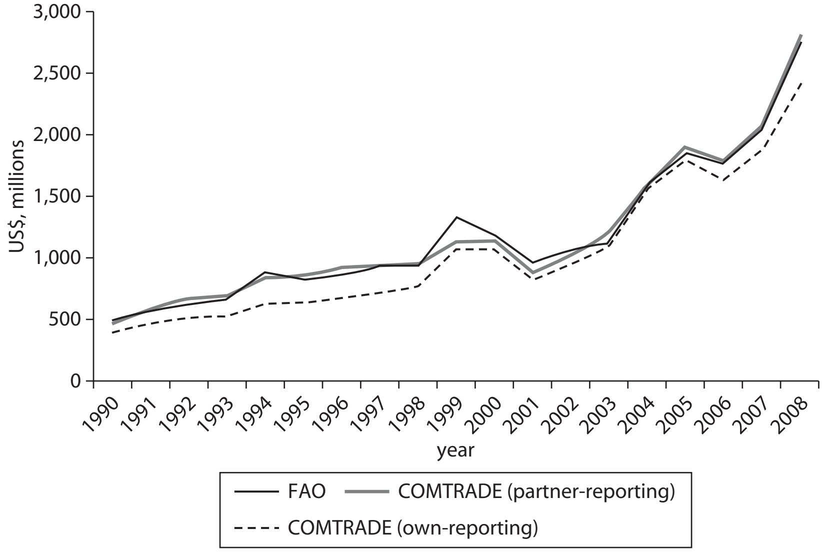
Reconciling the Numbers

Three sources of data are available for the cashew subsector. The first is the FAO database, which includes both volume and value series and also includes production, trade, and price series. It also separates raw and processed nut trade volumes and values. The second data source is the Anderson et al. database that includes a limited number of countries and commodities but also lists the nominal rates of assistance (NRA) for these commodities. In most cases, their numbers are very close to the FAO numbers. For trade data, the COMTRADE database is used; it contains predominantly values but in some cases also unit values that can be used to generate quantities. In COMTRADE data, two export series are given. First are the values reported by the countries and second are the values reported by trading partners. In many cases, especially for developing countries, partner reporting is used because countries do not report their trade fully or the figures are subject to serious delays. This is an issue for some SSA countries. Although partner import data are expected to be higher than export data due to freight and insurance costs, the differences cannot be explained simply by f.o.b. and cost, insurance, and freight differences.

In figures 6A2.1 and 6A2.2, a few points stand out. First, self-reporting, especially for SSA, underestimates the exports compared to both partner reporting and the FAO data. For total world exports, FAO numbers and COMTRADE Partner Data are almost identical, except for the year 1999. This gives us some comfort that both might be more reasonable than the alternatives. Thus, we use the COMTRADE partner data when there are questions or missing information.

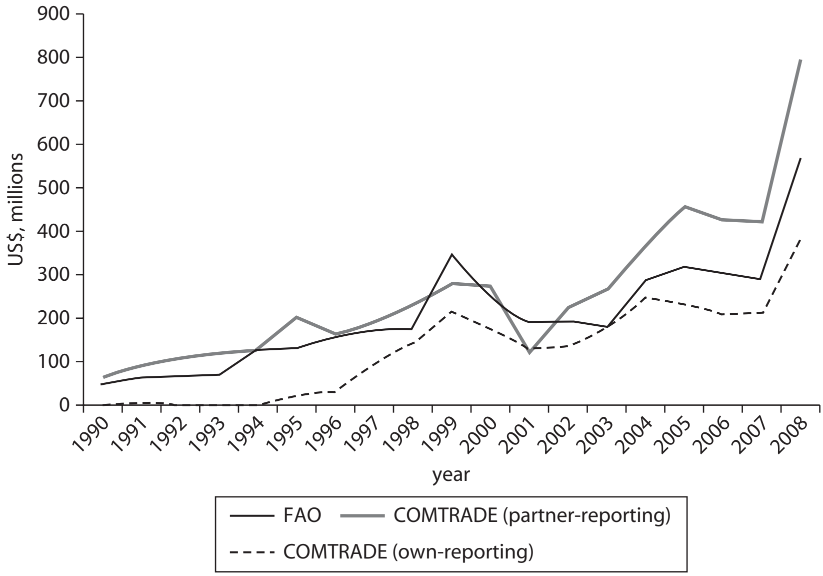
The numbers are quite different for SSA, especially between self-reported and partner COMTRADE data. In 1992 and 1993, FAO reported exports of US$65 and US$67 million, partner data showed US$108 and

Figure 6A2.1 Total World Cashew Exports



Source: COMTRADE.

Figure 6A2.2 Total Sub-Saharan African Cashew Exports



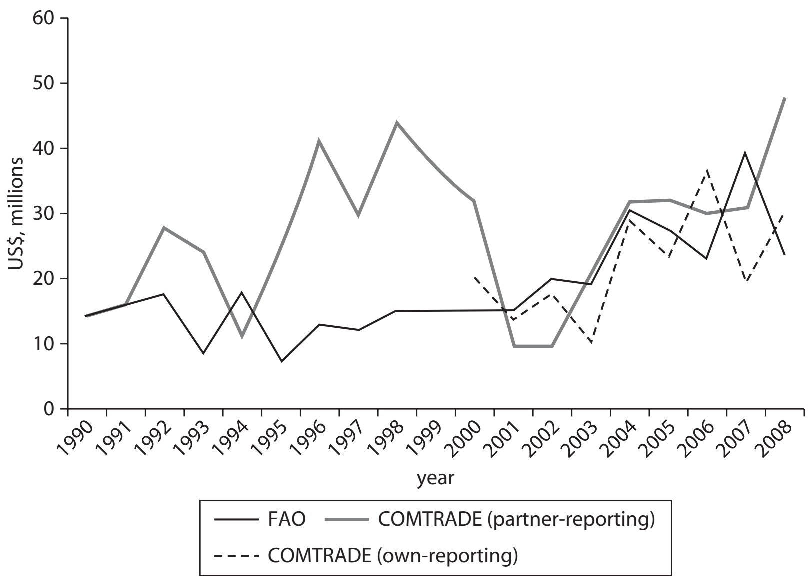
Sources: FAO; COMTRADE 2010.

US$110 million, and the self-reported figures were US$4 million and US$1 million, respectively. African countries have consistently underreported their cashew exports. The FAO numbers are close to the self-reporting COMTRADE series, and many times lay between partner and self-reporting series, thus making it very hard to reconcile these figures.

The reported values of exports for individual SSA countries vary widely as well. In almost all cases, partner reports show much higher levels of exports. However, since FAO and COMTRADE partner data are very similar at the global level, it makes sense to accept the COMTRADE numbers. The turning points are similar in all three series, but the absolute export numbers vary by almost US$100 million. For SSA countries in this analysis, the data for Mozambique and Tanzania, our case study countries, have been separated from the rest of the SSA countries. Tanzanian data do not show the same magnitude of differences among different data sources, and they have similar turning points, suggesting that FAO data and self-reported data might not be as far off as those for Mozambique and other African countries (figure 6A2.3).

The FAO data show almost no increase in the value of exports, especially around the time of the reforms in the early 1990s (see table 6A2.1).

Figure 6A2.3 Mozambique Cashew Exports



Sources: FAO; COMTRADE 2010.

Table 6A2.1 Existing Mozambique Cashew Production and Export Series

	Exports (raw and processed cashew, US$ mil.)				*Production ('000 mt)*	*Export volume ('000 mt)*	
	FAO	*COMTRADE (partner-reporting)*	*COMTRADE (own-reporting)*	*INCAJU*	*FAO*	*FAO (raw)*	*FAO (processed)*
1990	14.3	14.2	–	–	22.5	–	4.3
1991	16.0	15.9	–	–	31.1	–	3.8
1992	17.6	27.8	–	–	54.2	–	5.5
1993	8.2	24.0	–	–	23.9	–	2.3
1994	18.0	11.1	–	–	23.0	–	5.0
1995	7.0	24.4	–	–	33.4	–	2.0
1996	13.0	41.3	–	–	66.5	–	3.6
1997	12.0	29.6	–	29.8	43.3	–	4.1
1998	15.0	44.0	–	35.4	51.7	–	4.7
1999	15.0	36.7	–	33.8	58.7	–	4.7
2000	15.0	31.9	20.0	30.5	57.9	–	4.7
2001	15.0	9.7	13.5	24.1	58.0	–	4.7
2002	19.9	9.6	17.7	11.8	50.2	38.4	0.6
2003	19.1	21.3	10.1	15.2	63.8	32.7	0.2
2004	30.4	31.9	29.2	10.0	43.0	39.7	0.5
2005	27.4	32.1	23.1	44.8	104.3	33.5	0.9
2006	22.7	29.9	36.7	19.9	62.8	24.0	2.2
2007	39.5	30.7	19.5	24.2	74.4	32.7	3.2
2008	23.7	47.8	30.2	35.1	85.0	10.5	3.3

Source: Authors.
Note: – = data not available.

Partner data, however, show an almost doubling of export values during this period. The FAO data, which are used by almost all researchers, show the same production volumes (58,000 tons) for 7 years (1999–2005) as raw cashew export prices fluctuated by more than 100 percent down and up. This is very unlikely; data from other sources (such as an Agricultural Development Strategy report prepared by the World Bank in 2005) show that production during 2000–02 was 46,000, 47,000, and 44,000 tons, respectively. Floods marked the 2000 growing season, but their impact on cashew production is unknown.

Similarly, export prices for processed cashews reported by FAO are unchanged for four years (1999–2002), whereas processed export prices in India decline by almost 50 percent. Thus, data supplied by Mozambique and then used by the FAO should not be taken at face value. The INCAJU also supplies export and production data, and these also differ from all other sources, reflecting the same problems outlined above.

Partner data from COMTRADE seem to be the most reasonable for export values and prices. In this analysis, for domestic producer prices, data from INCAJU are used; these are identical to FAO and Anderson data for most earlier years.

COMTRADE partner data are used to generate export volumes, and thus estimate the raw cashew equivalent of total exports. For the exports of raw cashews, import figures from India are used, where all the raw cashews exports from Mozambique go. Unit import values from the COMTRADE database are also used in this analysis. By deflating the import values with unit values, the export volumes for raw cashews are obtained. For processed cashew exports, the import values from all countries are used, except India. Then, the unit value of these imports is used to arrive at cashew kernel exports. This number is divided by 0.22 to obtain the raw cashew equivalent of the processed cashew exports. Table 6A2.2 shows all series used to estimate the exports. These are the numbers used for production in the text.

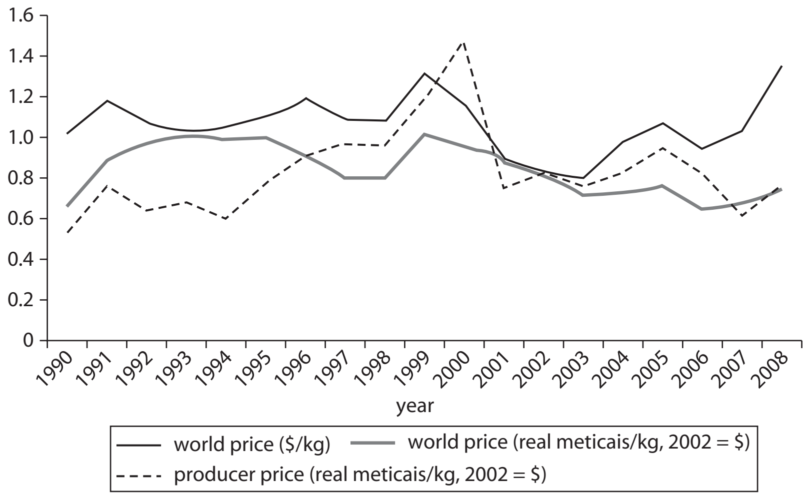
The price series used in this study are shown in figure 6A2.4, where U.S. dollar international prices are converted to local currency, and the real producer prices are shown. They are indexed to be equal in 2002. Raw cashew prices in U.S. dollars gradually increased during the late 1990s, reaching a peak around 1999. A large decline occurred during 2001 and 2003 (figure 6A2.4). After that decline, raw cashew export prices in U.S. dollars increased, to surpass pre-collapse levels in 2008.

Table 6A2.2 Constructed Mozambique Cashew Export Series

	Raw cashew exports			*Processed cashew exports*				*Total cashew exports*	
	Value (US$ mil.)	*Unit value (US$/kg)*	*Volume ('000 mt)*	*Value (US$ mil.)*	*Unit value (US$/kg)*	*Volume ('000 mt)*	*Volume (raw cashew equivalent a+ 5.2, '000 mt)*	*Total value (US$ mil.)*	*Total volume (raw cashew equivalent a+ 5.2, '000 mt)*
1990	–	0.92	–	14.2	3.5	4.0	18.4	14.2	18.4
1991	1.6	1.16	1.4	14.3	4.3	3.3	15.1	15.9	16.4
1992	13.3	0.95	14.0	14.5	3.6	4.1	18.5	27.8	32.5
1993	14.3	0.77	18.7	9.7	3.2	3.1	13.9	24.0	32.6
1994	6.2	0.90	6.9	4.9	2.8	1.8	8.0	11.1	14.9
1995	17.6	0.88	20.1	6.8	4.4	1.6	7.0	24.4	27.2
1996	24.6	0.87	28.1	16.8	4.2	4.0	18.3	41.3	46.4
1997	13.1	0.78	16.9	16.4	3.7	4.5	20.4	29.6	37.3
1998	24.8	0.88	28.2	19.2	4.0	4.8	21.9	44.0	50.1
1999	25.0	1.04	24.0	11.8	4.6	2.6	11.7	36.7	35.7
2000	17.4	0.93	18.7	14.5	4.6	3.2	14.4	31.9	33.1
2001	8.0	0.57	14.0	1.8	3.0	0.6	2.7	9.7	16.7
2002	8.3	0.55	15.1	1.3	2.6	0.5	2.2	9.6	17.3
2003	20.6	0.64	32.4	0.7	3.2	0.2	1.0	21.3	33.4
2004	29.8	0.70	42.5	2.1	4.1	0.5	2.4	31.9	44.9
2005	27.7	0.86	32.2	4.4	4.7	0.9	4.2	32.1	36.4
2006	20.1	0.74	27.3	9.7	4.4	2.2	10.0	29.9	37.3
2007	15.9	0.71	22.3	14.9	4.2	3.6	16.3	30.7	38.5
2008	31.7	0.91	34.8	16.1	4.8	3.3	15.2	47.8	49.9

Source: Authors.
Note: – = data not available.

Figure 6A2.4 Cashew Producer Prices in Mozambique and World Prices for Raw Cashew



Sources: INCAJU; COMTRADE 2010.

The difference between cashew prices in U.S. dollars and real local currency is the behavior of the real exchange rate. In the early 1990s, there was some increase in LCU cashew prices due to currency depreciation. The currency appreciation after 2003 did not allow the large increase in international prices to be passed on to local producers. Despite appreciation, some increase in producer prices was seen, but nowhere close to the international price increases.

Data for the prices used in the chapter and in this annex are presented in table 6A2.3.

Table 6A2.3 Mozambique Cashew Production and Prices[a]

			Export price				
Period	*Production ('000 tons)*	*Producer price (US$/kg)*	*Raw (US$/kg)*	*Processed (US$/kg)*	*World price (US$/kg)*	*CPI (2005 = 100)*	*Exchange rate (Meticais/US$)*
1990	18.40	0.22	0.92	3.52	1.02	4.41	0.93
1991	16.43	0.27	1.16	4.33	1.18	5.86	1.43
1992	32.53	0.18	0.95	3.57	1.07	8.53	2.52
1993	32.56	0.18	0.77	3.16	1.03	12.13	3.87
1994	14.86	0.17	0.90	2.79	1.05	19.79	6.04
1995	27.16	0.22	0.88	4.40	1.10	30.56	9.02
1996	46.36	0.31	0.87	4.17	1.19	45.39	11.29
1997	37.32	0.35	0.78	3.66	1.09	48.73	11.54
1998	50.07	0.34	0.88	3.98	1.08	49.45	11.87
1999	35.75	0.40	1.04	4.55	1.32	50.87	12.78
2000	33.12	0.47	0.93	4.57	1.16	57.34	15.23
2001	16.70	0.19	0.57	2.96	0.89	62.53	20.70
2002	17.30	0.22	0.55	2.59	0.83	73.02	23.68
2003	33.44	0.22	0.64	3.19	0.80	82.82	23.78
2004	44.86	0.29	0.70	4.12	0.97	93.31	22.58
2005	36.39	0.35	0.86	4.75	1.07	100.00	23.06
2006	37.27	0.31	0.74	4.45	0.94	113.24	25.40
2007	38.54	0.25	0.71	4.16	1.03	122.48	25.84
2008	49.94	0.36	0.91	4.82	1.35	135.13	24.30

Source: Authors.
Note: CPI = Consumer price index.
a. World cashew prices are from GEM (2011). Nominal exchange rates and CPI are from the WDI (2011). Producer prices are from Anderson and Valenzuela (2008) and updated from local sources. Export prices are unit export values calculated from COMTRADE (2010) partner-reported data. Raw cashew export prices are calculated from Mozambique's cashew exports to India, and processed cashew export prices are calculated from Mozambique's cashew exports to the rest of the world. Production reflects marketed output and is calculated based on export volumes from COMTRADE.

Annex 6.3

The Timeline

Table 6A3.1 The Timeline, 1974–2008

	Civil war and after 1977–94	*First phase of reforms 1995–2000*	*Price collapse 2001/02*	*More recent phase 2003–08*
Policy initiatives				
Policy actions	Export ban on raw cashews (1978) Nationalization of processing companies	Switch from export ban to export tax Privatization of processing companies	—	TA by donors for restructuring the processing industry Support to producers by INCAJU, farmers' associations Encouragement of vertical integration by processors
Exchange rate	—	Allowing moderate appreciation	Allowing depreciation	Allowing large appreciation
Exogenous factors				
Raw cashew export price ($)	—	Stable with 20% increase in 1999/00	40% decline, significantly below the 1993–2000 level	Gradual increase, reaching 1993–98 level in 2007; continued increase since then
Incentive indicators				
Real producer price (local currency)	—	Significant increase until 2000 (more than doubling) due to lifting of the export ban	Moderate fall, depreciation of currency moderating the sharp fall in US$ price	Stable; US$ price increase was not translated into producer price because of large appreciation
Impact on the sector				
Structure of the sector	—	Some old capital-intensive processing companies closed because they could not compete in international markets	Exit of old processing companies continued	New, smaller, and more labor-intensive processors emerge Some processors start their own raw cashew production
Exports (raw cashew equivalent—as a proxy for production)	Average exports for 1990–94 period was 23,000 tons	Average exports increased to 39,000 tons, 50,000 tons in 1999	Average exports: 17,000 tons	Average exports: 40,000 tons (50,000 in 2008)

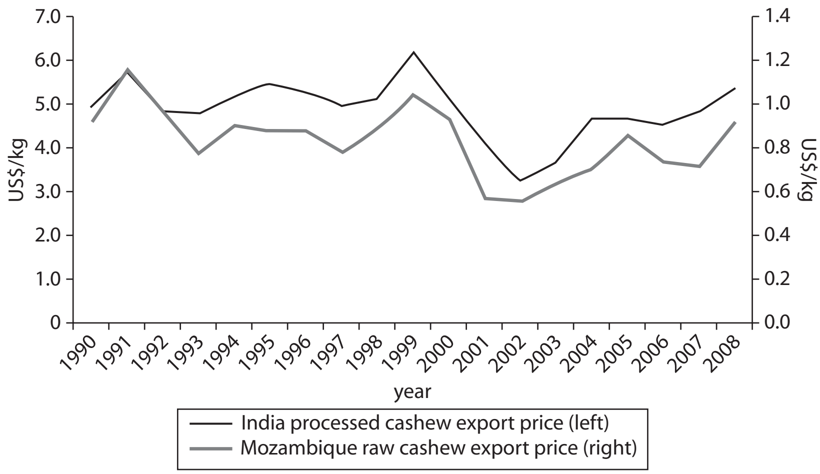
Source: Authors.
Note: — = data not available.

Annex 6.4

Monopoly Power of Indian Processors

If the cashew processing industry collapses in Mozambique, many fear that Indian processors would exert quasi-monopsonistic powers over the market. However, with Vietnam's entry into this market as a major processor and importer, India's monopsony has been eliminated. Similarly, India has become more dependent on imported cashews to both meet its domestic market and maintain its export markets. Figure 6A4.1 shows that the raw cashew prices closely follow the India kernel export prices, which can be taken as the international prices for processed cashews. This suggests that what Indian importers pay for raw cashews is closely determined by the world prices of processed kernels. Thus, the assumption of a competitive world market is reasonable.

Figure 6A4.1 Mozambique Raw Cashew Export Prices



Source: COMTRADE.

Annex 6.5

Cashew Processing Technology

Cashew processing involves various steps to recover the edible kernel and a liquid, called cashew nut shell liquid (CNSL). The process begins with the separation of raw nuts by size and moisture content. Then, the nuts are heated through various methods to make them brittle and thus easier to break open. Next, in the shelling stage, the shells are broken either through impact or cutting (decortication). The kernel is covered with a thin skin, which is removed either by hand or using pneumatic peeling. Thus, cashew processing varies from very primitive, manual systems to very complicated, highly capital-intensive techniques. There are more than 20 grades of cashew kernels, and grading is also a labor- and skill-intensive process (Abt Associates 1999).

With the expansion of cashew production during the colonial period, small, manual processing systems were replaced by large, mechanized factories. By 1993, 97 percent of Mozambique's installed processing capacity was either impact or Oltremare technology. Impact decortication systems operated efficiently with smaller quantities of raw nuts, but the nuts had to be of a consistent size to minimize kernel breakage. As the preferred method to break open raw cashews to obtain the edible kernel, a fully automated cutter, known as the Oltremare system, was well-suited for processing large, high-quality cashews (Deloitte and Touche 1997).

The value added by processing cashews depends on the ratio of non-scorched (white) and broken kernels. Large, white, full kernels are the most expensive. The price drops dramatically when the kernels are broken or scorched (reaching as high as 50 percent per unit). Original estimates by the World Bank argued that most of the capital-intensive factories of the early 1990s had negative value added because of the high ratio of scorched and broken kernels (Hilmarsson 1995).

Abt Associates (1999) confirmed the differences in breaking and scorching among different types of technologies (table 6A5.1). Steam heating and semi-mechanical cutting seem to yield much higher full white kernels. Full manual systems yield even lower amounts of broken kernels. Abt Associates concluded that the 15 factories that existed in 1999 could be grouped into four categories or clusters.

- Four former state-owned plants that used impact shelling technology
- Three traditionally private companies that use cutting technology

Table 6A5.1 Percentage of Raw Cashew Scorched and Broken

Cluster	*Scorched*	*Broken*
Steam/semi-mechanical cutting	13.6	38.5
Roasting/mechanical shelling	35.0	51.7
Roasting/impact shelling	68.6	52.2

Source: Abt Associates 1999, 3.16.

- Four new private plants that use semi-mechanical technology
- Four factories with mixed ownership history and processing technology

Except for the few plants using manual processing, both existing and new plants used inefficient capital-intensive techniques.

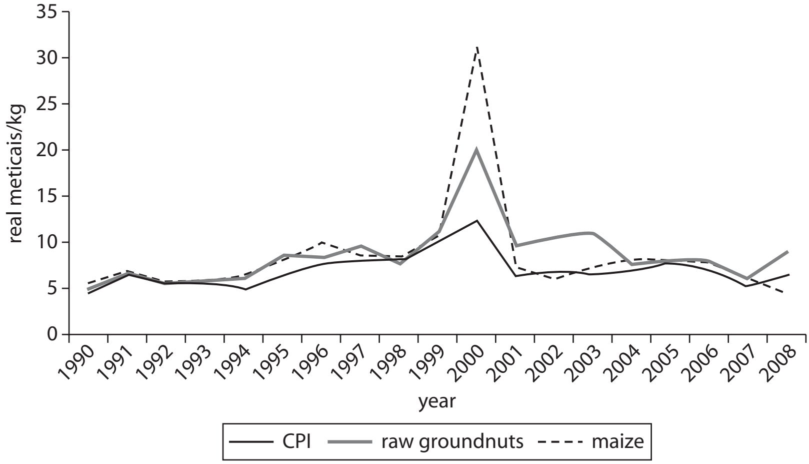
Annex 6.6

Real Cashew Prices

When the real cashew price is estimated using the CPI, real prices increase rapidly after the reforms, reaching a peak in 2000. Surveys undertaken by the World Bank during the late 1990s argued that, when evaluated at the prices of basic inputs and substitutes used by the farmers, these prices are very low, especially when compared to their competitors in countries where production is increasing more rapidly. Even though producer prices increased during the late 1990s, they were still too low to make it worthwhile for farmers to sell their raw nuts. Selling a kilogram of raw nuts in Nampula, Inhambane, or Gaza would generate enough profit to allow a farmer to purchase a kilogram of white maize flour, rice, peanuts, sugar, or oil, all of which are part of the basic rural consumption basket. In Mozambique, selling 1 kilogram of raw cashew nuts allows farmers to purchase less than 1 kilogram of the staple food, white maize flour. In Vietnam, relative prices are such that 1 kilogram of raw nuts allows farmers to purchase more than 2 kilograms of the staple food, rice. The Indian farmer has an even more favorable opportunity, since he or she earns close to US$1.00/kg of raw nuts, equivalent to 3 or more kg of rice. The most striking difference is observed in the quantity of salt—a basic nonfarm food—that can be purchased by selling 1 kilogram of raw nuts. In Vietnam, 1 kilogram of raw nuts is equivalent to almost 7.6 kilograms of salt, but in Mozambique, households in Nampula can purchase no more than 1760 g, and those in Inhambane and Gaza can purchase only about 1 kilogram of salt (World Bank 2001).

Thus, not only is the price of cashews vis-à-vis the general consumer price very important, but also the price of substitutes, the most important of which is groundnuts. Groundnuts are a staple in the Mozambican diet, but are substituted with cashew kernels for reasons of taste preference and price differences. Peanut prices in Inhambane and Gaza were, on average, two to three times those in Nampula. Raw cashew nut prices are also higher in Inhambane and Gaza, but by only about 20 percent. Thus, it makes economic sense for farmers to retain their raw nuts, instead of

Figure 6A6.1 Real Cashew Producer Prices in Mozambique with Various Deflators



Source: FAO.

selling them to purchase peanuts. This point was made by most villagers around Xai-Xai during field visits in 1996. They said that, historically, peanut prices were very low because they were imported from outside the region, and it made sense to buy peanuts and sell cashews. But, since the end of the war, prices had increased for peanuts, and it became more economical to simply eat the cashews.

However, the evolution of prices obtained from the FAO for cashew, maize, and peanut shows that peanut and maize prices move in the same direction as the overall CPI, and real cashew prices that have been deflated by CPI and separately deflated by groundnuts and maize yield very similar results (see figure 6A6.1).

Notes

1. See annex 6.1 for details of world cashew production, exports, and prices.
2. The story of the developments and policy debates has been told in detail by many authors and will not be repeated in detail here (see for example, Abt Associates 1999; Hanlon 2000; McMillan et al. 2002; Welch 2002). Annex 6.3 provides information on the timeline and specifics of policy and other actions.
3. These outputs were obtained because world prices were higher and East Africa had a near-monopoly in cashew production; most of the trees were young and disease-free; there was a poll tax that required cash income to be

paid and, in these provinces, cashew was among the few commodities that generated cash income; and, finally, the district authorities forced farmers to take care of the trees.

4. Apparently, older cashew trees have reduced yields even if they are well looked after.
5. See annex 6.3 for details.
6. There is little evidence that this tax was ever paid.
7. Many have argued that the World Bank led to the elimination of the export ban on raw cashews. However, raw cashew exports were allowed long before the Bank got into the debate, and significant exports of raw cashews started in 1992 (see figure 6.1). Most of these raw cashew exports were undertaken by the "processors" that had the right to buy the raw cashews first.
8. During the late 1980s and early 1990s, Mozambique started to move away from a planned socialist economy to a more liberal one. Reforms were implemented in almost all areas of economic activity, where price and production controls were eliminated. After the civil war ended, the government also started a large program of privatization and, within a few years, the bulk of economic activity has been privatized.
9. Despite domestic opposition, the government was dependent on continued support from international financial institutions. Mozambique was one of the poorest countries in the world in the mid-1990s, and international aid accounted for 60 percent of its gross domestic product (GDP). In addition, Mozambique was in the process of applying for debt relief under the Heavily Indebted Poor Countries (HIPC) initiative. According to Mozambican President Joaquim Chissano, Mozambique "had to liberalize the export of raw cashews in order to obtain other benefits from the Bretton Woods institutions." Specifically, he asserts that Mozambique complied with the World Bank's liberalization policy in order to qualify for HIPC debt relief (AIM, June 25, 2001).
10. In addition to the export tax, local producers have the advantage of not paying for shipping costs of raw cashews to India, which is the main importer of raw cashews from Mozambique. These costs are estimated to be between 5 and 15 percent of the raw cashew price, which increases the rate of subsidy to almost 25 percent.
11. A decrease shows appreciation of the currency.
12. This is a point made by McMillan et al. (2002); that, after all the debate about reforms, by 2001/02 the price increases and income gains by the producers were limited. However, the decline in international prices is the cause of limited income gains, not the reform program.
13. TechnoServe is supported and funded by the U.S. Agency for International Development (USAID).

14. Most of the new owners only paid symbolic amounts for the privatized factories. They paid only US$850,000 as down payment for factories valued at around US$13 million and sold at US$5 million (McMillan et al. 2002). It is not clear whether any other sums were actually paid.
15. However, most of these processors supported FRELIMO during the civil war and were probably promised new opportunities after hostilities ended. It is not possible to determine the right interpretation.
16. Formerly state-owned factories were large, mechanized, and located in larger cities and towns.
17. These factories also contributed to rural economies by creating wage and business income in addition to farming activities. Paul (2008) detailed the social and economic transformation that resulted from the startup of such a factory in Mogincual, Nampula province.
18. Miranda, for example, is integrating backward and growing more of its own cashews. Developing tree plantations successfully requires significant agricultural expertise.
19. Earlier programs designed during the 1990s to support producers were canceled by donors due to problems associated with program implementation. The Ministry of Agriculture never supported cashew producers during the earlier periods of reforms.
20. About half the exports in 1993–95 period were raw cashews. Thus, the decision to allow the export of raw cashews was made before the World Bank became involved in the policy debates on cashews, which was around 1995. The export licenses were given primarily to so-called "processors" and gave them a quasi-monopoly in exporting.
21. The Implementation Completion Report clearly states that "However, the planting program, the key to the development strategy behind the extension and nursery components, which were the main investments made under the project, was unsuccessful and did not contribute to increased production. Also, no commercial farms were established. The project therefore failed to achieve its production objectives" (World Bank 1999, v).
22. Ideally, we should separate the raw and processed cashew trade. The COMTRADE data do not differentiate between raw and processed cashew exports and are the most reliable data for the SSA exports. Other sources, such as FAO and country data that separate raw and processed exports, seriously underestimate SSA exports.
23. Of course, there are many kinds and qualities of cashews, each with different prices. These are basically an average price used as a benchmark.
24. There are large differences on the export values reported by different sources. Here, we report partner-supplied data from COMTRADE. See annex 6.2 for an analysis of different sources of data.

25. The FAO does not report cashew imports for Vietnam, thus there are no volume data for imports.

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CHAPTER 7

The Tanzania Cashew Sector: Why Market Reforms Were Not Sustained

Donald Mitchell and Mwombeki Baregu

Cashews are an important cash crop for farmers in Tanzania and an important export crop for the country, accounting for US$90.2 million of raw cashew nut exports in 2009 and US$21.8 million of processed cashew kernel exports (COMTRADE 2010). They are produced by more than 360,000 farmers who are mostly located in the southern districts of Matwara, Lindi, and Ruvuma, which are among the poorest districts in Tanzania. Most cashew producers are small, with 80 percent having less than one hectare planted to cashew trees and average sales of about 100,000 Tanzanian shillings (T Sh) (US$75) per year (Baregu and Hoogeveen 2009). Despite small sales per producer, cashews are the main cash crop in the southern region.

The Tanzanian cashew industry has had a volatile history. Production went into severe decline in the mid-1970s and made a significant

The views expressed in this paper of those of the authors and they may not reflect the views of the World Bank management and should not be attributed to the World Bank or its Executive Directors. Donald Mitchell is a retired World Bank lead economist and consultant, and Mwombeki Baregu was a World Bank consultant during the preparation of this chapter.

recovery in the 1990s (figure 7.1). At its peak in the early 1970s, raw cashew nut production in Tanzania reached 145,000 tons and accounted for 23 percent of global production. Production collapsed in the 1970s and 1980s due to forced villagization,[1] which moved farmers away from their farms, and other factors such as inefficiencies in the marketing system that reduced the share of export prices received by farmers to 25 percent, compared to a high of 67 percent during the early 1970s (Jaffee 1994). Cashew production fell to just 17,000 tons in the late 1980s and recovered to 120,000 tons in the 1990s, but has since stagnated at 80,000–100,000 tons of raw nuts per year.

National economic reforms undertaken in the late 1980s, cashew marketing reforms undertaken in the early 1990s, and government-supported replanting and subsidized inputs led to the resurgence of the Tanzanian industry in the 1990s. But production stalled after 2000 and remains well below the 120,000 tons reached in the 2000/01 marketing year. The marketing reforms of 1991 that allowed the private sector to buy raw cashew nuts directly from farmers and their primary societies[2] were reversed in 2007, and marketing was returned exclusively to primary societies and cooperative unions. Why were marketing reforms not sustained? That is the focus of this chapter. The chapter begins with a brief review of cashew production, marketing, and processing. This is followed by a more detailed look at why Tanzanian production declined during the 1970s and 1980s. The local processing industry is then examined, followed by a review of

Figure 7.1 Cashew Production, 1961–2008

Source: FAOSTAT 2010.

economic and policy reforms of the 1980s and early 1990s and their impact on producer incentives and production. The recovery of the industry in the 1990s and factors contributing to the stagnation of the industry after 2000 are then examined to answer the question: Why did reforms stall? The next section examines the warehouse receipts system introduced in 2007 that effectively ended the liberalization introduced in 1991. A final section looks at the lessons learned from the market reforms and suggests how future agricultural reforms can be made more sustainable.

Cashew Production, Marketing, and Processing

Cashew trees are found throughout the tropics, but were originally native to northeast Brazil. They were spread by the Portuguese to India in the sixteenth century and eventually to Southeast Asia and Africa. Cashew trees grow 10–12 meters tall and have a large canopy that makes them suitable for shade and controlling soil erosion. The fruit of the cashew tree consists of an apple with a nut attached to the lower portion of the apple. The apple is edible but deteriorates quickly and is not suitable for transporting for commercial sale. It is often eaten locally or fermented to make liquor. The kidney-shaped cashew nut is encased in a hard shell and covered with a softer skin. Between these layers is a black substance called *cardol*, which is extremely caustic and can blister skin upon contact. Cardol is referred to as cashew nut shell liquid (CNSL) and is recovered during the shelling process and sold to make varnish, insecticide, paint, and other products.

Cashews are grown commercially in about 30 countries, with production dominated by Asia with 55 percent and Africa with 38 percent of global production (FAOSTAT 2010). Africa dominated production in the 1960s, with Mozambique and Tanzania producing 60 percent of the world's cashew nuts. But Africa's share of global production has steadily declined since the 1960s, while Asia's share has increased. Vietnam has emerged as a major producer since the mid-1980s and now accounts for one-third of global production. India is the second largest producer, with about 17 percent of global production. Mozambique and Tanzania each currently accounts for about 2 percent of global production. West Africa has increased production rapidly over the past several decades, led by Ghana, Guinea, and Nigeria, which now account for 30 percent of global production.

Global yields of raw cashew nuts average slightly less than one ton per hectare according to the United Nations Food and Agriculture

Organization (FAO) (FAOSTAT 2010), but vary greatly between countries depending on the age and care of the trees. Yields can be raised by applying fungicide to control powdery mildew but, according to producer surveys and the agricultural census, most Tanzanian farmers do not apply fungicide. Trees are also not well maintained in Tanzania because of the low prices received by farmers for their raw cashew nuts.

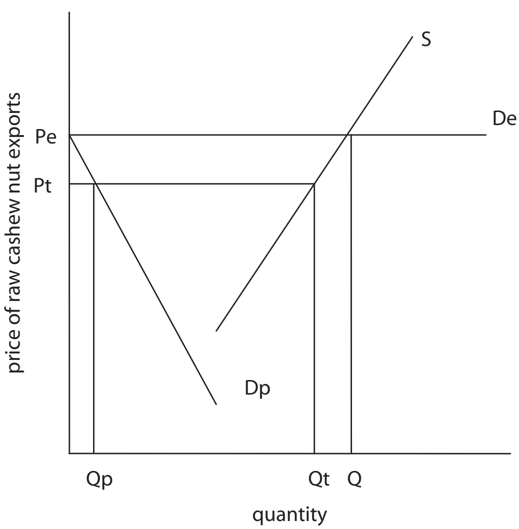
Harvesting the cashew nuts involves waiting until the fruit is ripe and falls from the tree, then collecting the apple and detaching the nut. The raw nuts must be collected twice a week in humid climates such as southern Tanzania to keep them from molding. The raw nuts are then sun dried to reduce the moisture content and ripen the kernel inside. Raw cashew nuts can be stored as long as 12 months under proper conditions.

Marketing of raw cashew nuts in Tanzania has changed over time and has included direct sales from farmers to traders and delivery of the raw nuts by farmers to their primary societies for marketing. The primary societies were the sole marketers of farmers' cashew nuts from independence until 1991, when marketing was liberalized and farmers were allowed to sell to any buyer. Marketing changed again in 2007, when the private sector was no longer allowed to buy cashews directly from farmers or primary societies, and all raw cashew nuts were marketed through primary societies and cooperative unions for sale at auction. The farmers are not well organized and lack market information, which makes them vulnerable to exploitation from buyers of cashew nuts, and this often results in low producer prices relative to export prices.

Processing involves removing the outer shell and inner skin of the raw cashew nut in order to recover the cashew kernel. This can be done manually by skilled workers or mechanically in large factories. India uses a manual process, whereas the processing industry in Tanzania was built on mechanical processing using equipment designed and manufactured in Italy or Japan. This mechanical technology produced a large share of broken kernels and was not competitive with manual processing, which can yield as much as 85 percent whole kernels. Tanzania invested heavily in mechanized factories to process raw cashew nuts with support from the World Bank and other donors. The factories were built mostly during the 1970s, when production was falling, and many factories never operated at capacity because of a shortage of raw nuts; and those that did were uneconomic because of the large share of broken kernels. Between 1985 and 1990, nine of the 12 factories in Tanzania closed. Local authorities contributed to the factories' problems by preventing cashews from being transported between factories, which would have allowed some to operate at capacity. Most of these factories have remained idle and deteriorating since the 1980s and were sold to private investors in recent years. But, despite some efforts, none is processing significant quantities of raw cashew nuts. Since the collapse of mechanical processing in the 1980s, manual processing has begun in Tanzania and has grown to about 20 percent of local production. About 7,000 workers were engaged in manual shelling and peeling of the approximately 20,000 tons of raw nuts that were processed in Tanzania in 2009.

Raw cashew nut exports are taxed in order to support local processors and provide revenue to the government, and the Tanzanian export tax was raised from 10 percent of the f.o.b. (free on board) value of exports in the 2009/10 marketing season to 15 percent in the 2010/11 marketing season. The effect of the tax is to lower the domestic price of raw cashew nuts by the amount of the tax (from Pe to Pt in figure 7.2 and reduce production from Q to Qt as shown on the supply curve S. Domestic processors will buy Qp raw cashew nuts at the lower price Pt and raw cashew nut exports will decline from Q to Qt—Qp as production is locally processed. Since Tanzania is a small exporter, the price received for its exports, Pe, is unlikely to change because of the reduced export volumes (the small country assumption), and the demand for exports is

Figure 7.2 The Impact of the Raw Cashew Nut Export Tax



Source: World Bank.

perfectly elastic and shown as De. The export tax revenue to the government is equal to (Pe – Pt) * (Qt – Qp). An export tax may be justified if it allows local processing to develop and become competitive. However, if local processing is not competitive, then the export tax is simply a transfer of revenues from producers to processors and the government.

Once processed, the cashew kernels are roasted and salted to produce the snack food eaten in high-income countries, or they are used raw as an ingredient in Asian cooking. Cashews are also consumed as a primary food item in villages where they are produced, when prices are low relative to other food items. Policies, such as export taxes, are often used to support local processing over exporting raw nuts, and this depresses farm prices and makes cashew production less profitable.

The Decline of Cashew Production from 1973 to 1990

Government involvement in the cashew industry began at independence in 1962, when the Southern Region Cashew Nut Board (SRCB) was established with a mandate to stabilize prices and develop cooperatives in the region.[3] Prior to that time, cashew marketing and trading was privately handled by Arab and Asian traders. Primary societies at the local level and cooperative unions at the secondary level quickly replaced private traders. The functions of the SRCB were taken over by the Southern Agricultural Products Board (SARB) in 1963, and, in 1964, the SARB was superseded by the National Agricultural Products Board (NAPB). Thus began the institutional changes that have plagued the cashew nut industry to the present.

The marketing system operated satisfactorily through much of the mid to late 1960s, although the official producer prices set by the government were not increased, and the primary societies and cooperative unions were apparently not effective in screening product quality. However, crop collection and payments to farmers took place on a timely basis. Although the pace of new plantings declined, the maturing of existing trees contributed to rapid growth in production and trade throughout the early 1970s.

In 1973, the Cashew Authority of Tanzania (CATA) was created to promote the expansion and wider development of the cashew nut industry. The CATA would take over the crop buying functions of the NAPB and bypass the former exporters by selling the crop to foreign buyers on a tender basis. The CATA's mandate was much broader, however, with plans outlined for the establishment of a cashew extension and grading service, the development of a cashew research program, an investment in a port storage facility for CSNL exports, and for further investments in large-scale cashew processing facilities. With the cooperative unions phased out over the 1974–76 period, the CATA would procure the crop directly from primary societies and influence the determination of official, pan-territorial producer prices.

From the 1973/74 peak of over 145,000 tons, marketed production fell quickly to 84,000 tons in 1975/76 and then declined through the late 1970s and early 1980s to 31,100 tons in 1982/83. Thus, just as the new factories were being completed, total national production was only one-third to one-fourth of factory capacity. Several factors likely contributed to this decline. One of these was the villagization program, whose implementation in the southern zone began in mid-1974. This program involved the forced relocation of the rural population into villages, which were then given priority in the allocation of land and in the provision of social services. In the south, one result of the program was to separate smallholders from their cashew trees, sometimes by considerable distances. This, together with new work responsibilities in the development of the new villages and communal plots, prevented many farmers from harvesting cashews and from properly maintaining their trees. The latter was probably an important factor in the spread of a powdery mildew fungus among cashew trees in certain locations and a subsequent decline in yields. These logistical and technical problems were exacerbated by the virtual collapse of support services for cashew at this time. With the CATA focusing on processing and trading activities, little research work was done, extension services deteriorated, and no system was put in place to detect and monitor farm-level production problems. Further undermining production incentives were a decline in the real producer prices of cashew nuts, together with a decline in cashew prices relative to those of other crops. From the 1971/72 season until the 1980/81 season, real producer prices declined by 52 percent, and the share of export prices received by producers declined from 67 percent to 31 percent.

In 1985, the CATA was replaced by the Tanzania Cashew Nut Board (TCNB), and the cooperative unions were re-established. Crop procurement arrangements would henceforth resemble those prevailing during the early 1970s, in which primary societies would procure the crop from farmers (paying official pan-territorial prices for two grades), using funds supplied by cooperative unions. The unions would in turn transport the crop to the TCNB, which would then either process the nuts or export them raw. An inter-store price was negotiated between the cooperative unions and the TCNB, ostensibly geared toward enabling the unions to recover their procurement and wider operating costs.

However, the cooperative unions lacked strong managerial capabilities and accounting systems, and were not effective in performing their functions, which led to the build up of huge arrears on their bank loans. These financial problems fed down through the system, with primary societies being unable to purchase the cashew crop and make timely payments to farmers. In several years, large quantities of nuts remained unsold at the farm or village level at the end of the buying season. Between primary societies and cooperative unions, significant quantities of nuts "leaked out" of the system. A total breakdown in the system of grading also occurred, with more than 95 percent of nuts delivered during the late 1980s being classified as standard (that is, first) grade.

The Local Processing Industry

During the 1960s and 1970s, an attempt was made to develop a local cashew processing industry in order to increase value-added levels and reduce the dependency on the Indian market for raw nuts. A government-sponsored study conducted in 1962 argued that uncertainties regarding the availability of labor in the south and shortages of skilled labor would prevent Tanzania from following the Indian model of manual cashew processing. The study recommended that the country move toward mechanical processing. In 1965, an Italian company, Oltremare S.A., set up Tanzania's first mechanized cashew nut factory in Dar es Salaam, with a 9,000-ton raw nut capacity (later upgraded to 12,500 tons). Although the factory did begin operations, its kernel exports were not profitable due to the generally low quality of raw nuts found in the Dar es Salaam region and the comparatively low yield of kernels per ton of raw nuts. In 1968, a second mechanized factory was set up in Mtwara by a Japanese company (Cashco). The factory had an 8,000-ton capacity, although equipment breakdowns and power shortages prevented it from operating for several years. By 1973, still less than 10 percent of the cashew crop was processed locally.

In 1974, a World Bank–funded project to construct five cashew processing factories with a total capacity of 36,400 tons was agreed upon. The factories were to be located in each of the main towns in Mtwara and Lindi regions and were to contain state-of-the-art (Oltremare) equipment for mechanical processing. Although factory construction proceeded satisfactorily, the actual factory costs were several times the original estimates. As a result, the research component of the project was dropped, and large cutbacks were made in technical support services. In 1976, with construction of the new factories still taking place, the Tanzanian government requested a second phase to the World Bank project. Concern was expressed about the lack of operational experience in the earlier funded factories and about the overall economic viability of additional factories. At the time, there was also some evidence of a decline in cashew nut production, although greater reliance was given to the CATA's optimistic projections for future production levels. The second phase of the project was approved for the construction of three more factories with an additional capacity of 26,000 tons. Parallel bilateral financing for two additional factories brought the total processing capacity to 113,000 tons by 1980. Before any of the new factories came on line, Tanzania's cashew production began to plummet.

Shortages of raw materials undermined the viability of the new processing factories, even though more than half of the total production was locally processed between 1980 and 1982. Two of the completed factories were never operational due to the lack of access to reliable sources of water and power. Of the remaining 10 factories, only 4 operated in 1982/83 and only 2 operated during the subsequent two seasons. Raw materials availability was not the only problem. With poor grading of raw nuts and with power and water interruptions, the quality of the finished product was uneven and generally below international standards. Tanzanian kernel exports thus brought price discounts of 35–50 percent from the Indian prices. This, together with the favorable prices for raw nuts imported by India, resulted in the Tanzanian factories accruing negative value-added levels in 1981 and 1982 and sustaining continued financial losses.

Declining marketed production and problematic buying agents constrained the operations of the TCNB during this period, and foreign exchange shortages led to shortages in spare parts and oil to operate the factories. At the same time, the factories were required to make employees permanent after only three months of work. This greatly added to labor costs for those factories that operated only 100 or fewer days per year. Even in the procurement of nuts, the factories ran into barriers set up by local authorities, who viewed them as local assets and thus sought to prevent local nuts being transported to other factories for processing. Between 1985 and 1990, nine factories closed entirely, while the three others operated only intermittently. The value added from processing was either negative or too low to cover processing costs. Raw nut exports also plummeted to 17,000 tons in 1989/90.

Although mechanical processing was a failure, it will be difficult for manual processing to become competitive with India or Vietnam for a number of efficiency, market, and policy reasons. However, much depends on wage rates, and if wages rise faster in India and Vietnam than in Tanzania, then local processing may become competitive. Tanzanian factories have lower productivity per worker than Indian factories, and the difference is at least partly due to the fact that Indian factories operate year-round, whereas Tanzanian factories operate only a few months of the year. This allows the Indian factories to maintain a permanent labor force that becomes more skilled with experience, whereas the Tanzanian factories have a higher share of inexperienced workers.

Indian factories also import raw cashew nuts from Africa and Asia for processing during those periods when local cashew nuts are not available. Tanzanian factories store raw nuts to extend their processing season, but this results in high storage costs and reduced yields of whole kernels per ton of raw nuts because the kernel recovery rate declines when nuts are stored for long periods.

India also has a large domestic market for cashew nuts, and broken kernels fetch higher prices in the local market than in the export market, which gives Indian processors an additional advantage over Tanzanian processors, who do not have a significant domestic market. India also protects its processing industry with high tariffs on imported cashew kernels, which prevents Tanzania from exporting broken kernels to India.

With these disadvantages, it will be difficult for Tanzanian processors to compete with India. Consequently, Tanzania and many other Africa countries provide policy incentives to assist their local processors. Mozambique, for example, imposes an 18 percent tax on raw cashew nut exports and restricts exports during the early part of the season to allow domestic processors to purchase raw nuts at reduced prices. As already noted, Tanzania has had a 10 percent tax on raw nut exports and recently raised it to 15 percent for the 2010–11 season.

Policy Reforms and the Recovery of the Industry, 1991–2000

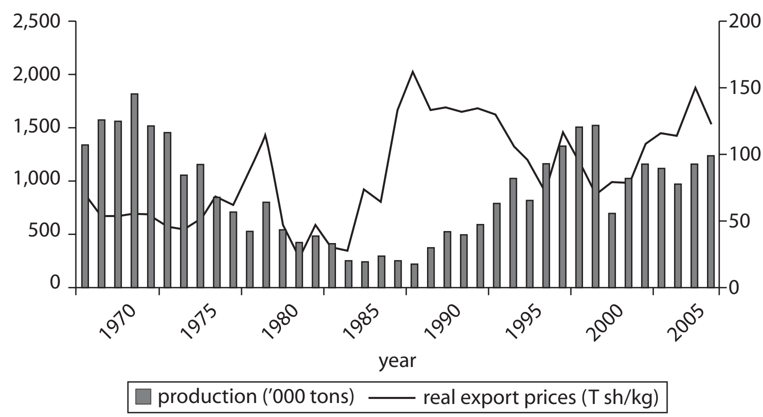
The recovery of cashew production in the 1990s was credited to the economic reforms begun in 1986, especially to trade liberalization and exchange rate adjustments, and to the sector reforms begun in the early

1990s that eliminated the monopoly of the Tanzania Cashew Nut Board (World Bank 1998). The combined effect was to dramatically raise the export price and producer price for raw cashew nut exports and provide the price incentive necessary to stimulate production and set the stage for recovery. The reforms began with the government's adoption of a three-year Economic Recovery Program in 1986, with support from the International Monetary Fund, World Bank, and other international donors. This was followed by the second Economic Recovery Program, implemented during 1989–92.

The main elements of these programs were reduction in the fiscal deficit, a series of large devaluations, import liberalization, positive real interest rates, and the elimination of most consumer price controls (GOT/WB/IFPRI 2000). Repeated devaluation of the Tanzanian shilling raised the nominal exchange rate from an average of 33 T Sh per US$ in 1986 to 405 T Sh per US$ in 1993, and the real exchange rate more than fourfold. The depreciation of the real exchange allowed the export price to increase in local currency, and that helped to support the liberalization of marketing. As shown in figure 7.3, real export prices increased beginning in 1986, and as these prices were reflected in real producer prices, they provided the incentives for production to recover.

Cashew sector reforms introduced in 1991/92 allowed private sector participation in marketing, which raised the share of export prices

Figure 7.3 Production and Export Prices



Source: FAO 2010.
Note: Real export prices are computed as the US$ export prices times the nominal exchange rate deflated by the consumer price index. Production figures are from FAOSTAT.

received by farmers from 51 percent during 1985–86 to 1990–91 to 61 percent during 1991–92 to 1995–96 (Mwase 1998). The Tanzanian export price also rose relative to the world market—from a discount of 27 percent during 1985–86 to 1990/91 to a discount of 7 percent during 1991–92 to 1995–96, according to FAOSTAT (2010). This was likely due to better grading and handling by the private sector. Cashew producers were also paid on time and in cash, whereas several months' delay was common under the regulated marketing system (GOT/WB/IFPRI 2000). The recovery was aided by the decision to export raw nuts rather than process them locally, which meant that farmers were paid more quickly and could better afford to apply sulfur dust to control powdery mildew fungus, which increased yields. The marketing liberalization and other policy reforms resulted in an almost complete switch from primary societies, cooperative unions, and government agencies supplying inputs and purchasing cashew nuts to the private sector providing these services. Real producer prices for raw cashew nuts increased fivefold from the mid-1980s to the mid-1990s due to the devaluation of the exchange rate, the increase in the average export price relative to the international price, and the increased share of the export price received by producers. International cashew dollar prices were relatively stable during this period and did not contribute to the rise in real producer prices.

Despite the overall success of the reforms in raising producer prices, the sector reforms were poorly planned and implemented (Jaffee 1994). The Tanzanian government began to liberalize the domestic marketing of grains and other food crops as part of a Structural Adjustment Program begun in 1983. However, the marketing of traditional export crops remained confined to one-channel, multitiered systems. Initial proposals to liberalize the cashew nut trading system were put forward in the late 1980s; however, it was not until 1990 that the government announced its intention to implement major policy and institutional changes in export crop marketing. This commitment was put in concrete form in Tanzania's Policy Framework Paper, presented by the government in April 1991. The cashew nut industry would play the lead role in export crop market liberalization, beginning with the 1991–92 season. This industry was chosen, in part due to the relative weakness of its cooperative unions compared with those in the cotton and coffee industries, but also because the industry was in the gravest condition. A survey conducted during the 1990–91 season had found that, depending upon location, one-third to one-half of farmers with cashew trees were not harvesting nuts. Even those who did harvest faced severe sales problems. By July 1991 (two to three months after the expected end of the buying season), 30 percent of the crop had not been purchased due to cash shortages. The government needed to intervene with the banks to clear the crop. Especially in the southern zone, where, depending upon location, cashew nut sales account for between 36 percent and 80 percent of total farmer crop incomes, the decline in production and the inefficiencies in marketing were contributing to a significant decline in living standards. At the same time, the government's huge investment in processing facilities was bringing minimal return, with most factories standing idle.

The government's original intention was that the TCNB would retain a monopoly on export marketing, while liberalizing domestic marketing. The Ministry of Agriculture issued its guidelines in July 1991, leaving only three months for preparation before the beginning of the 1991/92 marketing season. These guidelines were vague and were announced only through the media (for example, radio and newspapers), with no official documentation being sent to the regional and district authorities who would be responsible for implementing and monitoring the structural changes. Local authorities thus were given no explanation of the rationale behind the policy changes and were largely unaware of the structural changes envisioned within the marketing system. Implementation of the guidelines was seemingly left to the discretion of local authorities.

This weak communication, combined with the conservative attitude of some local authorities and the vested interests of the cooperative unions, caused a delay in the registration of private cashew traders and resulted in ad hoc procedures for doing so. In some regions, local officials viewed private traders not as competitors with the cooperatives, but as supplementary actors in the procurement of the crop. Restrictions were placed on the locations where the private traders could operate and on the quantities that they could purchase. They were required to pay official prices and to submit weekly sales returns to local authorities. The registration process was interpreted by some regional authorities as a fund-raising exercise, with significant licensing fees being charged. Initially, private traders were required to sell the crop to the TCNB. They argued that without the right to export (and retain FOREX), there was little incentive to participate. Only in April 1992, however, did the TCNB concede to the right of private firms (and cooperatives) to export cashew nuts on their own accounts.

As a result of the uncertainties and official barriers, very few private traders were registered through December 1991. By February, there were still only 31 registered traders, the majority of which were in Lindi (15) and Mtwara (10). In the Coast and Tanga regions, local authorities sought to protect the regional cooperative unions by greatly limiting the number of registered private traders. Only in the Lindi region did private traders play a major role in the procurement of the 1991/92 crop. The regional cooperative union, LIRECU, was declared insolvent prior to the season and was thus unable to obtain a bank overdraft to procure cashews. Only late in the season did the TCNB provide LIRECU with funds to buy the crop in poorly accessible areas where the private traders had not ventured. Thus, in Lindi, private traders accounted for 77 percent of the purchased crop. Nationwide, the share of private traders was only 17.5 percent during the first season of "liberalization."

With predetermined official prices and fixed margins, and with official efforts to segregate the buying operations of cooperatives and private traders, no real competition emerged during this first season. The only major distinction occurred with regard to grading. In contrast with the cooperatives, grading was taken seriously by private traders. As a result, nearly 30 percent of the nuts purchased in Lindi were downgraded to undergrade (UG). In contrast, in the neighboring Mtwara region, the cooperative union purchased nearly 10,000 tons of nuts, only two tons of which were classified as UG.

Several private firms did try to export in the 1991/92 crop, but the results were generally disastrous. Having procured much of their crop relatively late in the season, the firms had acquired stocks of mixed quality. Being granted the right to export only in April, the private exporters were in a position to sell their crop only after the Indian domestic season had begun. As a result of these two factors, Indian buyers offered relatively low prices, which several exporters rejected. These firms subsequently had to unload their stocks at even lower prices during the subsequent season. A few cooperative unions also sought to directly export their crop. They too ran into severe difficulties related to product quality and experienced several cancellations in sales contracts. Shipments that were made by the cooperative unions were subjected to major quality-related claims, reducing actual sales values to less than US$400 per ton, compared with invoice prices of more than US$600 per ton.

Despite all this confusion, marketed production did increase by 38 percent over the previous season, reaching 41,238 tons. Favorable weather, an increase in sulfur dusting in some locations (especially in

Tinduru, where a major government- and cooperative-directed campaign took place), increased real producer prices, and prompt payments to farmers all contributed to a larger proportion of cashew owners actually harvesting their crop and probably to a higher level of output. Although exporting most nuts in raw form, the TCNB did put into operation two of its factories, processing 9,000 tons of nuts. Once again, however, this resulted in negative value added as raw nut prices were favorable and Tanzania's kernel exports received price discounts. Although providing employment opportunities, the TCNB's processing operations were loss-making as a result of high unit costs and relatively poor technical results. The TCNB's use of mechanical processing, together with the organization's apparently poor technical efficiency in utilizing this equipment and weaknesses in the raw material grading system, resulted in a situation in which the kernel-based revenue per ton of raw nuts processed in Tanzania was nearly 26 percent lower than that obtained in India. This huge difference, stemming from Tanzania's lower yield of kernel material and much lower proportion of realized whole kernels, was a major reason why India could pay higher prices for raw nuts and why the TCNB frequently achieved low or negative value added through processing.

The beginning of the 1992–93 season was also characterized by uncertainty and confusion. The experience of the prior season, together with pessimistic predictions about the Indian market for raw nuts, led some former or would-be private traders to delay their registration or buying operations. The uncertainty was compounded by mixed signals from the TCNB concerning whether it would buy nuts from private traders. If not, then private firms would need to depend entirely upon their own export channels. Although the Lindi branch of the TCNB did announce that it would buy from private traders, this branch did not have funds at the beginning of the season and thus issued IOUs to traders. The Mtwara branch of the TCNB waited until December to announce its intention to buy from private traders, with this delay designed to protect the procurement interests of the regional cooperative union.

Uncertainty and confusion spread to the financing of crop procurement and to the prices that producers would be paid. Under pressure to recover past loans and to weed out nonpaying clients, the commercial banks (particularly the parastatal National Bank of Commerce) denied overdraft facilities to several of the cooperative unions and made loans to others contingent on agreements regarding guideline producer prices and inter-store TCNB buying prices. Negotiations on these matters were protracted, and issues were resolved out until December, three months into the buying season. Although a few of the cooperative unions did obtain overdraft facilities, others in the most important production areas needed to obtain their financing through the TCNB, which finally obtained overdraft facilities in December and January.

Three main marketing channels emerged during the 1992–93 season. One was organized by private exporters who had hired private traders or primary societies located in major production areas to serve as their buying agents. The second channel featured cooperative unions procuring nuts from primary societies and then trading on their own account. The third channel involved private traders and cooperative selling to the TCNB, which in turn exported the raw nuts. During the 1992–93 season, the overall performance of the industry was mixed. Total marketed production declined to about 35,000 tons, the decline being attributed to an unseasonable cold spell that damaged flowers and reduced fruit setting. Still, on the agronomic side, there was evidence of increased efforts to combat powdery mildew fungus and rehabilitate cashew trees. One of the major objectives beyond market liberalization was to improve the reliability of the crop procurement system and to raise farmer incomes. To some extent, progress had been made. In contrast with past seasons, when crop buying was not completed until April or later, in this season virtually the entire crop was purchased by the end of February and, in some areas, by the end of January. This occurred despite the delays in bank overdraft approvals. Also in contrast with past experience, farmers were paid on a timely basis, especially when private traders paid cash either directly to farmers or to the primary societies. The activities of private traders undoubtedly put pressure on the cooperative unions and primary societies to improve their services to farmers.

In 1993, the Cashewnut Board of Tanzania (CBT) replaced TCNB. The CBT was given limited, and mostly regulatory, authority compared to the TCNB, in accordance with liberalization reforms that were taking place throughout the agricultural sector. Among its wide mandate across the sector, the CBT retained influence in three key areas:

- The inputs market, through issuing inputs import licenses
- Marketing, through the setting of the indicative price and issuing buyers licenses
- The export market, through issuing export licenses.

The Re-Emergence of Government Controls and the Increase in Taxes

After a shaky start, liberalization began to take hold and production increased steadily through the balance of the 1990s, rising from about 17,000 tons in 1990/91 to more than 121,000 tons in the 2000/01 season. The producer's share of the export price averaged 72 percent from 1991 to 1999, compared to 38 percent during the 1980s (Baregu and Hoogeveen 2009). However, taxes and fees increased to erode the prices paid to farmers and the Local Government Act of 1999 led to even higher taxes and fees because it allowed local authorities to collect revenues. The CBT announced indicative prices that had little effect as long as export prices remained relatively stable, but became disruptive when export prices fell sharply. The CBT further disrupted cashew marketing by issuing a marketing regulation in September 2000 that delayed the start of the buying season by three months. These various interventions eroded the effects of marketing liberalization and the large devaluations taken in the late 1980s and led to a sharp decline in production. The producer's share of export prices for raw cashew nuts averaged 10 percentage points lower during 2000–05 compared to the 1990s, after marketing liberalization.

The 2000–01 marketing season was a disaster, and the producer's share of export prices fell to 38 percent. This was due to a sharp decline in raw cashew nut export prices and delays in marketing the crop, which led to crop quality deteriorations. This contributed to the more than 50 percent decline in marketed production in the 2002–03 crop to 55,000 tons. Small and poorly organized farmers were in a weak position to defend their gains from marketing liberalization, and the private traders lacked the political power to counter the changes. Eventually, these problems led to yet another policy reform, with the introduction of a warehouse receipts system in 2007. But, before turning to that, we examine the factors that stalled the reforms in the late 1990s.

Taxes and fees on cashew sales had become an important source of revenue for the CBT and local communities, and these taxes and fees were often imposed on an ad hoc basis, to the detriment of cashew producers and the industry. Such taxes and fees were charged on the gross sale value of raw cashew nuts rather than on profits, as is the more common approach in developed countries. When cashew prices were low and profits small, these taxes and fees often left the farmer with less than the cost of production when the crop was sold. In the years following the marketing liberalization, taxes and fees ranged from 18 percent to 19 percent of the CBT indicative price of raw cashew nuts. These were composed of export levies of about 8 percent and licenses and permits that comprised another 10 percent of the CBT's indicative prices. However, the Local Government Act of 1999 led to even higher taxes and fees, because it allowed local authorities to collect revenues (Baregu and Hoogeveen 2009), and local taxes and fees rose to 39 percent of the CBT indicative cashew nut price in 2000. Total taxes and fees reached an estimated 64 percent of the indicative price in 2000, before being scaled back to an average of 37 percent of the indicative price from 2001 to 2003. Local taxes and fees were capped at 5.0 percent in 2004, and total taxes and fees fell back to 15.7 percent, but have since increased to nearly 40.0 percent (table 7.1).

In addition to higher taxes and fees, the CBT began to reassert its influence in 2000 by issuing a marketing regulation that led to delays in marketing and sharply lower prices for farmers (Mitchell 2004). In early September 2000, the CBT unexpectedly announced a regulation that exporters of raw cashew nuts must ship in sisal bags instead of traditional jute bags. Sisal was produced locally, and the announcement was apparently part of an effort to promote the local industry over imported jute bags. Exporters protested the decision because they had already purchased jute bags and because sisal bags were more expensive and not available in sufficient quantities to handle export volumes. Exporters refused to accept the regulation during October and November, which prompted the CBT to take the case to the High Court of Mtwara.

The Court ruled in support of the CBT in late November, but this decision was quickly overturned by the newly appointed Minister of Agriculture. That cleared the way for exporters to use jute bags, but the market season had already been delayed by almost three months. In addition to the sisal regulation, the CBT had announced an indicative price of 540 T Sh per kilogram for standard grade cashew nuts in September and advised farmers and primary societies not to sell for less. The indicative price was set the same as in the previous year, even though the world market price of cashew kernels had declined by 26 percent, from US$2.72 per pound in August 1999 to US$2.00 per pound in August 2000. and the indicative price was unrealistically high. Exporters protested and refused to buy at the indicative price of 540 T Sh per kilogram.

In December, the CBT revised its indicative price to 435 T Sh per kilogram; but the world market cashew kernel price had declined to US$1.75 per pound by December and the indicative price was still well above the

Table 7.1 Taxes and Fees as a Share of Raw Cashew Nut Farm Gate Prices, 1996–2008

	1996	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
Free on board (f.o.b.) price (US$/kg)	0.84	0.81	0.65	1.03	0.82	0.57	0.62	0.60	0.83	0.90	0.86	1.22	1.15
Farm gate price (US$/kg)	0.50	0.53	0.68	0.75	0.31	0.33	0.37	0.43	0.72	0.52	0.47	0.52	0.50
Levies and fees as % of farm gate price													
Export levy	3.3	3.1	1.9	4.1	7.9	5.2	5.0	4.2	3.4	17.4	18.3	23.6	22.8
Cashew board fees	5.0	4.6	2.9	4.1	7.9	5.2	5.0	4.2	3.4	0.0	0.0	0.0	0.0
Stamp duty	2.0	1.8	1.2	1.6	3.1	2.1	2.0	1.7	1.4	0.0	0.0	0.0	0.0
Withholding tax	3.3	3.1	1.9	2.7	5.2	3.5	3.4	2.8	2.3	0.0	0.0	0.0	0.0
Local levies as share of farm gate (%)	5.0	5.8	10.4	14.2	39.4	21.1	23.5	22.3	5.0	5.0	5.0	4.5	5.0
Licensing as share of farm gate (%)	0.2	0.2	0.2	0.1	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
Fees & taxes as % of farm gate	19.0	18.7	18.4	26.9	63.8	37.3	39.1	35.2	15.7	22.6	23.4	35.3	38.4

Source: CBT TRA 2010.

300–360 T Sh offered by exporters. Farmers were slow to sell their cashew nuts, and many exporters withdrew from the market. The quality of cashew nuts declined due to poor storage, and many farmers finally sold their cashews for as little as 175 T Sh per kilogram—one-third of what they had expected. The two regulations issued by the CBT were largely responsible for the marketing disruptions in the 2000/01 season and the low prices caused by marketing delays amid falling global prices that caused farmers to receive less than they expected.

Further problems with marketing regulations occurred in the 2005–06 season, when the Cashew Board announced an indicative price of 600 T Sh, and traders refused to buy at that price (Baregu and Hoogeveen 2009). As with the 2000–01 marketing season, the price of cashew kernels in the world market were falling (from US$2.10 per pound in September to US$1.80 per pound in December 2005) and buyers were reluctant to purchase cashews at the indicative price. The government ordered traders to buy at the indicative price and revoked the buying license of seven firms that did not comply with this order. This led to delays in marketing, lower prices for farmers, and a 14 percent decline in production in the following season.

The warehouse receipts system was introduced in 2007, and it effectively ended the cashew market reform program introduced in 1991. The system was introduced to counter concerns about the lack of liquidity in cashew marketing and anticompetitive behavior by private sector buyers. Although there may have been merit to these concerns, the advantages of liberalized marketing far outweighed the disadvantages, according to Mwase (1998). Under the warehouse receipts system, the private sector was no longer allowed to purchase raw cashews directly from farmers or their primary societies. Farmers were required to deliver their cashews to primary societies, which were to obtain credit from their cooperative unions. This raises serious concerns because this marketing channel was used in the mid-1980s, and it led to marketing inefficiencies, graft, and large bank arrears by the cooperative unions and eventually to shortages of funds to procure the crop from farmers (Jaffee 1994). The grading system was largely abandoned and large quantities of raw cashew nuts "leaked out" of the system. The share of export prices received by farmers was 10 percentage points lower than when marketing was liberalized (Mwase 1998). The problems were blamed on weak managerial capabilities and accounting systems of the cooperative unions and, unless efforts are made to improve these capabilities and systems, it seems unlikely that a return to that marketing system will be beneficial.

The Warehouse Receipts System

Warehouse receipts are negotiable financial instruments issued by a warehouse operator and backed by the underlying commodity being warehoused. They are an integral part of the marketing and financial systems in industrial countries (Lacroix and Varangis 1996) and are advocated as a means to improve agriculture marketing in Africa by certifying weights and measures, easing access to finance along the marketing chain, moderating seasonal price variability, and promoting instruments to mitigate price risks (Coulter and Onumah 2002). Warehouse receipts were introduced in Tanzania under the Warehouse Receipts Act of 2005. The Act supports the participation of smallholder producers in agricultural commodities trade, allowing them better access to bank credit. It provides a regulatory framework for the operation of the warehouse receipt system, licensing procedures, and other related matters. The regulator is the Tanzania Warehouse Licensing Board (TWLB) under the Ministry of Trade and Marketing. Warehouse receipts were introduced in cashews in 2007, following pilot programs in cotton and coffee in 2006. The system was initially rolled out only in Mtwara; subsequently, in 2009, it was made mandatory across the cashew sector in Tanzania.

Warehouse receipts systems can and typically do exist within a liberalized marketing system; however, in the Tanzania cashew sector, the process involved three changes to the liberalized marketing system.

- First, the private sector was no longer allowed to purchase raw cashew nuts from farmers or primary societies, and the single marketing channel was reintroduced whereby farmers sold to their primary societies, which obtained credit through their cooperative unions. The cooperative unions operate as brokers and do not take ownership of the cashews, but rather provide access to loans provided by commercial banks and consign the cashews for sale.
- Second, cashews were used as collateral for loans provided by the specified commercial banks to cooperative unions. However, these loans were further secured by government guarantee.
- Third, all cashews were required to be sold at blind auction.

An additional channel of direct marketing from farmers to the auction was also allowed and has resulted in one group of large farmers bypassing their primary societies and cooperative unions and consigning their cashews directly to the auction. However, small farmers have not yet been able to use this marketing channel.

Under the new marketing policy, farmers are required to give estimates of their expected harvest to their primary society. The estimates are then used by the primary society to apply for a bank loan to market cashews. An indicative price, set by the CBT and agreed to by farmers, sets the total value of the loans. The government of Tanzania issues guarantees to banks that lend to primary societies. The guarantees are handled through the cooperative unions, which authorize access to loans through government guarantees. The unions also determine the capacity of the primary society to borrow, thus setting loan limits. A regional task force prepares all the marketing arrangements for primary societies within the region.

During harvest, primary societies and farmer associations consign cashews to designated warehouses. At the warehouses, blind auctions take place; for the primary societies, this process is managed by the cooperative unions, whereas other farmer associations manage this process themselves. The auction is not what the name suggests, since buyers submit the equivalent of closed tenders naming price and amount. The review and selection of these tenders is done in secret, and the winning tender is not publicly announced until the end of the season.

Although the system has only operated since 2007, problems are already apparent, and it does not appear to be an improvement over the previous system. Between 2007–08 and 2008–09, marketing costs from the primary societies increased 20 percent (almost double the rate of inflation). The share of the export price received by farmers in 2007–08 and 2008–09 averaged 46 percent, which is less than the average under the liberalized marketing system. The banks selected to loan to cooperative unions to finance cashew purchases have charged approximately 18 percent annualized rates, despite cashews that collateralize these loans and government guarantees for 75 percent of the value of the loans. These high interest charges are ultimately borne by the farmers, who receive lower prices because of increased costs on interest charged to their primary societies. The auction system is not transparent, and there are reports of buyers being allowed to change their offer price during the auction, which is supposed to be conducted by sealed bid.

The new system has also not allowed farmers to participate in the increase in global prices of raw cashew nuts that occurred in 2007 and 2008, when export prices rose by 46 percent and 40 percent, respectively, while farm gate prices rose 12–13 percent.

Conclusions

Cashew marketing reforms introduced in 1991 allowed the private sector to buy raw cashew nuts directly from farmers and their primary societies in competition with cooperative unions. Prior to that time, cashew farmers were required to sell to their primary societies for onward sale to cooperative unions, which then delivered the cashews for export to the government parastatal. The reforms got off to a shaky start due to the lack of a clear policy from the Ministry of Agriculture, weak support from local government, and resistance from cooperative unions trying to protect their vested interests.

Nevertheless, by the end of the decade, the private sector largely replaced the primary societies and cooperative unions as cashew buyers. The share of export prices received by farmers increased, and the price of Tanzanian exports rose relative to the world market as quality improved. In addition, farmers were paid in cash instead of after substantial delays, as was common when primary societies and cooperative unions were the sole buyers. Production rose from just 17,000 tons in 1989–90 to 120,000 tons in 2000–01. However, high local taxes, disruptions to marketing by the Cashew Nut Board, and volatility in international cashew prices led to policy reform in 2007 that reversed the liberalized marketing introduced in 1991. The new policy prevents the private sector from buying directly from farmers or their primary societies, and returns marketing exclusively to primary societies, which then transfer the cashews to cooperative unions for sale at auction.

The policy to liberalize marketing introduced in 1991 was poorly planned and executed and appears to have been more a response by the government to collapsing production rather than a desire to expand competition and the role of the private sector in marketing. The Ministry of Agriculture did not actively support or defend the reforms and allowed local authorities in cashew-producing regions to dictate the policies and exploit the reform by charging high fees for licenses from the private sector. In an effort to protect their vested interests, cooperative unions caused delays in registering private traders and placed restrictions on where traders could operate and the quantities they could purchase. The government initially retained predetermined official prices and fixed margins that prevented significant competition. Despite the confusion and restrictions, the private sector managed to purchase almost one-fifth of the cashew crop in the first year. In the second year of reform, confusion remained and private traders were uncertain whether they would be allowed to sell to the CBT or whether they were completely dependent on the export market. However, the activities of the private traders undoubtedly put pressure on the primary societies and cooperative unions, and the entire crop was purchased two months earlier than in the first year of liberalization. The lessons of the first two years were that reforms should be well planned and clearly articulated and that the government should monitor compliance with operating policies and procedures. This could have prevented the confusion and the wide range of outcome that occurred because local officials and vested interests either tried to exploit the private sector or tried to limit the private sector's participation in marketing. A weak start to the reforms reduced the confidence of both private sector buyers and producers that the government was committed to the reforms and that the private sector would be treated fairly.

Following a shaky start, cashew production increased rapidly during the 1990s. Two challenges emerged in the late 1990s that undermined the marketing reforms or weakened producer incentives, and the failure of the government to deal with these problems quickly and appropriately seems to largely explain why production stagnated after 2000. The first was the large increase in local taxes and levies on cashew sales, which reduced producer incentives. These taxes and levies rose from 5.8 percent of f.o.b. export prices in 1996 to 39 percent in 2000. These were eventually capped at 5 percent of export prices in 2004, but only after they had averaged 22 percent from 1996 to 2003. In addition to local taxes and levies, export levies were 8 percent of export prices during this period, and total taxes, levies, and fees rose to as much as 60 percent of the producer price of cashews by 2000.

The second challenge was adjusting to the decline of international prices in 2000 and the reluctance of the CBT to adjust its indicative price to reflect changing international market conditions. The CBT issued an indicative price in September 2000 that was unchanged from the level of the previous year, despite a sharp decline in international prices. The private sector was unable to buy at the indicative price, and the CBT advised farmers and primary societies not to sell for less than the indicative prices. This led to delays in marketing and lower crop quality due to poor storage conditions. International prices continued to decline, and farmers eventually sold their crop for less than half of the indicative price. The CBT should not have set an indicative price that was inconsistent with the international market, and it should probably have never set an indicative price at all. Instead, it should have provided market information and allowed farmers and primary societies to make their own marketing decisions. A similar situation developed in 2006, when the CBT set an indicative price that was too high relative to the international price. As in 2000, the international price was falling and the private sector was ordered to buy at the indicative price. Seven private firms that refused to buy had their buying licenses revoked. This led to delays in marketing, lower prices for farmers, and a 14 percent decline in production in the following season.

A third problem that undermined the marketing reform was the unwarranted marketing regulation issued by the CBT in September 2000 that delayed marketing and eventually contributed to the collapse of producer prices in that year. In early September 2000, the CBT unexpectedly announced a regulation that exporters of raw cashew nuts must ship in sisal bags instead of the traditionally used jute bags. Sisal was produced locally, and the announcement was apparently part of an effort to promote the local industry. Exporters protested the decision because they had already purchased jute bags, and because sisal bags were more expensive and not available in sufficient quantities to handle export volumes. Exporters refused to accept the regulation during October and November, which prompted the CBT to take the case to the High Court of Mtwara. The Court ruled in support of the CBT in late November, but this decision was quickly overturned by the newly appointed Minister of Agriculture. That cleared the way for exporters to use jute bags, but the marketing season had already been delayed by almost three months. During that period, international prices had declined and farmers eventually sold for much lower prices.

The lessons for future reforms are that the government must have the capacity and commitment to fully support and defend reforms from vested interests that seek to undermine them and from new threats and market changes that emerge. It should monitor reforms to identify problems quickly and make adjustments to keep the reforms on track, especially when the industry is composed of small producers who are not well organized and are poorly prepared to defend the benefits of the reform. The re-emergence of the CBT as a disruptive force undermining private sector marketing illustrates the lack of institutional commitment or capacity to support the reforms. This failure of the government to support the reforms weakened support for private sector marketing and led to another reform, the warehouse receipts system introduced in 2007. The new system brings new problems but no evidence of an improvement in the prices received by the 360,000 small cashew producers in Tanzania. If history is a guide, the new system will reintroduce problems such as inefficiencies in marketing, lower quality and lower prices relative to the world market, delays in paying farmers, and large arrears on bank loans to cooperative unions, which have historically had weak managerial capabilities and accounting systems.

Sustainable reforms that will revive the Tanzanian cashew sector will require three things. First, the government must commit to the reforms and issue clear policies and operating procedures that it will then enforce and defend against vested interests. Second, the role of the CBT must be limited to exclude direct marketing or the issuing of regulations that disrupt marketing. Third, total taxes and fees on cashew sales must be capped at a level that does not destroy producer incentives. This will require assisting local governments to obtain alternative revenue sources, rather than allowing them to impose high taxes on cashew sales, and providing other methods to encourage local processing instead of high export taxes. Additional government support to the industry could include a replanting program to help farmers with the cost of replanting those trees that are no longer productive.

Notes

1. *Ujamaa* was the Tanzanian government policy began in 1967 that moved rural populations into villages in order to provide government services and labor for collective farms. The policy is often referred to as "villagization."
2. Cooperatives have a long history in Tanzania, with the first cooperative founded in 1925, and the first Cooperative Societies Act enacted in 1932. Farmers were organized into local cooperatives in agriculture and other sectors, and these cooperatives (called primary societies) provided a single service, such as marketing, or a range of services, such as marketing, input supply, or transport. Cooperative unions are unions in which all members are primary society cooperatives, and they provide similar services to primary societies as those unions provide to farmers. Government historically provided support and controls to primary societies and cooperative unions, but that changed in 1991 with the passage of the Cooperative Societies Act. That Act provided autonomy status to cooperatives and was further strengthened by additional legislation in 1997 (Sizya 2001).
3. This section draws heavily from Jaffee (1994).

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CHAPTER 8

Kenya Smallholder Coffee and Tea: Divergent Trends Following Liberalization

Donald Mitchell

Coffee and tea are important export crops in Kenya, with a large number of smallholder producers as well as large estate sectors. These crops were targeted for liberalization and restructuring in 1992. Tea was liberalized as part of an agreement between the government of Kenya and the World Bank, under the Public Enterprise Reform Program to liberalize strategic parastatals (World Bank 1998) and coffee as part of the overall economic liberalizations undertaken at that time. The reform process was slow to begin, but eventually led to a new tea act that liberalized the tea sector in 2000 (GOK 2000) and a new coffee act that partially liberalized the coffee sector in 2001 (GOK 2002).

Divergent production trends were already emerging before liberalization began, and these continued following initial reforms in the 1990s and further reforms in 2000 and 2001. Smallholder coffee production peaked in 1988/89 and trended lower during the 1990s, whereas smallholder tea

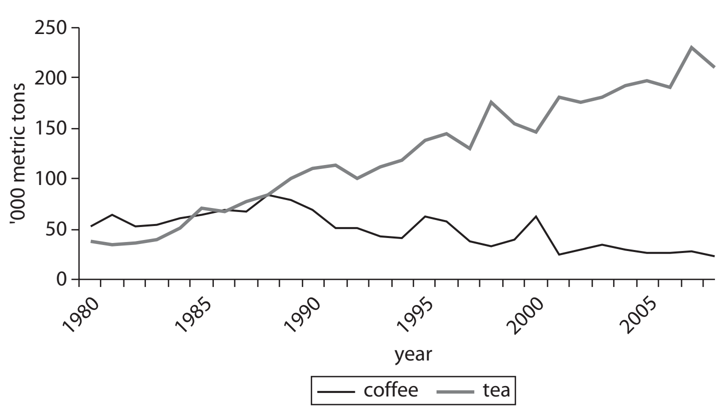
The views expressed in this chapter are those of the author and should not be attributed to the World Bank or its executive directors.

production continued to increase (figure 8.1). Part of the divergence was due to international prices that favored tea with less volatility and smaller price declines than coffee, but the divergent trends were also due to other factors including the policy changes begun in 1992 that were supportive for tea but disruptive for coffee. These policy changes and the sector's responses are the focus of this chapter, and the lessons that can be learned from these reforms can be applied to other agricultural commodities in Kenya and other developing countries.

Historical Perspective and Background

Kenya produces high-quality arabica coffee that competes well on the world market, and coffee was the leading export earner from independence until 1988, with over 40 percent of total exports in some years. After the 1988–89 peak in coffee production and the subsequent decline in global prices (due in part to the collapse of the International Coffee Agreement in 1989), the share of total coffee exports declined to about 14 percent during the 1990s and 5 percent during the 2000s. Kenya also produces high-quality black CTC[1] tea, and exports have steadily increased, accounting for an average of 24 percent of total Kenyan exports during the 1990s and 23 percent during the 2000s. Tea exports were surpassed by horticultural exports during the 2000s, but regained the top export position in 2009 by a slim margin, with total exports of US$4.25 billion.

Figure 8.1 Smallholder Production, 1980–2009



Sources: Kenya National Bureau of Statistics; Economic Survey, various issues.

Coffee production in Kenya began in 1893, when missionaries brought coffee to the area around Nairobi, and tea production began in 1903, when European settlers first began to experiment with growing tea in the Kiambu District. The climate proved favorable for both, and production reached commercial levels in the early twentieth century. By the 1920s, Kenyan teas were being sold at the London tea auction, and coffee was being exported to Europe. The industries were under private sector control until the colonial government enacted the Coffee Industry Ordinance in 1932 and established the Coffee Board in 1933, with the mandate to promote and regulate the industry. A coffee auction was established in 1934 to provide a means for selling the coffee, and the Coffee Marketing Board was established in 1946, with the sole responsibility for coffee marketing (GOK 2001). The Tea Ordinance was enacted in 1934, and the Tea Board of Kenya was established in 1950, with the mandate to regulate the tea industry to the best interests of the stakeholders. The Kenya Tea Development Agency (KTDA) was established in 1964, to promote the cultivation of tea among smallholders (GOK 1999), and continued to operate as a government parastatal until it was privatized in 2000.

Coffee producers were affiliated with the cooperative movement in Kenya that began shortly after independence in 1963, and coffee cooperatives processed and marketed smallholder coffee and supplied inputs to producers. All smallholder coffee producers were required to be members of coffee cooperatives in order to market their coffee, and, by the mid-1990s, almost 400,000 smallholder coffee producers were members of coffee cooperatives. Smallholder tea producers were not closely affiliated with the cooperative movement and instead were under the management of the KTDA. By the end of the 1990s, smallholder tea growers numbered about 300,000 and 45 factories were operated by the KTDA to process smallholder tea.

The Coffee Marketing Board and the Coffee Board were merged into the Coffee Board of Kenya (CBK) in 1971, with responsibility for coffee marketing activities as well as regulatory and promotional activities. Coffee Research was undertaken by the Ministry of Agriculture and funded from the national budget until 1964, when it became funded by a levy on coffee proceeds to growers. The Coffee Development Authority was created between 1968 and 1970 to improve coffee development, especially for smallholders; however, it was soon replaced by the Field Service Department of the CBK. The policy of the government between 1960 and 1970 encouraged formation of coffee cooperative societies for smallholder farmers and rapid expansion of smallholder production. The expansion led to a shortage of processing facilities and to the Smallholder Coffee Improvement Project (SCIP I), funded by the World Bank and government in 1979 to alleviate processing constraints, improve quality, and increase production. The Second Coffee Improvement Project (SCIP II) followed in 1989 and provided credit to finance a coffee payment system, input loans, coffee factory development, and capacity building. However, the decline in production from the 1988/89 peak and the decline in global coffee prices led to underutilization of coffee factories and high indebtedness by farmers and coffee cooperative societies. The debt became a substantial burden to the smallholders and still plagues the industry.

The Tea Board of Kenya regulates the industry, directs research, and promotes tea consumption and Kenyan teas, but it has no marketing or processing responsibilities or activities. It is composed of representatives from both the estate and smallholder sectors, and is maintained by a cess on sales. Tea research for Eastern Africa was initially carried out by the Tea Research Institute (TRI), headquartered at Kericho in Kenya, with substations in Tanzania and Uganda. The TRI was funded by contributions from the Tea Boards of Kenya and Uganda and the Tanzania Tea Authority. Since its inception in 1951, research was confined to the production of improved and selected clonal planting material; the nutrition, cultivation, and harvesting of the crop; and the influence of climate on tea. Limited facilities have prevented research into manufacturing processes. The TRI maintained a small extension service designed to bring up-to-date information, such as recommended fertilizer application rates, to the notice of tea extension workers in both estate and smallholder operations throughout Eastern Africa (World Bank 1974b).

The Tea Research Foundation of Kenya (TRFK) was established in 1980 to replace the Tea Research Institute of East Africa. Its main functions are to carry out research on the control of pests and diseases and the improvement of planting material, husbandry, yields, and quality (Tea Research Foundation of Kenya [TRFK] 2010).

Coffee and tea production in Kenya has been composed of both estate and smallholder[2] production since the 1950s, with smallholder production increasing relative to estates. By 1980, smallholders accounted for 70 percent of coffee area and 57 percent of coffee production, whereas tea smallholders accounted for 66 percent of area and 38 percent of production. Yields of smallholders were 58 percent of estate yields for coffee and 32 percent for tea, with the lower yields of smallholders due to lower input use and less intensive production practices. Coffee estate production peaked in the early 1980s and has gradually declined, due in large part to high labor costs and low global prices, whereas smallholder production peaked in 1988/89 (figure 8.2a). Tea estate production has continued to increase, but was surpassed by smallholder production in 1989/90 (figure 8.2b). At its peak in 2007–08, smallholders accounted for 62 percent of national production and 66 percent of area. Yields were 82 percent of estate yields, compared to 32 percent in 1980.

Figure 8.2a Coffee Production

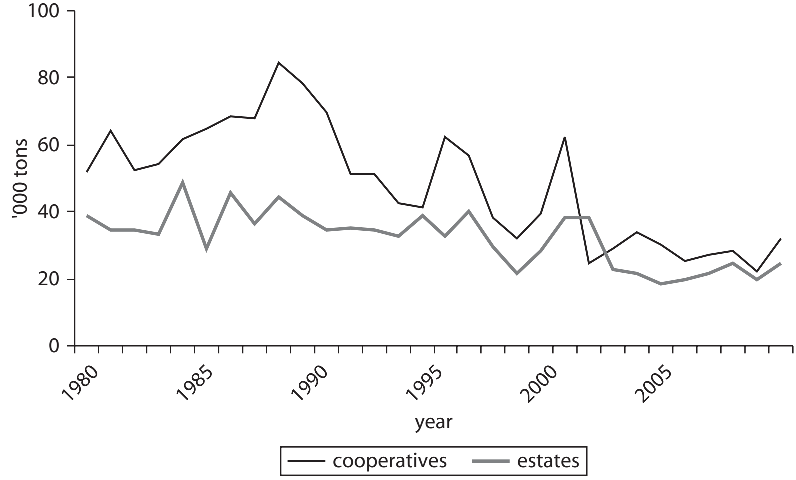


Figure 8.2b Tea Production

Sources: Kenya National Bureau of Statistics; Economic Surveys, various issues.

The smallholder tea industry in Kenya is composed of a large number of producers cultivating an average of 0.4 hectares of tea. Harvesting begins in the third year after planting of tea bushes and involves hand harvesting (plucking) the new growth (green leaf) and hauling it to the buying station established by the KTDA to receive and weigh the green leaf. The green leaf is then transported to a factory for processing the same day; ideally, the green leaf should be delivered to the factory for processing within four hours of plucking. Once the factory receives the green leaf, processing takes 48 hours and the finished product is called "made tea." It is then boxed and shipped to the auction for sale or delivered directly to a buyer. Ownership of the green leaf transfers from the smallholder to the KTDA, and then from the KTDA to the factory, which then processes the green leaf and markets the made tea. About 85 percent of smallholder tea is sold through the Mombasa tea auction, 10 percent is sold directly to foreign buyers, and about 5 percent is sold to local buyers for domestic consumption (EPZ 2005, 11).

Smallholder Coffee Processing and Marketing

Prior to the start of liberalization in 1992, the smallholder coffee marketing chain was controlled by cooperatives and the CBK and was closed to outside competition. Each smallholder coffee grower was required to deliver his ripe coffee berries (cherries) to his cooperative societies for initial "wet" processing. There were approximately 1,900 cooperative society factories located throughout the growing areas to undertake this initial stage of processing. The coffee cherries were first pulped to remove the fleshy outer part, and then the seeds were fermented, washed, soaked, and sun dried to produce coffee beans (parchment) that still had an outer husk.[3] The dry parchment was then delivered to one of three coffee mills owned and operated by the Kenya Planters' Cooperative Union (KPCU) to remove the husk, polish, grade, and bag the green coffee beans for transfer to the CBK for sale at the auction.

The CBK classified each lot of coffee, and licensed commission agents then brokered the sales of coffee at the auction. These brokers provided financial and technical services, such as tasting (liquoring) and advising producers on quality and checking the classification awarded by the CBK. Producers received the average "pooled" price for all coffee sold of each class during the year, and proceeds were paid after deducting fees for processing, milling, brokering, and selling at auction. The fees charged by cooperative societies and the cooperative union were fixed by the Ministry of Agriculture, but in fact varied greatly (World Bank 1989).

The share of auction prices received by Kenyan coffee farmers prior to 1992 were high by international standards, with parchment receiving an average of 84 percent of auction prices (World Bank 1989). Farmers may have actually received much less because their cooperative societies may have retained a large portion of the payments for coffee. Payments were made to producers at each stage of the marketing process, and credit for inputs was provided through the cooperative system from the Cooperative Bank of Kenya, which was established to serve the cooperative movement. Although the system generally worked well, inefficiencies in the cooperative societies and cooperative union led to high costs and final payments to producers that were often delayed for more than one year from the time the coffee cherry was delivered by the farmers. Estate producers were allowed to operate their own factories for initial processing and then send their coffee parchment to the mills for further processing. This gave the estates a cost advantage because cooperatives' costs were 2.5 times those of large estates (World Bank 2005).

As part of the overall liberalization of the economy, coffee reforms were agreed to by the government in 1992, with the intent of reducing government involvement in the sector. Several initial reforms were taken in 1992, including: (1) the conduct of coffee sales in U.S. dollars exchanged at market rates, (2) the licensing of private sector millers and brokers, and (3) the introduction of outside pool payments to producers (World Bank 2000). These reforms allowed growers to appoint their own miller and marketing agents, but smallholders were still required to deliver their coffee cherries to their cooperative societies, which continued to be responsible for issuing credit to smallholders, making advance and final payments for cherries and parchment, and providing management, inputs, and other services. All coffee producers were required to sell their coffee through the auction operated by the CBK.

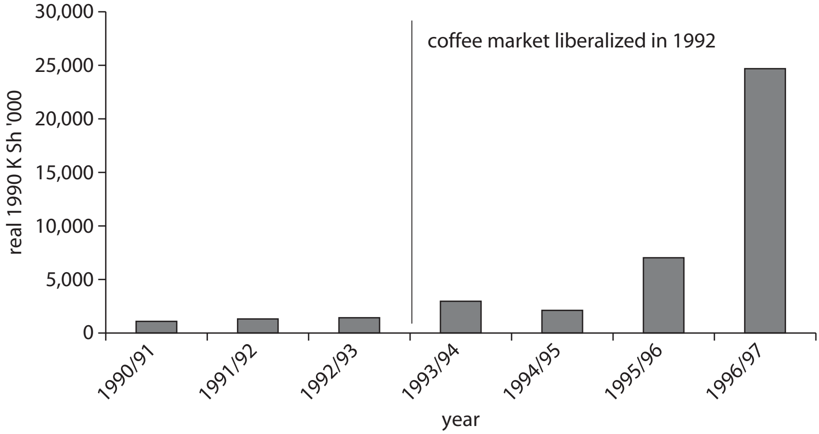
Although initial reforms were important, they failed to introduce competition to the cooperatives' control of smallholder marketing and processing. Three new mills were licensed and began operating in 1995 and 1996, and they quickly gained market share from the KPCU. (USDA 1997), which led to surplus milling capacity for the KPCU and financial problems. The loss of market share by the KPCU was indicative of poor service and high fees charged by it and the need for competition.

The new private millers and estates lobbied for direct sales to foreign buyers, rather than sales through the CBK-run auction. They argued that the CBK should not have the dual responsibility of regulating the industry and being the sole marketing agent. The CBK marketing charges of 7 percent of gross sales were also considered excessive, netting the CBK about 1.2 billion Kenya shillings (K Sh; US$20.0 million) per year (USDA 1997). The government was reluctant to permit this change to the system, and the Ministry of Agriculture stalled by maintaining that the industry was already fully liberalized (USDA 1997). A Task Force established by the Ministry of Agriculture in 1995 to examine liberalization of the coffee sector, and a subsequent study in 1999 by Price Waterhouse, failed to address these marketing issues.

Although not planned as part of coffee policy reforms, the Cooperative Societies Act of 1997 (GOK 1997) removed all government involvement in the economic activities of cooperative societies; members then fully owned and were empowered to manage their cooperatives. Since all smallholder coffee farmers were required to market their coffee through their cooperative societies, the change was critical for smallholder coffee producers. The coffee cooperatives were poorly equipped to manage their new responsibilities, payments made to coffee growers plummeted, and the coffee smallholder industry found itself mired in increasing levels of corruption, political opportunism, and gross mismanagement (Mude 2005). These reforms added to an already serious problem of mismanagement and cost increases that had emerged in some cooperatives after the initial steps toward liberalization in 1992. For example, a survey of 12 factories in the main coffee-growing area near Mount Kenya showed that real operating costs increased by an average of 68 percent per year from 1990–91 to 1996–97 (figure 8.3) (Nyangito 2001). This was attributed primarily to mismanagement and the deducting of expenses unrelated to coffee by the cooperative societies that operated the factories.

A follow-up study of operating costs of five cooperative societies in the Murang'a district for the 2000/01 crop year found that 51 percent of coffee payments received by the cooperatives were retained to pay for overhead and debt, and only 49 percent was paid to farmers (Karanja and Nyoro 2002). These deductions were in addition to charges for factory operations to process and market their smallholders' cherries. Such large deductions encouraged farmers to bypass their cooperative societies and sell directly to traders. Although illegal, this was common practice among coffee farmers because they could avoid repayment of their input loans

Figure 8.3 Coffee Factory Operating Costs (Real), Murang'a District



Source: World Bank.

to the cooperative society, and they were paid cash by the trader. However, such side-selling further weakened the ability of the cooperative society to provide input loans and service its debt.

A new Coffee Act was approved in 2001 (GOK 2002), and it removed the marketing role from the CBK and appointed the KPCU and two private companies as marketing agents on an interim basis. The Act became operational in March 2002, and the CBK ceased marketing coffee and became responsible only for regulating and promoting the industry (Gitau et al. 2009). However, the Act did not remove the obligation of smallholders to market through their cooperative societies. A Coffee Development Fund was created by the Act, to be funded by a levy on gross sales of clean coffee for the purpose of supporting coffee farmers. Amendments to the Coffee Act of 2001 were made in the Finance Act of 2005 and included authorizing the sale of coffee directly to foreign buyers in what was called a "second window" to the auction. This led to the registration of 43 agents to market coffee without selling through the auction.

The impact of changes in policies and other factors after 1992 devastated smallholder coffee production and has caused smallholders to abandon coffee cultivation.[4] Average yields fell 40 percent in the 10 years after 1992, compared to the 10 years prior to 1992, and yields continued to fall during the 2000s, with 60 percent lower yields than during the 1980s. This was caused by a combination of factors in addition to policy changes;

however, policy changes were likely a major contributor to the decline. Other factors contributing to the decline in smallholder yields included a collapse in world coffee market prices, which reduced input use; the appreciation of the real exchange rate; and coffee disease. Estate yields fell by 24 percent during the 10 years after 1992, compared to the 10 years before, and these declines were due primarily to the collapse in global coffee prices, which led to reduced input use and consequently lower yields.[5] Estates were especially hard hit by the appreciation of the real exchange rate, which increased their wage costs relative to export receipts. The booming tea sector also provided stiff competition to coffee, and land shifted from coffee to tea.

Smallholder Tea Processing and Marketing

Smallholder tea production has been a success in Kenya. It began in the 1950s, when smallholders began to grow tea to sell to private factories. The Special Crops Development Authority (SCDA) was established in 1960 to expand smallholder tea production and, in 1964, the KTDA was formed as a government parastatal to replace the SCDA and manage the more than 20,000 smallholders already growing tea. The KTDA took over the assets, liabilities, staff, and facilities of the SCDA, and the KTDA was well run from the outset. It was established to provide the integrated services required by smallholders to enable them to participate in tea growing, including credit, extension, leaf collection, and the manufacture of green leaf. The KTDA was authorized to recover its operating costs by a cess levied on green leaf purchases. Under the KTDA's First Tea Plan, financed by the Commonwealth Development Corporation (CDC) and the Federal Republic of Germany, 4,200 hectares were planted by the end of the 1963–64 season. The World Bank provided an International Development Association (IDA) credit in 1964 for the Second Tea Plan, which by 1967–68 had added a further 6,600 hectares of smallholder tea. The Third Tea Plan, also funded by the World Bank and CDC in 1968, added an additional 13,700 hectares, and, by the end of 1972, a total of 26,000 hectares of smallholder tea had been planted by 67,000 growers.

By 1972, smallholders accounted for about one-quarter of Kenyan tea production, and the quality of smallholder tea was reported to be comparable to estate teas. During the period of rapid expansion of smallholder tea, the average price of all Kenyan teas at the London tea auction increased from a discount of 14 percent to a premium of 6 percent (World Bank 1974a). The KTDA was free to market its smallholder tea through any channel and used four: the London tea auction, which accounted for 37 percent of sales; the Mombasa tea auction, which accounted for 17 percent of sales; local pool sales for East African consumption, which accounted for 15 percent of sales; and private contracts, which accounted for 31 percent of sales. The best teas were shipped to the London market, where quality was recognized and premiums paid for top quality. The Mombasa auction mainly sold medium-quality teas for the Middle East and Gulf countries, and private contacts were used when advantageous. The local pool was a form of cooperative selling by the major East African producers that supplied 90 percent of the East African market (World Bank 1974a).

In 1974, a Fourth Tea Plan added an additional 4,700 hectares and 12,400 smallholders, and the World Bank and CDC funded a Tea Factory Project to develop factories to process smallholder tea (World Bank 1974b). The KTDA was able to manage the expansion while continuing to improve its operations and replace expatriate with local staff. By 1968, all staff were local hires, except for the Chief Accountant, who was seconded from the CDC. In 1969, the KTDA computerized its growers' accounts, which enabled it to pay farmers monthly instead of quarterly for their green leaf, and payments were increasingly made by check, rather than cash, which reduced the security risk and stimulated the development of local bank branches.

The KTDA Ltd. was incorporated as a private company on July 1, 2000, to take over the role and functions of the former Kenya Tea Development Authority. At the time of privatization, the KTDA managed 45 factories and 300,000 smallholders from headquarters located in Nairobi. It provided managerial, production, transportation, and marketing services that included management of tea factories, green leaf transportation, procurement of inputs, marketing, and payment of proceeds to smallholder producers. The government provided guarantees on external loans borrowed by the KTDA for smallholder tea development and granted exemption from taxes in order to allow surpluses to be used to improve the smallholder tea sector. In addition, the government paid salaries and allowances of the tea extension staff (GOK 1999). The KTDA payments to smallholders averaged 69 percent of gross made tea sales in the late 1990s, with 23 percent of total sales going for factory operation and services, 4 percent going for selling and distribution, 2 percent going for agricultural services, and 2 percent for government taxes (Nyangito 2000).

The liberalization of the tea industry agreed to in 1992 removed the KTDA's monopoly on buying and processing smallholder's green leaf tea. This made it possible for farmers to legally sell directly to private factories or traders. Although the payments for green leaf from these alternative buyers were generally lower than those from the KTDA, the payments were in cash and were attractive to some farmers. However, this alternative marketing channel also encouraged farmers to avoid repaying their input loans and encouraged theft of green leaf from neighbor's fields (Nyangito 2000).

Following privatization in 2000, the KTDA continued to expand and had 550,000 smallholders and 63 factories by late 2010.[6] It paid growers twice per month and returned 76 percent of revenues to farmers, according to company officials. Recent innovations, such as the shift to electronic scales (now used by 40 factories) for green leaf purchases, have reduced the potential for weighing errors and mismanagement by providing tamper-resistant scales that print a receipt for farmers and a record for the KTDA. Sales are primarily through the Mombasa tea auction, following the closing of the London tea auction in 1998, with approximately 85 percent of tea selling at the Mombasa auction, with 10 percent sold directly to foreign buyers and 5 percent sold to local processors for domestic consumption.

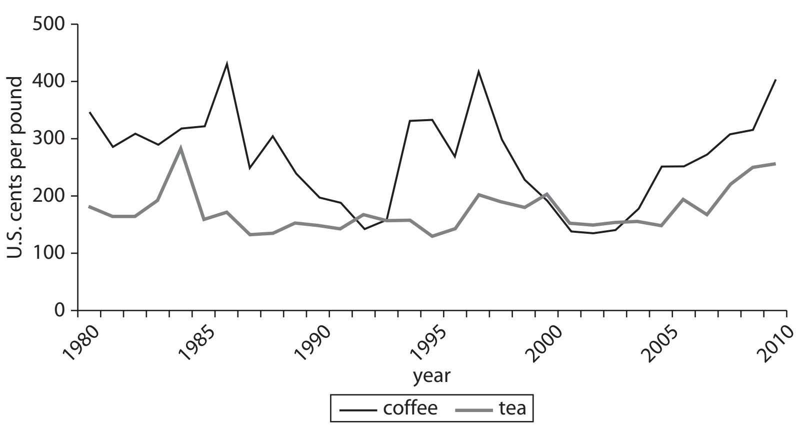
The remarkable growth of the tea industry in Kenya has been attributed to the supportive role of the TBK and the management of smallholder production, processing, and marketing by the KTDA (Nyangito 2000). The TBK was responsible for regulating the industry, research, and promotion, but it did not process or market tea. Equally important, the cooperatives sector was not involved in tea processing or marketing. This allowed the tea industry to develop using professional management without the inefficiencies of cooperatives or the mismanagement and corruption that often occurred with coffee cooperatives. A further advantage of the tea industry was that the KTDA was well run and took control of the entire processing and marketing chain. That allowed the KTDA to benefit from economies of scale in providing services and inputs, which contained costs. Some critics maintain that the KTDA has corrupt practices, is not transparent in its dealings (CPDA 2008), and that more competition is needed in the provision of services and inputs to smallholders (Nyangito 2000). Although these charges and recommendations may have some merit, the overall performance of the KTDA has been exemplary and the smallholders have benefited.

The Economic Environment

Although smallholder tea has boomed, it did so during a period of a generally weak economic environment. In contrast, smallholder coffee has collapsed, and the weak economic environment contributed to this decline. The global prices of both coffee and tea were low during the early 1990s and early 2000s, with average global arabica coffee falling 17 percent from the 1980s to the 1990s (in U.S. nominal dollars) and tea prices falling 7 percent. Since 2000, global coffee and tea prices have improved in nominal U.S. dollar terms (figure 8.4), but these gains have been offset by continued appreciation of the Kenyan schilling, leaving real producer prices for both commodities near historic lows.

The Kenyan real exchange rate[7] depreciated by 50 percent from 1980 to 1993, which should have provided a more favorable environment for coffee and tea exports; however, this coincided with low global prices, which offset the favorable exchange rate movements. As global coffee and tea prices rose during the 2000s, the real exchange rate appreciated sharply, which offset price increases in the global market. Since 1993, the real exchange rate has appreciated sharply, with inflation averaging

Figure 8.4 Global Prices, 1980–2010



Source: World Bank 2010.
Note: Coffee prices are the International Coffee Organization's indicative price for other mild arabicas, and tea prices are Mombasa average auction prices for all teas.

10 percent per year while the nominal exchange rate versus the U.S. dollar increased less than 2 percent (figure 8.5).

This caused real producer prices to plummet (figure 8.6) and made exports less profitable. The appreciation of the real exchange rate was especially difficult for estates because of their larger use of purchased inputs while smallholders used less purchased inputs and hired less labor. Tea estates responded to higher wage costs by introducing mechanical harvesters (Daily Nation 2010), although coffee harvesting is still done by hand. This has contributed to the decline of coffee estate production relative to smallholders and relative to tea. Despite the weak economic environment for both coffee and tea, the tea sector has continued to expand. In contrast, both smallholder and estate coffee production have declined. The difference is due, at least in part, to reforms introduced in the 1990s and early 2000s.

The Role of the Estate Sector

The estates accounted for about 60 percent of national coffee production in the mid-1980s compared to 50 percent of national tea production. They played an important role in guiding the tea sector, but a less important role in the coffee sector, possibly because the estates in tea were large multinational companies capable of influencing policy, whereas the

Figure 8.5 Kenyan Real Exchange Rate

Source: World Bank calculations based on International Monetary Fund and Economic Survey data.

Figure 8.6 Real Export Prices

Sources: Kenya National Bureau of Statistics; Economic Surveys, various issues.

coffee estates were large in number, but small in size, and lacked the expertise or influence to guide policy.

Reasons for the Divergent Trends

Although there were many reasons why smallholder tea boomed and coffee collapsed after liberalization began in 1992, primary among these were the government's policy of reform and its implementation, the dependence of coffee smallholders on cooperatives to process and market their coffee while tea smallholders were managed by the KTDA, and the role and performance of the crop boards. Other factors were also important, but not significant enough, in themselves, to have led to the wide divergence that emerged after liberalization. These other factors included a less favorable global economic environment for coffee than for tea, the greater problem of disease in coffee than in tea, and the large debt burden of the smallholder coffee sector following expansion in the late 1980s.

Government policy toward the two sectors and the implementation of these policies were significantly different. The policy differences began in 1971, when the Coffee Marketing Board and the Coffee Board were merged into the CBK and given the dual role of regulation and marketing. This created a conflict of interest that remained until legislation separated these functions in 2005. In contrast, the KTB did not directly engage in marketing and played a supportive role to the tea sector. The liberalization of the coffee and tea sectors, starting in 1992, was also designed and implemented differently. Smallholder tea was liberalized without disruption, whereas smallholder coffee was never fully liberalized and some policy changes that were made occurred only after intense pressure from the private sector. The Ministry of Agriculture provided weak leadership and appeared to have been strongly influenced by vested interests rather than by the needs of smallholders. The government's policies on cooperative societies, as reflected in the Cooperatives Societies Act of 1997, further weakened smallholder coffee production by allowing cooperative societies freedom to operate without apparent concern for the impact on smallholder coffee producers.

The reliance of smallholder coffee producers on the cooperative system while smallholder tea producers were not closely affiliated with the cooperative movement contributed to the success of smallholder tea and the collapse of smallholder coffee. The cooperative system was inefficient in smallholder coffee processing and marketing and mismanaged their financial affairs. The cooperatives had two important roles in the smallholder coffee sector. First, cooperative societies did the initial processing of coffee cherries and provided services, such as providing inputs and delivering payments for coffee cherries. Second, the cooperative union had a monopoly on coffee milling. Both of these cooperative activities contributed to the collapse of smallholder production. The cooperative societies incurred large expenses and returned a small share of auction prices to smallholders. In addition, they were unable to provide inputs and other services to farmers as their financial situation deteriorated. The KPCU also had higher expenses and delivered poor service, which further reduced smallholder coffee prices. It quickly lost market share when new private sector millers were allowed to operate in the mid-1990s. In contrast, smallholder tea producers sold their green leaf to the KTDA-owned and -operated factories for processing and marketing and continued to receive a large share of auction prices.

The various roles and performances of the CBK and KTB were also important factors in the divergent trends in smallholder production. The CBK held dual responsibility for regulating and promoting the coffee sector, and for marketing, whereas the KTB had only responsibility for regulating and promoting the tea industry. These different responsibilities led to monopoly control and high fees for the CBK, while the KTDA was free to market tea through any marketing channel deemed appropriate. The CBK resisted efforts to liberalize marketing during the 1990s, although it finally was forced to relinquish its dual role in 2005, when a second window to the auction was approved. The impact on smallholders of these different roles and operations was to reduce coffee smallholder's payments due to higher marketing costs and greater delays in payments, and to restrict the marketing of coffee, which likely reduced sales revenues.

Lessons Learned

The lessons of the liberalization of smallholder coffee and tea in Kenya beginning in 1992 are as follows:

- *Strong government commitment to reforms and strong government leadership are essential to successful reform*. The government support of coffee policy reform was weak, and that contributed to the poor performance and eventual collapse of the smallholder coffee sector. This was reflected in several actions. The government did not separate the regulatory and marketing activities of the CBK when the sector was liberalized in 1992, despite the obvious conflict of interest, and instead allowed the CBK to continue requiring all sales of coffee to go through the auction. This was finally changed in 2005, but only after a decade of pressure from the private sector. The government has not allowed competition in the initial processing and marketing of smallholder coffee and instead requires smallholders to sell through their cooperative societies, which have mismanaged their affairs and have often been involved in corrupt practices. This has resulted in a smaller share of the export price going to producers and weakened the supply response that could have been expected from reforms. The removal of government oversight of cooperative societies' financial activities in 1997 further weakened the coffee sector and should have been strongly opposed by the government because of the negative impact on smallholder coffee producers. Government support for smallholder tea producers was much more positive, but also less contentious because the sector had a long history of success. The privatization of the KTDA in 2000 has strengthened the organization and was done in an orderly manner. The ease with which this was accomplished was largely due to the limited role of the cooperative sector and the appropriate role of the TBK, which undertook regulatory but not production, processing, or marketing activities.

- *The appropriate roles for the crop boards are regulation, research, and promotion rather than production, processing, or marketing*. These functions were separate in tea but combined for coffee, and the combining of these roles for coffee created a conflict of interest that resulted in regulations that were detrimental to the sector. One such regulation was the requirement that all coffee sold in Kenya must go through the coffee auction, whereas tea sales were allowed to go through any channel, thus allowing the tea sector a wider range of marketing opportunities.

- *Sector reforms done in a weak economic environment increase the risk that the reforms will fail or be reversed*. The sharp appreciation of the real exchange rate from 1993 to 2009 offset the recovery in global coffee and tea prices from the historical lows of the early 2000s. This reduced the incentives for production and exports and increased the financial problems of the sector. The global economic environment cannot always be predicted, and that contributes to the risk of successful policy reforms. The national economic environment, however, is largely determined by national policies, and those policies should be supportive of the reform process. This was not the case in Kenya, as the real exchange rate appreciated sharply from 1993 and this coincided with the liberalization of the coffee and tea sectors starting in 1992. This caused the real prices of coffee and tea exports to fall to historic lows after 2005, while global prices recovered sharply.

- *Professional management of smallholder processing and marketing can be preferable to producer-managed processing and marketing and should be considered*. The KTDA is professionally managed to process and market smallholder tea production, whereas smallholder coffee processing and marketing are handled by coffee producer cooperatives. The performance of smallholder tea has been exemplary, whereas smallholder coffee has collapsed. Management has been one of the important differences, with professional management better able to organize, finance, and operate the complex systems required to support several hundred thousand smallholders, whereas producer cooperatives have lacked the expertise and resources to do the same. The KTDA has benefited from economies of scale in input supply, financing, factory design and construction, and marketing, whereas individual producer cooperatives must arrange for the same services without the experience or expertise. Within a professionally managed system, specialists can be assigned to deal with particular problems such as computer use, accounting, production practices, processing, marketing, and logistics. In contrast, a producer cooperative does not have such expertise and cannot acquire such expertise because of its small scale and limited resources.

Conclusions

Coffee and tea account for almost 30 percent of total Kenyan exports. They are also important cash crops for the roughly 500,000 smallholder coffee producers and 550,000 smallholder tea producers who grow them, and for the estates that account for half of coffee production and about 40 percent of tea production. Both crops were liberalized starting in 1992, as part of a larger effort to reduce government involvement in the economy and to divest in strategic parastatals. The liberalization was slow to begin, but eventually led to a new Tea Act in 2000 that privatized the KTDA, which was responsible for managing all aspects of smallholder tea production, and a new Coffee Act in 2001 that partially liberalized the smallholder coffee sector. The reforms were supportive of smallholder tea production and led to continued production increase, but disruptive of smallholder coffee production, which declined by half following initial liberalization in 1992.

The collapse of smallholder coffee production was due to a number of factors, including an unfavorable economic environment caused by low world prices and a large appreciation of the real exchange rate. However, the collapse was mostly due to the lack of effective leadership and support from the government for the reforms, inefficiencies, and mismanagement by the cooperative sector that provided services to smallholders, and marketing regulations by the Coffee Board that were detrimental to the sector. In contrast, the smallholder tea sector benefited from effective management by the KTDA, both prior to privatization in 2000 and after privatization as part of the reforms, and was able to overcome the similarly unfavorable economic environment. The Kenya Tea Board also played an important role in the success of the smallholder tea sector by limiting its activities to regulation, promotion, and directing research rather than competing with the private sector in providing marketing and other services. The very different roles of the coffee and tea boards date to the 1950s, when tea regulation and marketing were kept separate, and to the 1970s, when coffee regulations and marketing were combined under the control of the Coffee Board. The failure of the government to separate these important functions during the liberalization of the coffee sector led to marketing regulations that were detrimental to the industry.

The cooperative sector was responsible for providing all services for smallholder coffee producers, and smallholders were required to deliver their coffee to the cooperatives for initial processing and final milling. This system worked reasonably well prior to liberalization, but became inefficient and corrupt following the removal of all government regulation of the economic activities of cooperatives in 1997. The share of export prices received by producers plummeted, and payments were often delayed by a year or more from the time the farmers delivered their coffee to the cooperatives. This encouraged farmers to sell their coffee to traders rather than cooperatives, and although illegal, the action became common and further reduced the ability of the cooperatives to provide inputs and other services. Large debts incurred during the expansion in processing capacity during the late 1980s also limited the ability of the cooperatives to support smallholders. In contrast, cooperatives were not significantly involved in marketing or other services for smallholder tea producers and instead these vital services were provided by the professionally managed KTDA. Efficient operation and management by KTDA, combined with the supportive role provided by the Tea Board, are credited with the success of smallholder tea.

Coffee marketing was not fully liberalized as part of initial reforms in 1992 or the later reforms as part of the new Coffee Act in 2001. The government maintained that the sector had already been liberalized despite the regulation that all coffee must be marketed through the coffee auction operated by the Coffee Board. Producers argued that marketing fees charged by the Coffee Board were excessive and that greater revenues could be realized by allowing producers to market through multiple channels that would provide higher premiums for specialty and branded coffees. Pressure from the private sector eventually led to an alternative marketing channel in 2005 and the separation of marketing responsibilities from the Coffee Board, but only after a decade of reluctance by the government to make such reforms and of opposition from the Coffee Board. In contrast, smallholder tea was marketed through multiple channels since the 1960s and was not required to go through the Kenyan tea auction. That difference is usually attributed to the separation of regulatory and marketing functions in the Tea Board but not in the Coffee Board.

Going forward, the prospects appear good for smallholder tea under the professional management of the KTDA and the regulatory environment established by the Tea Board. In contrast, the prospects of reviving the smallholder coffee sector are poor. Although reforms have increased competition in milling, brokerage, and marketing, they have not allowed smallholders to legally bypass their cooperative societies for initial coffee processing and marketing. The cooperative societies are burdened by debt, inefficient, and often corrupt. They are not capable of providing inputs or essential services, and, as long as smallholders are required to market their coffee through these cooperatives, they have little prospect of recovering from the collapse of the past two decades. Changing the role of cooperatives in the smallholder coffee sector will be politically difficult, especially after the government withdrew regulatory oversight as part of its earlier reforms of the cooperatives in 1997.

Notes

1. *CTC* refers to a method of processing black tea whereby the final stage is to crush, tear, and curl the leaves, hence the name (CTC). The alternative method of processing black tea is called *orthodox*, and this process rolls the leaves by hand or machine and is used mostly for specialty teas.
2. A smallholder coffee producer is defined as having less than five acres of coffee.
3. About 15 percent of the coffee cherries were rejected as overly ripe and unsuitable for wet processing; these were used to produce a low-quality coffee called *mbuni* that is dried in the cherry.
4. Coffee Board of Kenya (CBK). 2010. Personal Communication with CBK Official, Nairobi.
5. SOCFINAF. 2003. Personal Communication with General Manager, Ruiru, Kenya.
6. Kenya Tea Development Agency (KTDA). 2010. Personal Communication with General Manager, Nairobi.
7. The real exchange rate is a proxy for the relative price of tradables and nontradables and compares the output prices of tradables to the costs of nontradables used to produce them (land, labor, capital, etc). It is defined in this case as the Nominal Exchange Rate × Manufactures Unit Value Index ÷ the Kenyan National consumer price index (CPI).

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CHAPTER 9

The Tanzania Tobacco Sector: How Market Reforms Succeeded

Donald Mitchell and Mwombeki Baregu

Tobacco is the largest agricultural export crop in Tanzania and an important cash crop for the roughly 60,000 households that grow it. Export earnings reached US$143 million in 2009–10 (figure 9.1) and accounted for 29 percent of traditional crop export revenues.[1] Domestic sales of tobacco accounted for an additional US$19 million, to bring the value of the 2009/10 crop to US$162 million.

Export earnings have grown sevenfold since the mid-1990s, due mostly to increased yields and improved quality. The share of the crop graded as top quality rose from 20 percent to 70 percent during that period, which allowed Tanzanian export prices to rise while global tobacco prices remained largely unchanged. The typical farmer had about one hectare planted to tobacco in the 2009–10 buying season, and he or she would have seen yields rise 46 percent, planted area rise 24 percent, and production rise 80 percent since 1996–97. Along with increased yields and improved quality, the industry has been able to keep pace with

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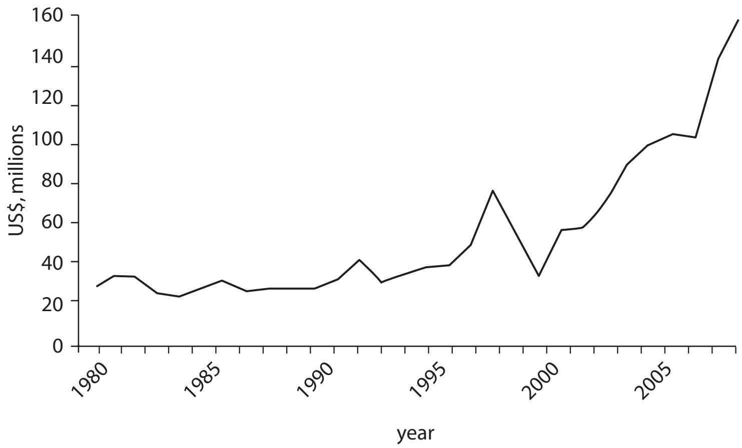
Figure 9.1 Tobacco Exports, 1980–2009



Sources: Tanzania Tobacco Board; FAOSTAT 2010.

changing global requirements for compliance with environmental standards, chemical residue levels, and traceability to origins of production.

These remarkable achievements were due to the privatization of marketing and processing in the 1990s. The privatized sector provided farmers with improved seeds, inputs on credit, better extension, and more timely payments for their tobacco. The public sector, through the Tanzania Tobacco Board, has played an important role by providing a forum for price negotiations and conflict resolution, graders for tobacco, and record keeping that permitted traceability of production. Although successful now, privatized marketing and processing began on a sour note, as tobacco companies lost large sums on input loans to primary societies and farmers received low prices while the loans were repaid. But the problems were addressed and solutions found. The reasons for this remarkable performance are the focus of this chapter, and some of the lessons can be applied to other crops and other countries.

Historical Perspective

Tobacco production in Tanzania began in the 1940s, when Greek settlers established large plantations in the Iringa area to produce Virginia flue-cured tobacco. Cultivation of flue-cured tobacco spread to smallholders in Tabora and Mbeya in the 1950s. By the early 1960s, significant numbers of smallholders were cultivating flue-cured tobacco and organizing themselves into village cooperatives and settlement schemes (World Bank 1984), and smallholder tobacco was heralded as a success (Mackenzie 1982). Dark, fire-cured tobacco production began in about 1960, on a small scale mainly for domestic consumption; Virginia flue-cured tobacco remains the dominant tobacco, accounting for 93 percent of total production in 2009/10. Dark, fire-cured tobacco accounts for about 6 percent of production, and burley tobacco accounts for about 1 percent. Tobacco processing was initially done in a small plant in Songea that processed dark, fire-cured tobacco and in a larger plant, built in 1966, in Morogoro that processed both flue- and fire-cured tobacco. Flue-cured tobacco is now grown primarily near Tabora, which is located 800 kilometers from Morogoro, and transported by truck and rail to the factories for processing.

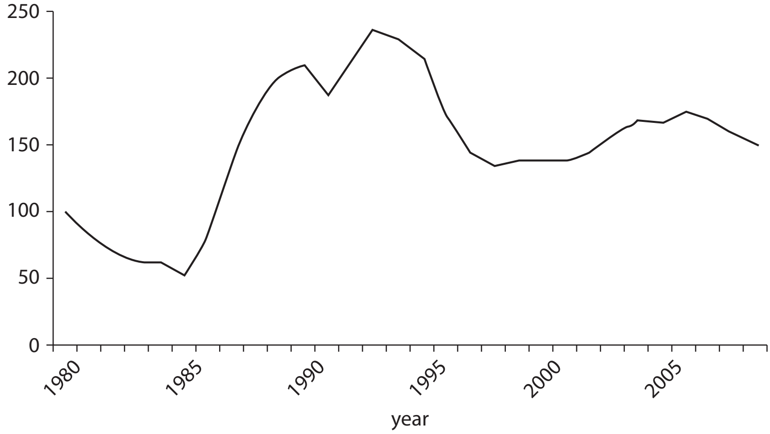
Following the Arusha Declaration in 1967, the state assumed direct control of large sectors of the economy, including tobacco processing and marketing. Markets for agricultural products and inputs were controlled by monopolistic parastatals, and prices and marketing margins were set by the state. The state invested heavily in social services and lacked the resources to maintain investments in traditional support services for agriculture such as research, extension, and infrastructure. Rural roads deteriorated, and the profitability of the railroads declined along with the quality of service, thus raising the cost of transporting tobacco from Tabora to the factory in Morogoro. Funding for public research and extension declined, which reduced the development, dissemination, and adoption of improved varieties. The exchange rate was overvalued and incentives for export crop production weakened. Shortages of foreign exchange reduced imports of spare parts and, eventually, the efficiency of the tobacco factories. By the mid-1970s, the effects of these policies were becoming apparent, and, by the mid-1980s, agricultural production was declining rapidly and the country faced severe economic problems. This led to economic reforms starting in 1986, which included devaluing the exchange rate, and these reforms began to reverse the decline in agriculture.

The first legislation concerning the tobacco industry was the Tobacco Industry Act of 1972, which established the Tobacco Authority of Tanzania (TAT) and granted it authority to regulate, control, market, and manufacture tobacco (URT 1972). Under this legislation, marketing of tobacco was done by cooperative unions, which purchased tobacco from farmers through their primary societies and transported it to the factories. The TAT performed the processing and marketing of tobacco to domestic and international markets and set the tobacco prices. The cooperative unions purchased inputs on credit and delivered them to the primary societies, which provided them to farmers. The payment to farmers for tobacco was the net value of crop sales after deducting the input credits received, their share of the primary societies' costs and levy, and their share of the cooperative union's costs and levy. This marketing system had a number of weaknesses, including inadequate incentives to contain costs, little incentive for farmers to maintain quality, quality losses during transport of tobacco to the factories due to reliance on poor-performance railways, and weak marketing. The TAT also had heavy administrative costs and inadequate operating margins, as well as excessive transportation and processing costs.

The cooperative unions were abolished by the government in 1976 due to sharply rising costs attributed to inefficient marketing. The TAT was given responsibility for all aspects of the tobacco industry in Tanzania, including extension, procurement, and distribution of all inputs, and the transportation, processing, and marketing of cured leaf tobacco. This was the first of many changes in industry operation implemented by the government through its various tobacco authorities from 1972 until 1995, when the private sector was allowed to buy, process, and export tobacco. In 1976, the factory in Morogoro was expanded with World Bank support to accommodate what was expected to be a steady increase in tobacco production. However, tobacco production peaked just as the factory expansion was approved and construction began. The additional capacity remained idle for many years and became a burden on the industry.

According to the World Bank's Project Performance Audit of 1984, the decline in tobacco production during the late 1970s and 1980s (figure 9.2) was due to a number of factors. These included inadequate availability and distribution of inputs, lack of good seed material, lack of proper extension and agronomic advice, crop disease, delays in crop collection due to transport shortages and the Ugandan war, shortages of fuel wood for curing, and sharp increases in unregulated maize prices compared to official tobacco prices, which encouraged farmers to shift to maize production. Delays in fertilizer deliveries were especially critical since there are only 40 days from planting to harvesting of the first tobacco leaves, and yields are significantly reduced without timely fertilizer application. Institutional weaknesses by the TAT prevented these problems from being adequately addressed, and this weakness was reported by the World Bank to be due to conflicting objectives, poor accountability, and policy

Figure 9.2 Real Exchange Rates, 1980–2009



Sources: Authors calculations based on exchange rates and consumer price index (CPI) from the International Monetary Fund (IMF); International Financial Statistics (IFS); the World Bank's Manufactures Unit Value (MUV).

and regulatory constraints. The Ministry of Agriculture, which was responsible for overseeing the TAT, exercised only nominal controls and failed to monitor management performance. With production stagnant at less than 20,000 tons per year, the doubling of factory capacity from 18,000 to 41,000 tons of tobacco approved in 1976 was unnecessary and a financial burden to the TAT, one that contributed to growing debts and large losses.

By 1984, it had become apparent that abolishing the cooperative unions had not solved the problem of rising marketing costs, and the government reintroduced them. The government also repealed the Tobacco Industry Act of 1972, replacing it with the Tanzania Tobacco Processing and Marketing Board Act of 1984. This act created the Tanzania Tobacco Processing and Marketing Board (TTPMB) and authorized it to be the sole buyer of tobacco from the cooperative unions, with the fixed price for tobacco to be established by the Marketing Board.

The Government of Tanzania embarked on a major economic revitalization program in 1986, and privatization of parastatals and liberalized marketing of export crops were major components of that program. The reforms began with the government's adoption of a three-year Economic Recovery Program in 1986, with support from the International Monetary Fund, World Bank, and other international donors. This was followed by the second Economic Recovery Program, implemented during 1989–92.

The main elements of these programs were reduction in the fiscal deficit, a series of large devaluations, import liberalization, positive real interest rates, and the elimination of most consumer price controls. Repeated devaluation of the Tanzanian shilling (T Sh) raised the nominal exchange rate from 33 T Sh per US$ in 1986 to 405 T Sh per US$ in 1993, and the real exchange rate rose more than fourfold (figure 9.2). This provided better incentives to commodity exporters, but tobacco producers did not initially benefit from these reforms because tobacco prices were set by the TTPMB. Real tobacco producer prices fell 20 percent from 1986 to 1991, despite a doubling of real export prices. The real exchange rate then appreciated 45 percent from 1993 to 1998, just as the sector was being liberalized, and this weakened the incentives for exports and contributed to the initial problems of sector reform.

Further adding to the problems faced by the private sector as it took control of marketing and processing was the government's action to raise the real producer prices by 80 percent in 1992, in anticipation of liberalization. Although overdue because of the rise in export prices, this occurred just as the real exchange rate began to appreciate and added to the problems of sector reform. In 1993, the government amended the Tanzania Tobacco Processing and Marketing Board Act of 1984 with the Crop Boards Amendment of 1993. This amendment allowed private sector participation in tobacco marketing, processing, and exports of tobacco, and led to the sale of the government-owned factories in Morogoro and Songea.

In 2001, the government repealed the Tanzania Tobacco Processing and Marketing Board Act of 1984 and replaced it with the Tobacco Industry Act of 2001. The new act replaced the TTPMB with the Tanzania Tobacco Board (TTB) and granted it the authority to license and regulate the tobacco industry, provide tobacco classifiers (graders) to the marketing centers, promote the industry, and represent the government. However, the TTB no longer had authority to engage in marketing or processing of tobacco. Its board of directors consisted of eight members; the chairman was appointed by the president, and members were appointed by the minister of agriculture. There is one representative for the buyers, three for the growers, and one member from the Ministry of Agriculture. The board's budget was provided by the Ministry of Agriculture, and funded by a 1.0 percent fee on f.o.b. (free on board) sales of tobacco. Additional funding was from fees charged by the TTB for licenses of green leaf buyers, dry leaf sellers, and tobacco processors.

Market Liberalization

The Tanzania tobacco industry began the process of privatizing in 1995, and the two factories owned by the government parastatal were sold in July 1997. The factory in Morogoro was sold to a U.S. company, Universal, and modernized to attain a processing capacity of 40,000 tons of tobacco per year. It operated under the name of Tanzania Leaf Tobacco Company Limited (TLTC). The small factory in Songea was sold to a cooperative union and a foreign investor, and it had an annual processing capacity of 4,000 tons. It was not modernized and closed in about 2001. A new factory was built in Morogoro by a U.S. company, Dimon, with a processing capacity of 20,000 tons of tobacco per year. The two factories in Morogoro were modern, state-of-the-art facilities. Another multinational company, Stancom, was active in the Tanzanian tobacco industry as a buyer but not as a processor until May 2001, when it withdrew from Tanzania. The two main buyers were Dimon and TLTC, who purchased Virginia flue-cured tobacco from the western zone and dark, fire-cured tobacco from Ruvuma. There were also smaller buyers of dark, fire-cured tobacco. Dimon merged with Stancom in 2005 to become Alliance One Tobacco Tanzania Limited. A new company, Premium Active Tanzania Ltd., entered the Tanzanian tobacco industry as a buyer of tobacco in 2008/09. It is the Tanzanian affiliate of Premium International, which operates in 14 countries. It does not have a factory, but is allowed to process tobacco under an agreement with the existing factories as part of the original privatization agreement.

Under the privatization agreement, a contract between growers and companies is negotiated in the Tanzania Tobacco Council, which is an industry organization that brings together tobacco producers and buyers to discuss issues important to the tobacco industry. The Council has been in place and meeting since 1995. The meetings are held every three months, in Morogoro, under the auspices of the TTB and are attended by the general manager of the Tobacco Board, as well as by a representative from the Ministry of Agriculture. All matters, such as farmer contract formats, input price negotiations, tobacco price determination, and general procedures for the industry, are decided in these meetings. No significant issues in the industry can be completed without the blessing and majority vote of the Tobacco Council. The tobacco companies negotiate a single- or multiyear contract with the growers to buy their tobacco at an agreed upon contract minimum price for each grade of tobacco. A company could pay more than the minimum, but rarely does (Rweyemamu and

Kimaro 2006). A multiyear contract entails more risk for companies, but also allows longer-term loans for infrastructure development. Once a contract is agreed upon, the individual tobacco companies contract with primary societies to provide inputs and buy tobacco. The primary societies then contract with farmers to grow tobacco and receive inputs on credit. Once a farmer has an agreement with, and receives inputs from, the primary society, he or she produces and cures the tobacco and delivers it to the primary society for sale at a marketing center.

The tobacco is laid out at the marketing center, and the TTB-classifier (grader) goes through and classifies each lot. The company buyer follows along and either accepts or rejects each lot. If the company buyer agrees to the grade, then the company agrees to buy the tobacco. If the farmer does not accept the grade, the farmer can reject the offer and remove the tobacco from the marketing center. If the company and farmer agree on the grade, then the company records the sale and gives the farmer a receipt. The payment is made to the primary society, which then pays the farmer for the amount and grade of tobacco. Tobacco is then transported by rail or truck by the companies from buying centers to factories and processed either for eventual sale to foreign buyers or according to buyer specification if a buyer has already contracted for the tobacco. Shipment from the factory to the port in Dar es Salaam for export is by truck.

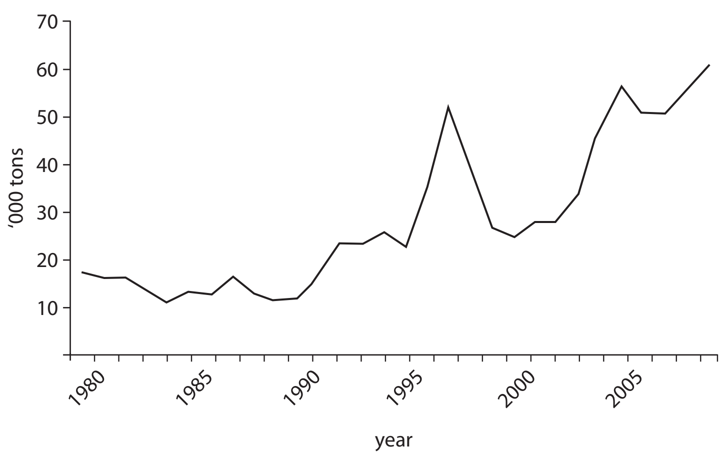
Industry Performance

The private sector began to operate in the 1997/98 buying season but quickly ran into trouble because they advanced inputs to primary societies without adequate safeguards, and the primary societies sold some of the inputs rather than providing them to producers. Side-selling was also a major problem, as both producers and primary societies took input loans from one company and then sold their tobacco to another company or trader to avoid repayment of their loans. Further losses occurred in 1998/99, when poor yields due to El Niño weather conditions caused production to fall. To recoup their losses, the tobacco companies retained half of the producer payments in 1999/2000. However, the low prices received by farmers led to further declines in production. A three-year contract was finally agreed to in the 1999/2000 season; it had two provisions for recovering some of the debt. The agreement was that tobacco prices would remain at 1999/2000 T Sh levels for three years (through 2001/02), and the farmer's price would be reduced by about 20 percent to partially repay the input debt. This arrangement allowed some of the debt to be repaid, but did not provide sufficient incentives to farmers to increase production, and production remained low. Production began to rise in 2002/03, after this agreement expired, and, by 2004/05, production had more than doubled from the 2001/02 level (figure 9.3).

Following large losses on input loans in 1997–98, the industry faced the problem of how to deliver essential inputs to producers on credit, avoid side-selling, and get the loans repaid. Without loan repayment, companies could not provide inputs on credit, and production would not have increased. The two companies formed the Association of Tanzanian Tobacco Traders (ATTT) as a wholly owned subsidiary of Dimon and TLTC with the approval of the Tobacco Council.

The ATTT was to provide inputs to farmers on credit, provide extension services, provide administrative services for buying tobacco, and make payment to the farmers through their primary societies on behalf of the tobacco companies. These inputs and services were to be provided at cost by the ATTT, and all transactions were to be fully transparent. Inputs were purchased by public tender and disclosed to the Tobacco Council and all stakeholders. The ATTT then contracted with primary societies to provide inputs and buy tobacco. The primary societies then contracted with farmers to grow tobacco and receive inputs on credit. Once a farmer had an agreement with and inputs from the primary society, he or she then produced, cured, and bagged the tobacco

Figure 9.3 Tobacco Production, 1980–2009



Sources: Tanzania Tobacco Board; FAOSTAT 2010.

and delivered it to the primary society for sale at a marketing center. The system was successful; inputs were provided on credit to producers, and input loans were fully repaid in the 2001–02 season. Seeds were provided free by the ATTT to ensure that quality seeds were used, rather than farmer-kept seeds. The program, along with the prompt payment by the tobacco companies, largely accounted for the recovery of flue-cured tobacco production. Companies paid the primary societies by bank transfer, usually within 14 days, and primary societies then paid farmers. The cooperative union and companies buying tobacco in the Songea region did not adopt a similar system, and production fell there due to the inability of the Songea Agricultural Marketing and Cooperative Union to buy and pay farmers for their tobacco. The major tobacco companies were eventually invited to buy in the Songea region, and the Agricultural Marketing and Cooperative Union stopped buying and processing tobacco.

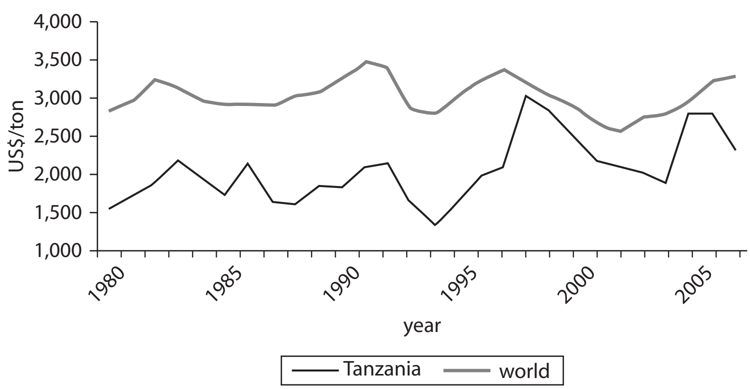
With the ATTT operating successfully, the next challenge facing the tobacco industry was to improve quality, which would both better position the industry in the world market and improve the price of tobacco. Tanzania had historically produced a common grade filler tobacco in competition with major producers such as China and India. The quality and prices were lower than for tobacco produced in Malawi, South Africa, Uganda, and Zimbabwe. To improve quality, Brazilian agronomists familiar with smallholder schemes were brought to Tanzania by the companies to work with local extension workers to improve farmer practices and tobacco quality. The fertilizer recommendations were changed, new on-farm handling procedures were implemented, and producers were encouraged to improve their curing barns. Brazilian varieties were imported for use in Tanzania. For the 2002–03 season, the tobacco companies changed the packaging procedure of farmers to a twine-tied bale, which reduced waste. This change replaced the practice of farmers bundling their tobacco in jute bags for transport to the buying centers, which resulted in damage and spillage. The new system was common in other counties and could be done by farmers using small, manually operated presses. Multiyear contracts between the companies and growers allowed the companies to loan for infrastructure, such as curing barns, which improved tobacco quality and reduced post-harvest losses.

The quality and quantity of production have improved over the past decade, and Tanzania is now known as a reliable supplier of quality tobacco. This has allowed the gap between the export unit value received for Tanzanian exports and the global average to narrow from 33 percent during 1975–96, when the government was responsible for marketing and processing, to 20 percent during 1997–2009, when the private sector was in charge (figure 9.4).

Tobacco yields in Tanzania have more than doubled since the private sector began providing producers with improved varieties, inputs on credit, extension, and post-harvest handling advice (figure 9.5). This increase reversed a 20-year trend of stagnant yields. The average yields have increased by 61 percent during the period when the private sector has taken the lead role, compared to the previous decade when the government parastatal was managing the industry. Yields in the most recent three years have shown even larger increases, with average yields 120 percent higher than during the 1987–96 period. The yield gap relative to the world average has also declined from 58 percent during 1987–96 to 38 percent during 1997–2008, and 20 percent during 2006–08. Improved extension services are credited as being one of the most important factors accounting for increased yields, and the private sector, through the ATTT, provides one extension worker for every 250 tobacco farmers.[2]

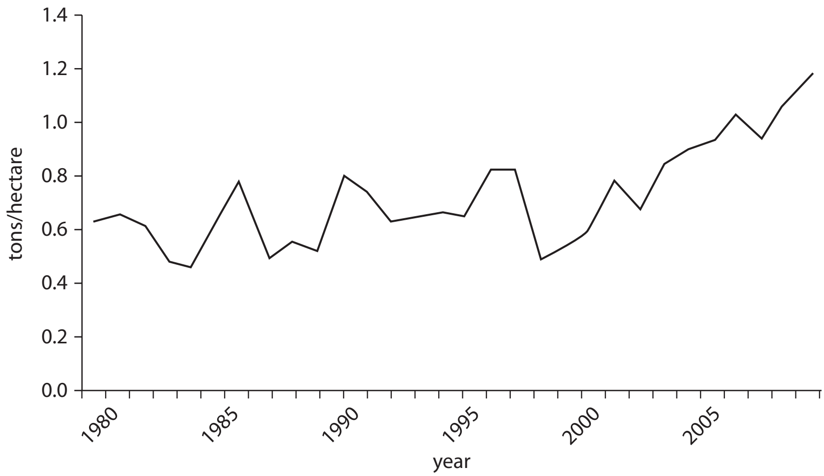
Tobacco quality has improved, as shown by the increasing share of the flue-cured crop graded as high quality by the Tobacco Board classifiers and the declining share of low- and medium-quality tobacco (figure 9.6). During the years immediately following the liberalization of marketing and processing, the share of the tobacco crop graded high quality was less than 20 percent. However, as new procedures were implemented by the private sector, the share of the crop graded as top quality rose to more

Figure 9.4 Tobacco Export Unit Value, 1980–2009



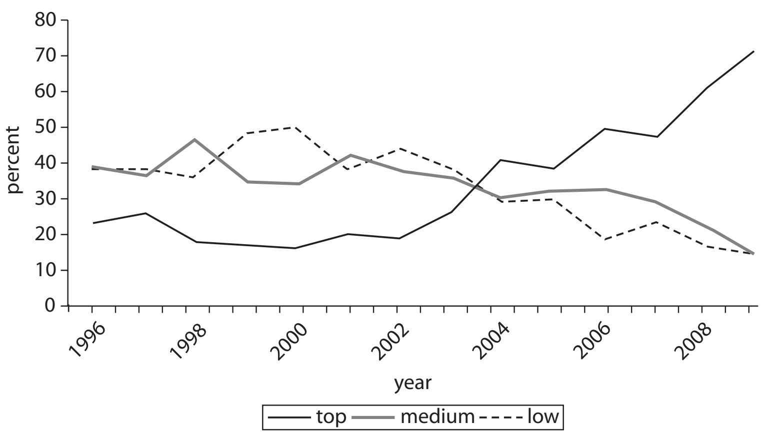
Source: FAOSTAT 2010.

Figure 9.5 Tobacco Yields, 1980–2009



Sources: Tanzanian Tobacco Board; FAOSTAT 2010.

Figure 9.6 Quality Outturn, 1996–2009

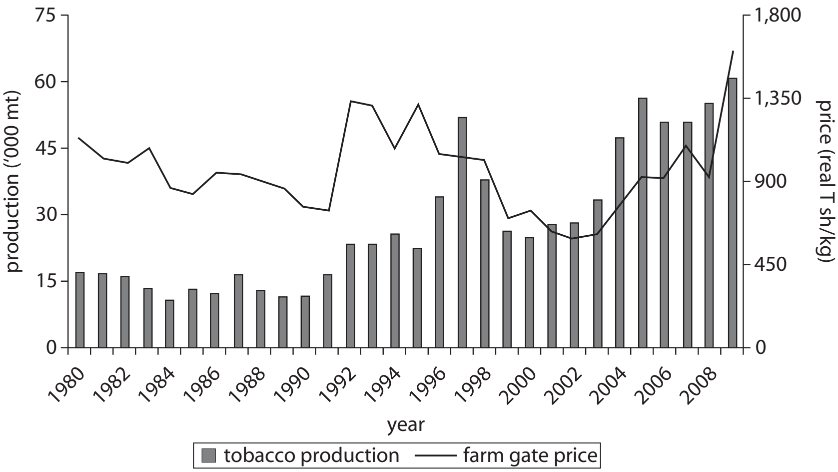


Source: Tanzanian Tobacco Board.

than 70 percent, and the share of the crop graded low- and medium-quality fell to 15 percent, respectively, according to the Tanzania Tobacco Board's data.

Real producer prices of tobacco fell by two-thirds during the 1970s and 1980s, before rising in 1992 in response to market forces and

Figure 9.7 Real Prices vs. Production, 1980–2009



Sources: Real prices are based on data from the National Bureau of Statistics, Economic Survey, and production is from Tanzania Tobacco Board and Food and FAOSTAT 2010. Note 2009 real producer price is estimated based on Tanzania Tobacco Board data since data were not available from the Economic Survey.

government price setting (figure 9.7). Prices then fell from the 1992 high until 2002, as inflation surged (16 percent per year) and international tobacco prices stagnated. Multinational companies contributed to the low prices by freezing producer prices from 1999 to 2002 in an effort to recoup large losses sustained in 1997/98 and 1998/99 due to lax lending practices and poor yields. Real producer prices gradually rose from 2002, as private sector initiatives led to production of better quality tobacco and higher prices and inflation moderated to 7 percent per year from 2002 to 2009. Prices rose sharply in 2009 due to increased world market prices, which led to higher export prices, and increased competition within the Tanzanian market following the entry of a third multinational company into the Tanzania tobacco market. Production responded to changes in real producer prices (figure 9.7) both before and after privatization of the sector. However, nonprice factors were also important, as evident by the large increase in tobacco production to record highs from 2000 to 2009 that were not preceded by record high real producer prices.

The lack of competition and monopsony buying power of the two large multinational companies likely resulted in lower producer prices for tobacco than would have been the case with greater competition. This was demonstrated in the 2009/10 season, when Premium Active entered the market and bought tobacco in competition with the established companies. According to tobacco company officials, in that year, the average buying price paid for tobacco increased by about 10 percent, compared to the price that would have been paid to farmers if Premium Active had not entered the market. Still, compared to the period when the public sector was in control of marketing and processing, farmers were better off because of higher yields, higher prices relative to the world market, and a higher share of the export price because of lower operating costs. The share of export prices received by farmers rose from 34 percent in 2003 to 53 percent in 2009/10.[3,4]

Why Market Reforms Were Successful

The multinational companies were successful in increasing tobacco production and quality where the parastatal was not. The success of the new arrangements reversed more than two decades of stagnation in production and declines in real producer prices relative to the world market. This benefited tobacco growers and reduced poverty.

There are many reasons why this should have been expected. The private sector should be more efficient in marketing and processing, have tighter accountability and cost containment procedures, have better access to technology and capital, and be able to make decisions more quickly to respond to problems that develop. Yet that has not always been the case. In the Tanzania cashew industry, for example, privatized marketing that began in 1991 was less successful and stalled within a decade, to be replaced by an increased role for the public sector.

Why was private sector marketing of tobacco successful? There seem to be four reasons. First, the multinational tobacco companies that entered the tobacco industry as buyers and processors were well capitalized and had access to superior technology and management. Second, the public sector played a supporting role rather than a competing role, and this reduced government interventions that undermined marketing reforms in other Tanzanian crops, such as cashews. Third, the tobacco companies, with the support of government, were able to solve the problem of side-selling and thus allow these companies to provide inputs to farmers on credit and to make longer term loans to improve infrastructure, such as curing barns. Fourth, the structure of the industry was amenable to the kinds of strict controls imposed by the tobacco companies. Each of these is considered in more detail in the remainder of this section.

The multinational companies were well capitalized and had access to superior technology and management. Both the TLTC and Dimon invested heavily in factories to process tobacco and supported smallholder production to ensure adequate supplies of tobacco for the factories. The TLTC brought tobacco varieties from Brazil to use in Tanzania, and brought experts from Brazil who were familiar with smallholder tobacco production to work with local extension agents. New methods were introduced for tying tobacco into bunches rather than placing it in gunny bags, as had been the practice, and that improved quality and reduced post-harvest losses. Agronomists were brought in to examine soils, and this resulted in changed fertilizer recommendations. Improved curing barn designs were introduced, and farmers were trained in how to build and use these improved barns. Borrowing was from international capital markets at lower interest rates than those available locally. Management was internationally recruited and had experience in the tobacco industry in many countries. Extension became a priority, and the tobacco companies, through the ATTT, provided one extension agent for every 250 farmers.

The public sector played a supportive role and did not compete with the private sector in buying and processing tobacco. This reduced the incentives for disruptive interventions in marketing, as had occurred in other crops. The Tobacco Board of Tanzania provided graders to the marketing centers to grade each lot of tobacco in a fully transparent way, and this allowed the farmer and buyer to know the grade and agree to it before completing the sale. The Tobacco Board required that all tobacco sales occur at the marketing centers and be graded by Tobacco Board graders. Prices for each grade of tobacco were established through contract negotiations between buyers and growers within the Tobacco Council, which served as the forum for all negotiations and the resolution of industry problems. The Tobacco Board registered each farmer and kept records that allowed compliance with environmental standards and traceability.

Credit recovery of input loans was a very important part of the success of the private sector. Without recovery of credit, neither the private nor public sector could continue to provide inputs to farmers on credit. The solution to the problem was provided by a wholly owned subsidiary that provided all inputs and bought all tobacco. Farmers no longer had the opportunity to avoid selling their tobacco to the company that provided the inputs on credit, and this resulted in nearly total recovery of input loans. This would not have been possible without the support of the government for this innovative solution, and the approval of the Tobacco Council for the formation of the ATTT.

The structure of the industry was amenable to the types of solutions provided by the private sector. The tobacco sector has many small growers (typical of agriculture in Africa) but only two buyers of tobacco; this made it possible to closely monitor input loans and sales. A less concentrated processing industry would have been more difficult to control, and the credit recovery would probably have been lower because processing companies would have been able to buy from independent traders without disclosing their activities. Since the companies only bought at the marketing centers and only from farmers or their primary societies, private traders were not available to enable side-selling.

The cotton and sugar sectors offer a comparison. Side-selling is a problem in the cotton sector because many ginneries exist and they buy cotton from private traders (Baffes 2002). This makes it relatively easy for farmers to avoid selling to the ginnery that provided the input loans. This has led to various (usually unsuccessful) methods to try to prevent side-selling, including dividing cotton-producing areas into zones and trying to prevent cotton from crossing zone boundaries. In contrast, sugar companies have fewer problems with side-selling because sugar cane is costly to transport and must be processed within a short time of harvesting. It is very difficult for a farmer to sell to a different sugar company than the one that provided the input loan. This may partially explain why sugar production in Africa has relatively high yields (86 percent of the world average) and is globally competitive, while cotton production has low yields (43 percent of the world average) and is not competitive (Food and Agricultural Organization 2010 and USDA 2010). A similar comparison can be made for tea and coffee. Tea leaves must be processed within a few hours of plucking and require a factory, whereas coffee cherries can be processed into green coffee beans in small decentralized plants using small-scale equipment. That makes credit recovery relatively easy for tea and relatively difficult for coffee, and that is reflected in yields. African tea yields are 155 percent of the world average, whereas coffee yields are only 60 percent of the world average (FAOSTAT 2010).

The structure of the industry also provided the private sector with market power, which could have positive and negative effects. Such power could have allowed the companies to pay lower prices for tobacco than they would have if there had been more companies buying and processing tobacco, and there is some indication that this has occurred. When a third multinational company entered the industry in 2009/10, the prices paid by the two existing tobacco companies increased, suggesting that price negotiations between growers and buyers did not result in the most favorable price to growers. A second way that market power could have benefited the private sector is through negotiations with the government and the ability of the tobacco companies to prevent rent seeking—a common problem in cashew industries without large multinational buyers.

Lessons Learned and Implications for Other Sectors

Several lessons can be learned from the experiences of the Tanzania tobacco industry over the past 40 years. The public sector was less efficient and effective at marketing, processing, and providing services to smallholder growers of tobacco than was the private sector. This is reflected by the growth of production under private sector control during the 1940s–1960s and from 1997 to 2009, compared to stagnant production during the period of public sector control during 1967–96. It is also reflected in the price discount of Tanzanian tobacco relative to the world market, which widened under public sector control and narrowed under private sector control. Other commodity sectors would be expected to experience better performance under private sector marketing and processing; however, unique characteristics of tobacco production in Tanzania yielded better results than would be expected in many other sectors.

The establishment of the ATTT was probably the single most important factor in the success of the private sector in the tobacco industry. This solved the age-old problem of how to provide inputs to small producers on credit, and then recover the credit when the commodity was sold. This problem is well known and many attempts have been made to solve it (Akiyama et al. 2001; FAO 1999), but with little success because producers are often able to avoid repayment of loans by selling to alternative buyers. This initially occurred in the Tanzania tobacco industry following liberalization and resulted in large losses, curtailment of credit, and a fall in production. However, because the companies created a single agent for input supply and crop buying, farmers were forced to repay their input loans. This arrangement allowed the companies to continue providing inputs and extension and to benefit from the increased output and improved quality. Commodity sectors that have a similar industry structure, such as sugar cane, have used a similar approach with equal success. However, companies with a large number of small traders have not been able to solve this problem, and it seems unlikely that they will.

Smallholders were better off when the private sector controlled marketing and processing than when the parastatal was in charge. Smallholders received better services from the private sector, including improved varieties, better and more timely inputs, better extension services, and reduced post-harvest losses and quality deterioration. Smallholders also benefited from more efficient industry operation, which reduced operating costs compared to the period when the public sector controlled marketing and processing. A smaller share of the value of the tobacco was lost in marketing and processing inefficiencies.

Offsetting some of these benefits was the lower share of the crop value going to producers because of the concentration of the industry, which allowed tobacco companies significant market power. However, even after allowance for this market power, smallholders were still much better off under private sector marketing and processing than under public sector control. The nation also benefited because export earnings from tobacco increased from about US$20 million per year under public sector control of marketing and processing to more than US$143 million under private sector control, and tobacco became the largest export earner among traditional agricultural commodities.

The analysis of the tobacco sector in Tanzania illustrates the importance of market structure to the types of programs that can be successfully implemented in Africa and other developing countries. When buying and processing is concentrated in a few large companies, they are able to provide services to smallholders on credit and implement programs that reduce the problem of side-selling and loan default. They may also be better able to resist government interventions in marketing and rent-seeking behaviors that reduce efficiency and ultimately harm smallholders. The concentrated industry structure also gives buying companies market power in negotiating producer prices and likely results in lower producer prices. However, on balance, industry concentration has benefited Tanzanian tobacco growers and the nation. There is a trade-off between market power to benefit the industry and market power to disadvantage the producer. In the case of the Tanzania tobacco sector, the producers benefited more from market power than they lost from it. Perhaps they would have benefited even more if more companies had operated in Tanzania. The fact that a third company entered the tobacco market in 2008 is evidence of both increased competition that comes with market power and the success the industry has achieved.

Recent Developments

Under pressure from the cooperative unions for a larger role in the tobacco industry, a Memorandum of Understanding (MoU) was signed on August 29, 2006, in which the industry agreed to a rationalization of roles, functions, and financing of institutions dealing with agricultural crops. This was partly a response to the concern that the ATTT was a monopoly that did not allow farmers to decide on which input to use. Among other things, the MoU instructs stakeholders to determine a mechanism for financing the development of the tobacco crop (shared function). The mechanism will increase the role of the primary societies and cooperative unions in supplying inputs to farmers on credit provided by commercial banks. The government will guarantee 75 percent of the loans. This new credit channel first operated in the 2009/10 season, and the repayment rate on credit extended to farmers through their primary societies is not yet available. In addition to the new method of delivering credit, the industry has shifted to a one-year contract between growers and companies, instead of the three-year contract that had been in use for several years. This will make it more difficult for private companies to finance infrastructure loans for curing barns and other structures since they are not assured of renewed contracts with the primary societies. The changes have also increased companies' uncertainties and caused them to revise their investment plans until the impacts of these changes are clear.

Going forward, it seems risky to change a system that has provided such positive benefits to producers, tobacco companies, and the nation. However, the system has changed in accordance with the MoU agreed to in August 2006, which provides for a large role for cooperative unions in the provision of inputs, beginning with the 2009/10 crop season. The government has increased its risk by providing a credit guarantee to input loans made to farmers through the cooperative unions. The performance of this new system has not yet been evaluated; however, past experience in tobacco and other industries suggests that the cooperative unions and primary societies will not be as efficient at providing inputs to farmers as were the tobacco companies under the ATTT. This will most likely result in lower prices for farmers because of higher costs in input supply. The government also has taken a risk by guaranteeing input loans to cooperative unions.

Notes

1. The traditional export crops include cashews, cloves, coffee, cotton, sisal, tea, and tobacco.
2. Tanzanian Leaf Tobacco Company (TLTC). Personal Communication with CEO, August 2010.
3. Alliance One. Personal Communication with CEO, August 2010.

4. The share of tobacco export prices received by farmers is lower than in other industries, such as cashews, because the crop is processed rather than exported in raw form.
5. Premium Active. Personal Communication with CEO, August 2010.

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CHAPTER 10

Performance of Zambia's Cotton Sector under Partial Reforms

Fahrettin Yagci and M. Ataman Aksoy

Cotton is the largest cash crop in Zambia. It is grown in the eastern, southern, and central provinces by about 150,000 families. About 1 million Zambians depend on the cotton sector for their livelihood. Small farmers, a large proportion of whom live on incomes below the poverty line, make up a very large segment of this group. The sector also earns an average of about US$50–70 million in foreign exchange a year for the country, and it has potential for significantly increasing its contribution to employment, national income, export diversification, and poverty alleviation in Zambia.

In the early 1990s, Zambia introduced a series of reforms to boost agricultural production as part of its efforts to reduce its heavy dependence on copper. As a result, agriculture emerged as an important source of export diversification and economic growth. Agricultural reforms included the privatization of the Lint Company of Zambia (LINTCO) in 1994—a national public monopoly in the ginning industry. The cotton

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The findings, interpretations, and conclusions expressed herein are those of the authors and do not necessarily reflect the views of the World Bank and its affiliated organizations. We would like to thank Stephen Kabwe and Richard Bwalya for their substantive contributions to this chapter. We would also like to thank Kapil Kapoor, Indira Ekanayake, and the officials and industrialists who helped us during the mission. Any errors are our own.

sector performed well since then, with an average annual growth rate of 9 percent, despite two production collapses that were the result of disruption of input provision to farmers. This growth rate was achieved against a persistent decline in international cotton prices since 1995 and substantial appreciation of the exchange rate, particularly after 2004. Significant potential exists for higher growth in the sector, particularly in the form of yield increase.

This chapter aims to identify the factors underlying the good performance and occasional collapse of production in terms of the structure of the market, main players in the sector, and the policy environment directly and indirectly affecting the industry. The objective is to assess the ability of the sector to react to adverse policy developments and shocks and maintain growth momentum. It is also hoped that understanding Zambia's experience will provide insights for other countries and commodities.

The rest of the chapter is organized as follows.[1] The section "Policy Environment and Institutional Arrangements" briefly describes the main changes in the policy environment and institutional arrangements in the cotton sector since the privatization of LINTCO and sets the stage for data analysis. The sections "Cotton Sector Response to Privatization" and "Major Challenges Remaining" review the performance of the sector in the period 1994–2008 in terms of main economic, social, and institutional indicator trends and point out the remaining challenges to the sector. The sections "Effective Outgrower Scheme" and "Partial Nature of the Reform Program and Remaining Challenges" seek to identify the principal determinants underlying the sector's successful but unstable performance. The concluding section highlights the main political economy features of the cotton sector and seeks to distill lessons from the Zambian experience. The data used in the chapter are presented in annex 10.2.

Policy Environment and Institutional Arrangements

Until 1994, the cotton sector was dominated by LINTCO, a state-owned cotton company. LINTCO provided agricultural inputs (seed, fertilizer, pesticide, etc.) and extension services to farmers under near monopsonistic conditions and purchased their seed cotton at a fixed price in a near monopolistic environment. The sector performed badly under these arrangements, with an annual average production of 32,000 tons of seed cotton in the five years before 1994. Also, LINTCO suffered from large financial losses. At times, it failed to pay farmers and its staff. The privatization of LINTCO in 1994, an initiative garnering broad consensus among all stakeholders in the sector and political community, was the necessary first step in restructuring the cotton sector. Its eastern operations were sold to Clark Cotton, and the southern and central ones to Lonrho Cotton. Geographically divided, there was little competition between these companies (see box 10.1 for the main policy initiatives and the changes in the institutional structure of the sector since 1994).

These two companies worked effectively as regional monopsonies and monopolies until 1997, when new ginners began to enter the market.

Box 10.1

Main Policy Initiatives and Institutional Changes in the Cotton Sector

1994 – LINTCO was sold to Lonrho and Clark Cotton. The two companies operated in separate regions of the country. Lonrho was sold to Dunavant in 1999. Clark was acquired by Cargill in 2006.

1999 – The Cotton Development Trust (CDT) was established as an autonomous public agency to conduct research and provide extension services and training to farmers. Its efforts have focused largely on the development of new seed varieties.

2002 – The Cotton Outgrower Credit Fund (COCF) was launched as a publicly funded line of credit for ginners, for input provision to farmers. The Fund was managed by the CDT. It was later expanded and turned into a revolving fund in 2005. The Fund financed mainly smaller ginners to encourage them to participate in the input credit system and reduce the amount of side-selling. The Fund has not been operational since 2007 because of lack of resources.

2003–05 – The Cotton Act was prepared in 2002/03 without adequate consultation with ginners and farmers. After undergoing several revisions, it was approved by Parliament in 2005 but not implemented, largely because of the concerns expressed about the heavy regulatory role and policing responsibility given to the Cotton Board, which was to be created under the Act. Instead, stakeholders were asked to collaboratively review the Act and propose revisions. Such revisions have been prepared, but the government has not yet acted on them.

(continued next page)

Box 10.1 *(continued)*

2005 – Under the aegis of the Zambia National Farmers' Union, the Cotton Association of Zambia (CAZ) was formed to represent cotton farmers. It participates in consultations on cotton sector policies and farm gate price negotiations with the Cotton Ginners Association.

2007 – Four larger ginners (Dunavant, Cargill, Great Lakes, Birchand) formed the Zambia Cotton Pre-Financiers' Association (ZCPA) to encourage cooperation among the ginners to reduce credit defaults. It did not do well and is now defunct.

2009 – Following pressure from Dunavant and CAZ, the Cotton Board was established under the 2005 Act. Halting side-selling is a key responsibility of the Cotton Board. It will also develop procedures for licensing and maintain a database of farmers' credit status, but will not play a role in price setting. The Board is not yet fully operational mainly because of the limited funds it receives from the government.

Source: Authors.

Lonrho was sold to Dunavant in 1999, during the first credit default crisis. The number of companies in the ginning industry continued to increase after 2003. Clark was succeeded by Cargill in 2006. Today, there are seven ginners in the industry, but Dunavant and Cargill dominate the industry with a market share of over 80 percent between them (see Annex 10.1).

A key feature of Zambia's cotton sector is the outgrower scheme developed by Lonrho and Clark in the second half of the 1990s, under which they provided inputs on credit, extension, and quality management services to farmers, and bought seed cotton from farmers at predetermined prices. Later, the scheme was significantly improved by Dunavant and Cargill. Although the objective is the same, major differences exist between the outgrower schemes currently implemented by Dunavant and Cargill. Dunavant's system relies on independent "distributors" contracted by the company. These distributors recruit farmers, deliver inputs on credit provided by the company, and mobilize output. Their remuneration is determined by the amount of credit recovered on an increasing scale. They make the final determination as to the credit-worthiness of the farmers based on the detailed data they keep and local knowledge they have. These distributors must achieve at least an 80 percent credit repayment rate to keep their contracts. Cargill's system, developed originally by Clark, is more traditional. It relies largely on the company's employees for input distribution, credit repayment, and output collection. Unlike Dunavant, Cargill signs contracts with farmers and maintains detailed farmer data on input delivery, credit extension and recovery, and cotton sales.[2]

Dunavant, as the dominant ginner holding a market share of 50–60 percent, acts as a price leader, announcing a minimum preplanting price to farmers for seed cotton, which may be adjusted during the buying season. Cargill normally follows Dunavant's pricing, whereas smaller ginners frequently pay higher prices than Dunavant.[3]

Governmental intervention in the cotton market has been minimal since 1994. During the first crisis (1999/2000), the need for cooperation and regulation emerged in the sector, but until 2002 the government adopted a hands-off policy. The exception to this stance was the establishment of the Cotton Development Trust (CDT) in 1999 as a technical agency to undertake research and provide training and extension services. In 2002, the Cotton Outgrower Credit Fund (COCF) was established in close collaboration with the Zambia Cotton Ginners' Association (ZCGA), an institution representing the sector's ginners. The objective of the COCF was to finance smaller ginners to encourage them to participate in the input credit system. The responsibility for the Fund's management was given to the CDT. It was later expanded and turned into a revolving fund in 2005. The Fund has not been operational since 2007 because of lack of resources. The initiative was partially successful in bringing smaller companies into the outgrower scheme, and some smaller ginners now participate in the input credit system. Its impact was limited, however, because the CDT was unable to develop effective eligibility criteria for the allocation of COCF,[4] and the area financed under this Fund remained at about 3 percent of the total area under cotton production.

Another government initiative was the preparation of the Cotton Act in 2002/03, with the objective of creating a legal and regulatory environment that would facilitate better cooperation and coordination among the main players in the sector and avoid a repeat of the input credit system disruption and the collapse of production experienced in 1999 and 2000. The Act was prepared without consultation with farmers and ginners. It proposed a Cotton Board as a regulatory body with overarching responsibilities. After going through several revisions, it was signed into law in 2005, but implementation was postponed as a result of strong opposition from stakeholders to the heavy regulatory and policing role given to the Cotton Board. Consequently, consultations were held with all stakeholders, and the law was revised accordingly. Revisions were prepared by the Cotton Act Working Group (CAWG), with participation of the main stakeholders, and these revisions were submitted to the Ministry of Agriculture and Cooperatives (MACO). The MACO has not yet acted on the proposed revisions nor submitted them to the parliament.

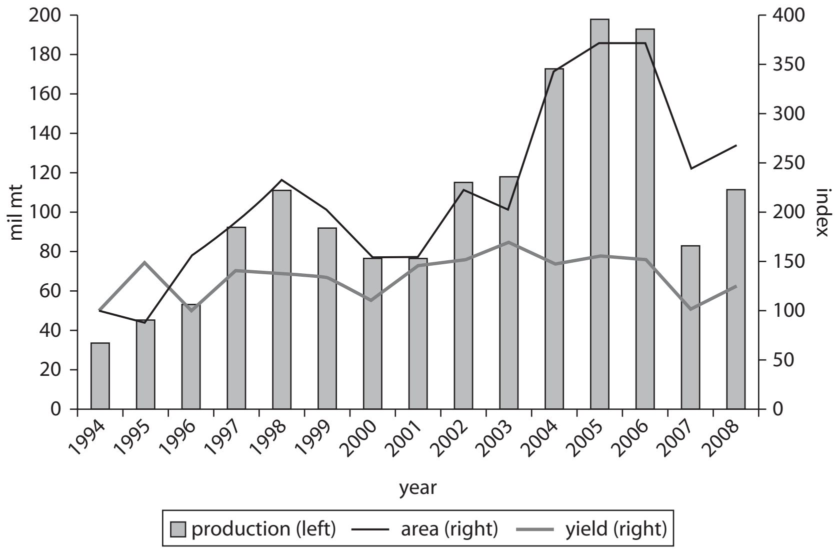
Following pressure from Dunavant and CAZ, the Cotton Board was established under the 2005 Act, pending passage of the proposed revisions to the Act. All stakeholders are represented on the Board, and six of the 12 members are from the public sector. Halting side-selling through strong policing activities and inspectors is a key responsibility of the Cotton Board. It will also develop procedures for licensing and conditions of entry in the ginning industry and maintain a database of farmers' credit status. The Board does not play a role in price setting, which is left to negotiations between ginners and farmers. The Board is not fully operational because of the limited funds it receives from the government.

Cotton Sector Response to Privatization

The cotton sector reform has been largely successful in Zambia. Since the privatization of the ginning industry in 1994, seed cotton production has grown at a rate of 9 percent a year, outperforming most other cotton producers in Africa.[5] From an average level of 32 million tons over five years before 1994, seed cotton production reached a level of 170–200 million tons during 2004–06, before falling to 86 million tons in 2007. Production in 2009 is estimated at 110 million tons. Growth came mainly from area expansion, which increased at an annual average rate of 8 percent. Yield increase was moderate, averaging 1 percent a year (figure 10.1). The quality of cotton has also increased significantly. Zambian cotton now receives a quality premium of 8.8 cents per kilogram in international markets—the highest premium in Africa (table 10.1).

In addition, Zambia has emerged as the most competitive among Africa's cotton producers, with the lowest ratio (0.78) of total free-on-truck (f.o.t.) costs to f.o.t. value (table 10.1). This is largely a result of the very high price premium Zambia earns on international markets because, as shown in table 10.1, it does not have the lowest unit production cost in the ginning industry. At 0.32 US$/kg, the unit production cost of lint in Zambia is higher than in Cameroon, Tanzania, Uganda, and Zimbabwe.

Figure 10.1 Seed Cotton—Production, Area, and Yield Increase



Source: Authors.

Table 10.1 Comparative Performance across Key Indicators

	Price premium US$/kg lint	*Competitiveness US$/kg lint*	*Farmers' share of f.o.t. price*	*Production cost US$/kg lint*	*Average yield kg/ha*
Benin	2.2	n. a.	0.67	n. a.	1,079
Burkina Faso	2.2	1.05	0.66	0.37	1,041
Cameroon	4.4	0.99	0.68	0.31	1,150
Mali	0	1.15	0.65	0.45	1,000
Mozambique	–4.4	0.80	0.50	0.38	349
Tanzania	–4.4	0.83	0.68	0.21	585
Uganda	2.2	0.93	0.70	0.31	n. a.
Zambia	8.8	0.78	0.59	0.32	668
Zimbabwe	6.6	0.85	0.58	0.26	742

Source: Tschirley, Poulton, and Labaste 2009.
Note: f.o.t = free-on-truck, n. a. = not applicable.
Price premium: weighted average premium over Cotlook A Index, 2007.
Competitiveness: f.o.t. costs/f.o.t. revenue, 2007.
Producer share of f.o.t. lint price: 1995–2005.
Production cost: farm gate to f.o.t., 2007.
Average yield: 2003–07.

Because the sector had been vertically integrated, a large part of the domestic textile industry collapsed after rapid import liberalization in 1991, particularly after allowing unlimited imports of second-hand clothing. Since then, about three-quarters of cotton is exported after ginning. A large part of it goes to South Africa. Figure 10.2 shows the structure of exports from the cotton and textile industry since 1990.[6]

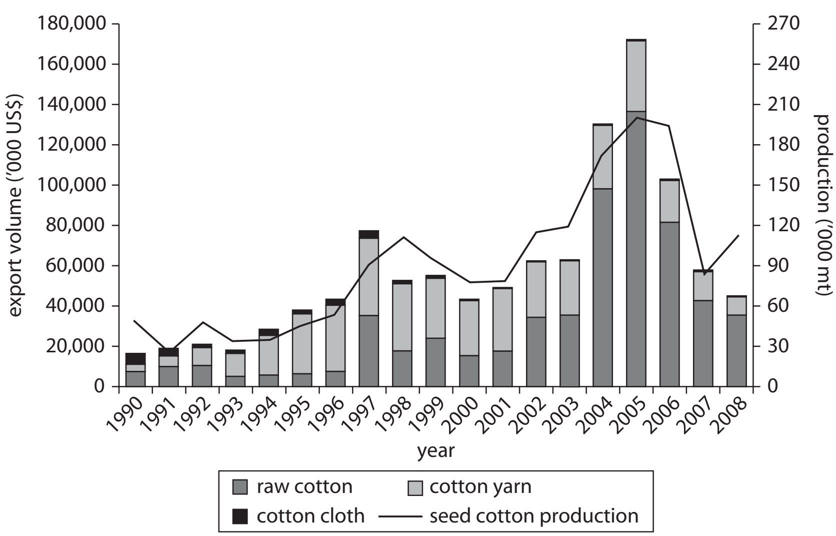
Between 1990 and 1997, a small amount of cotton cloth and very little raw cotton was exported, with most of the cotton produced used for local processing. Furthermore, cotton production was limited. Raw cotton exports and output increased after the 1994 reforms and followed the pattern of production (for example, in years of high production, raw cotton exports are high). The value of yarn exports stayed about the same until 2004, suggesting limited capacity to convert cotton into yarn.

Major Challenges Remaining

Successful growth performance notwithstanding, the Zambian cotton sector faces three major challenges.

- *Unstable growth*. Growth was disrupted twice, during 1999/2000 and 2006/2007, when outgrower arrangements between the farmers and

Figure 10.2 Cotton Exports and Production



Source: Authors.

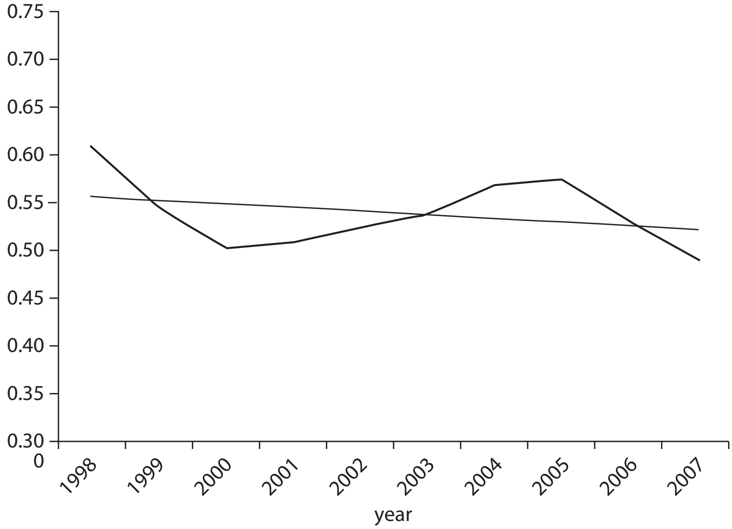
the two dominant ginners broke down as a result of large side-selling cum credit defaults by farmers and the resulting disruption in input supply on credit by the ginning companies (figure 10.1). The first crisis was caused by fierce, unregulated competition from new ginning companies and the entry of a large number of cotton traders into the market in 1997 and 1998. The new entrants did not provide preharvest credit and services to farmers, but competed with Lonrho and Clark for seed cotton on the basis of price at harvest, thus encouraging side-selling and credit default by farmers. Lonrho and Clark reduced the provision of input credit in the next cropping season, generating a sharp fall in area under cotton (figure 10.1 and annex 2). The sector rapidly recovered, to enjoy a boom in the following years because the two dominant ginners significantly improved the input credit system.

The second crisis developed similarly but was triggered by a 70 percent appreciation in the Zambian kwacha in 2005 and 2006. The Zambian government had delayed currency appreciation during the copper price boom in an effort to protect its substantial increase in foreign exchange earnings from copper exports. As a result, Dunavant and Cargill failed to pay the price they announced before the appreciation, triggering side-selling and credit default by farmers. Credit recovery, normally over 85 percent, fell below 70 percent during both crises. Recovery from the second crisis has been much slower because of its greater depth. The crisis also resulted in segments of cotton growers losing confidence in the outgrower system when dominant ginners failed to pay the preannounced price. Low prices for cotton in the world markets compared to other products, along with the appreciating currency, also slowed recovery to precrisis levels.

It is important to note, however, that the outgrower scheme did not collapse as a result of these crises. In fact, it has been consistently improved over time by the two dominant ginners.[7]

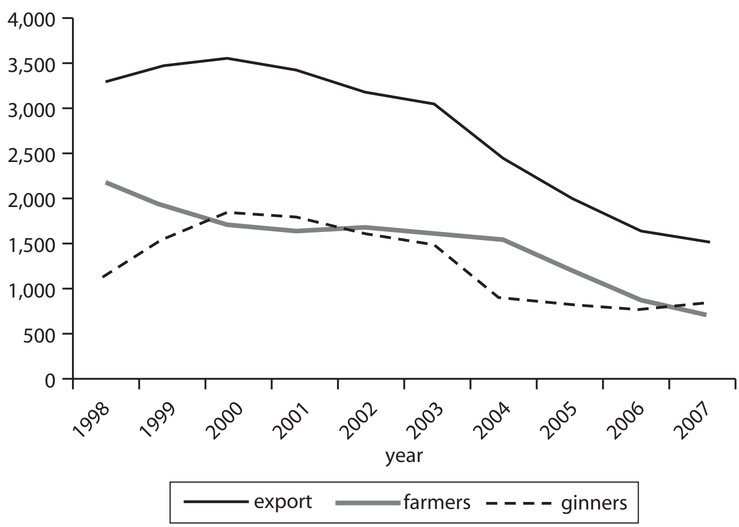
- *Inequitable distribution of benefits between farmers and ginners*. The farmers' share in export value has fluctuated but shows a clear declining trend despite increasing yields and quality of seed cotton (figure 10.3a).[8] The farmers' share declined from an average 65 percent in 1997–99 to an average 45 percent in 2006–08, with a corresponding increase in ginners' share.[9] The unit export price in local currency in real terms declined at an annual rate of 9.7 percent from 1997 to 2008.[10] The

Figure 10.3a Farmers' Share in Export Price



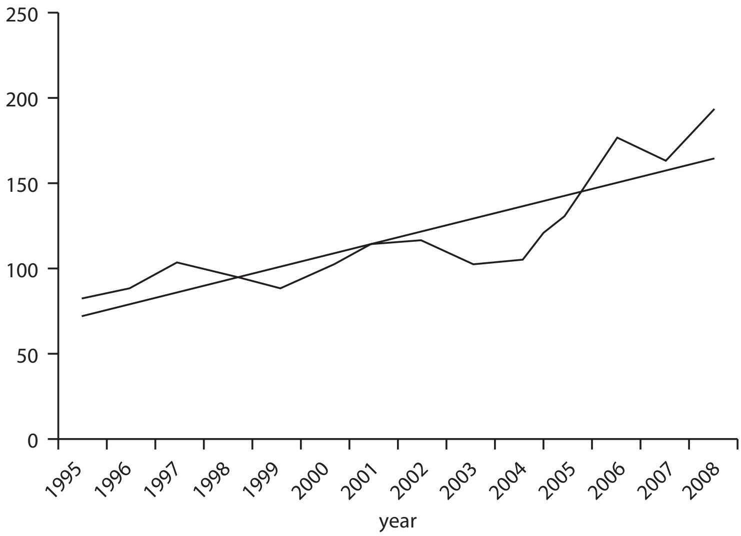
Source: Authors.

Figure 10.3b Real Prices—Export, Farmers, Ginners



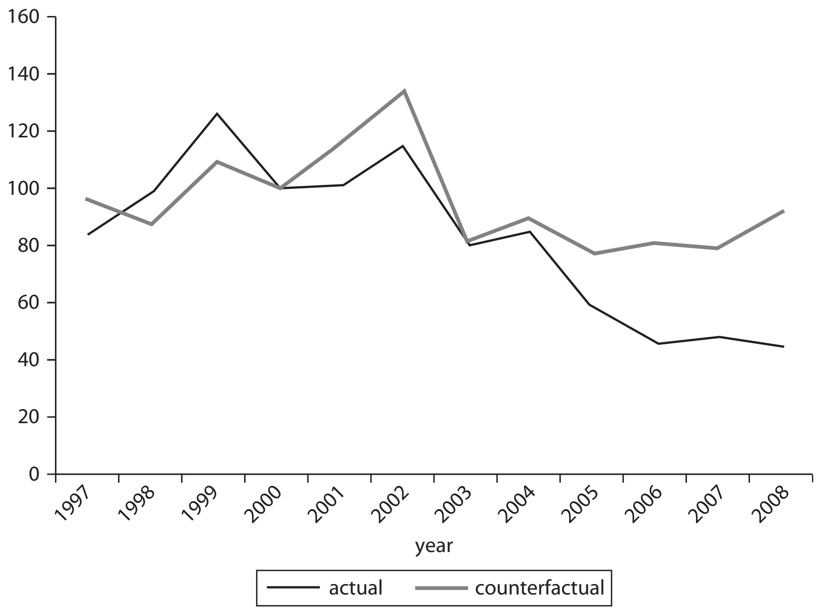
Source: Authors.

Figure 10.3c REER



Source: Authors.

Figure 10.3d Real Export Unit Price (Actual and Counterfactual), Index



Source: Authors.

burden of adjustment to this was not evenly shared by farmers and ginners. Although the price received by farmers declined 11 percent annually in this period, the fall in the price received by ginners was contained at 7.1 percent (figure 10.3b). It appears that by using their dominant position in setting farm gate prices, the ginners managed to shift the larger part of the adjustment on to the farmers, thus minimizing the impact of declining export prices on their profitability. Note that the farmers' shares in Tanzania and Uganda, where the cotton market is less concentrated, were substantially higher compared to Zambia, despite the higher quality cotton produced by Zambian farmers (table 10.1).[11]

- *Slow yield increases.* The yield increase, which is critically important for improving returns to farmers and reducing poverty, has been steady but slow, averaging only about 1 percent per year since 1994. Currently, yields in Zambia (about 700 kg/ha) are significantly lower than those in western and central African countries (table 10.1) and about half of the world average for rain-fed cotton. Rapid area increase is an important cause of low average yields and slow growth. Yields are much higher among larger and more experienced farmers who have better access to extension advice and animal traction. In the eastern provinces, for example, average yields go as high as 1,200 kg/ha. The increasing entry of new and inexperienced farmers has lowered the average yield and its growth. Tschirley and Kabwe (2009a) show that most farmers do not earn as much as the rural wage from cotton production.[12] Only the biggest and richest farmers earn more, due to higher productivity and better use of technology and inputs. During the crisis year of 2006, even the best farmers did not earn enough to match their earnings from basic labor. Thus, most of these households did not commit fully to efficient cotton production by investing in traction and other inputs to increase their productivity; subsequently, they failed to achieve independence from the ginning companies. In that sense, the extension system has not been successful and has left itself vulnerable to shocks.

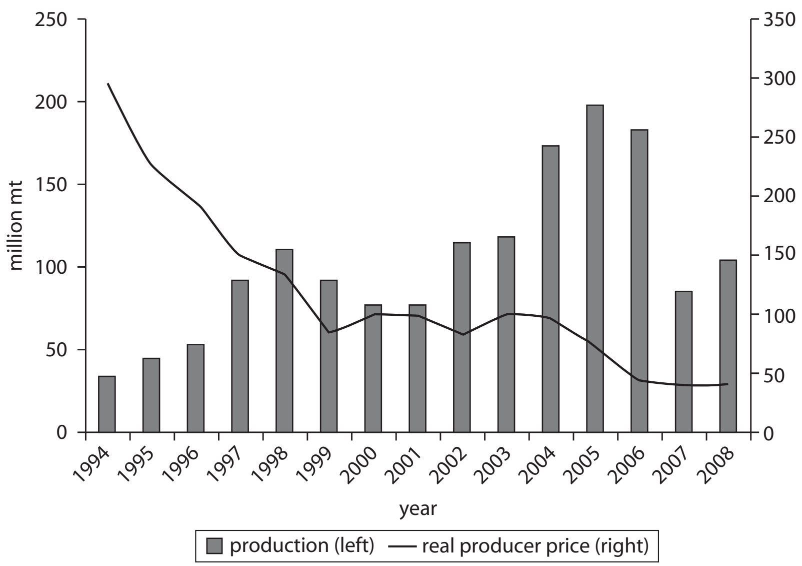
Effective Outgrower Scheme

The marked improvement in cotton sector performance after privatization was due largely to the successful outgrower scheme, which was introduced and consistently improved by the dominant ginning companies. The system secured the farmers' guaranteed delivery of inputs, extension, and other services, as well as the purchase of their product at preannounced prices, thus helping to build capacity and productivity among farmers. As a result, seed production maintained a 9 percent trend growth rate since 1994, despite a sharp fall in producer prices in real terms (figure 10.4). This has been achieved without any governmental intervention.

Effective provision of these services is critically important for agricultural development, particularly in places where smallholder farmers without working capital are dominant and rural credit markets do not exist. Credit arrangements by governments to small farmers have largely failed in Africa, but the innovative approach taken by the ginning companies in Zambia has worked well for the cotton sector.

Maize is a close substitute for cotton, thus a positive relationship would be expected between the production and relative price of cotton with respect to maize. A preliminary review of data shows otherwise. The relative price of seed cotton with respect to maize has declined significantly since 1994, whereas the area under cotton and production of cotton grew substantially faster in comparison to maize. Also, evidence

Figure 10.4 Seed Cotton Producer Prices and Production



Source: Authors.

shows that the rate of return to family labor in cotton production is lower compared to maize.[13]

The absence of substitution between cotton and maize in production is explained largely by the differences in the policy environment and market structure in which these crops operate. Maize is a politically and socially sensitive crop in Zambia. It is an important food crop, produced by a larger number of households. There is a high degree of politization in maize policies when compared to policies affecting cotton. The government guarantees a politically determined, minimum fixed price to maize producers and commits to buy all maize offered to it at that price. It also provides fertilizer at subsidized prices. Therefore, the link between the international price and the farm gate price is relatively weak in the case of maize. In contrast, the cotton sector does not enjoy such political protection. Given the world price and exchange rate, prices received by cotton producers are determined largely by the dominant ginners. However, maize producers buy their inputs in the market. That is, the option of purchasing agricultural inputs on credit, available to cotton producers, does not exist for maize producers.

The question is why farmers do not switch to maize production (some farmers switched only during the crisis years). One possible answer is that price is a strong incentive to farmers only if they have working capital or access to credit at a reasonable price that allows them to buy the necessary inputs for production. In other words, availability of agricultural inputs enables farmers to take advantage of price incentives. A related question is why maize farmers have access to credit while cotton producers do not. This may be explained by two factors. First, compared to cotton production, the amount of purchased inputs and the need for working capital is small in the case of maize production. Second, the risk of lending to maize farmers is lower because of the protection they receive from the government in the form of a politically determined price. Finally, farmers earn high returns when they sell to government procurement agencies at high prices. Given limited public resources and uneven access to these agencies, if they cannot sell to these agencies, then maize has to be sold at much lower prices in the local markets. Thus, the higher returns for maize cannot be obtained if it cannot be sold to the government. In case of cotton, an established price is set, however low, and the ginners buy all the cotton that can be produced.

Yet another question asks why larger ginners did not abandon the outgrower scheme but continued to improve it, despite deep crises induced by credit defaults. The answer may lie in the fact that the dominant position of larger ginners in the market, in the absence of government intervention, enabled them to set the farm gate prices and thus control the distribution of benefits.

Partial Nature of the Reform Program and Remaining Challenges

A key weakness of the cotton sector reform program is that it focused exclusively on the privatization of LINTCO, and the necessary complementary measures have not been taken. As a result, the full benefits of privatization have not been realized. In particular,

1. *Privatization of LINTCO turned a national public monopoly into regional private monopolies without any regulatory arrangement to set the rules under which the sector operates.* As new entry into the market and competition ensued in 1997, the outgrower scheme came under pressure. Because these new entrants did not provide preharvest credit and services to farmers, they offered higher prices at harvest, thus encouraging side-selling and credit default by farmers in the absence of necessary operating rules for pricing, competition, and coordination in the market. After the 1999/2000 crisis, the outgrower scheme was significantly improved, with particular emphasis placed on contract enforcement. However, without any regulatory arrangements in place, the sharp appreciation of the currency in 2006 led to a similar side-selling cum credit default crisis in 2006–07, which again disrupted the input credit system and production.

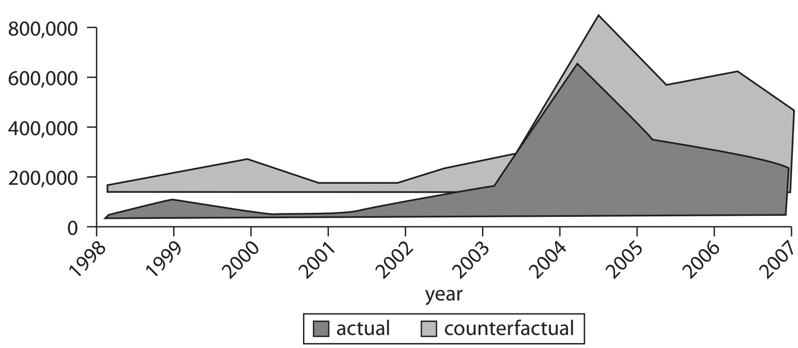
   As noted, some progress has been made to put in place a regulatory framework to improve competition. Under the 2005 Cotton Act, the Cotton Board was established with a primary responsibility of halting side-selling. It will develop procedures for licensing to ensure orderly entry into and exit from the market, and it will maintain a database of farmers' credit status. The Board is not yet operational because of limited funding from the government.

2. *Poorly organized farmers lack adequate bargaining power against well-organized ginners in setting farm gate prices.* Dunavant, as the price leader, has determined farm gate prices largely on its own. Farmers and the government have no say in pricing. As noted, this lack of

farmer bargaining power and pricing rules in the sector enabled ginning companies to tilt the distribution of benefits excessively in their favor. Establishment of the Cotton Association of Zambia (CAZ) in 2005 as the representative of the cotton farmers is a step in the right direction. However, inadequate institutional capacity hampers its forceful participation in pricing and other policy decisions in the sector. Substantial technical assistance will be needed to enhance the capacity of the CAZ to organize farmers more widely, gather and analyze market information, and train its staff to improve their negotiation and consultation skills.

3. *The government has failed to maintain a competitive exchange rate.* The Zambian government allowed the exchange rate to appreciate at an average annual rate of 5.4 percent since 1994. Appreciation accelerated following the copper price boom, recording an 80 percent increase in the real exchange rate from 2004 to 2008, thus significantly suppressing the local currency price of all exports including cotton (figure 10.3c and annex 2). The counterfactual calculations show that, in the absence of appreciation, the decline in the export price of lint in real terms in local currency would have been only 3.0 percent instead of 9.6 percent from 1998 to 2008 (figure 10.3d). This would have resulted in additional revenues of about 45 percent of the actual revenues received during the 1997–2008 period, with a likely result of a substantially higher return to farmers and higher growth in production (figure 10.5). Active management of the exchange rate will be needed to avoid significant overvaluation and ensure adequate revenues for the sector.

Figure 10.5 Actual and Counterfactual Export Revenues



Source: Authors.

4. *The provision of services affecting yields was left almost entirely to ginners.* The dominant ginners have consistently provided farmers with high-quality seeds, insecticide treatment, fertilizer, and advice on agronomic practices and quality management, but their resources were insufficient to meet the needs of a rapidly increasing number of farmers entering cotton production. Larger farmers benefited most from these services. The CDT, the institution responsible for research and development, extension services, and training, used its limited resources mainly to develop new seed varieties.

Substantial scope exists for yield improvement. The yield potential of the Chureza, F-135, and CDT 2 cotton varieties currently used is over 2,000 kg/ha, three times the mean yields currently realized. Mean yields achieved in demonstration plots managed by lead farmers operated under Dunavant's YIELD (Yield Improvement through Empowerment, Learning and Discipline) Program are over 1,400 kg/ha.[14] Research also shows that animal traction increases yields significantly. A comprehensive program for yield enhancement will be needed to realize this untapped potential. This would include expanding Dunavant's YIELD Program to cover a larger number of farmers, enhancing the capacity of the CDT to supplement private companies' efforts in provision of extension services, facilitating farmers' access to funds to acquire farm assets, and improving agricultural infrastructure, including irrigation.[15]

Low cotton prices were partially caused by the adoption of Bt cotton in India and China (Baffes 2012). The lack of Bt cotton adoption by Sub-Saharan African countries has resulted in an inability to gain the benefits of higher yields at lower costs, which would have counteracted the negative effects of low prices. The CDT tried to develop the institutional structure to adopt Bt cotton in the early 2000s, but the effort was rejected by the current president and abandoned.[16]

Conclusions

The driving force behind the successful growth performance of Zambia's cotton sector is the input credit and extension scheme effectively implemented by two dominant ginning companies operating under limited competition. Smaller companies have also begun to participate in this scheme. The experience of some African countries shows that competition beyond a certain point carries the risk of undermining the input credit system.[17] It is advisable, therefore, to maintain a concentrated market structure that enables well-established larger companies to continue implementing the current outgrower scheme in Zambia, unless an equally effective input credit and extension system is put in place. However, as noted, the current system has a number of weaknesses, including instability in growth and a declining share for farmers in the lint export value.

To maintain growth momentum and ensure stability and more equitable distribution of benefits, it is advisable to preserve the current outgrower scheme but complement it with measures to fill the remaining policy gaps and create a flexible participatory policy environment.

A critical issue is to determine which features of the sector explain its remarkable resilience and adaptability to the adverse policy changes and local and external circumstances of the past 15 years and its ability to react quickly to these developments to restore and maintain growth momentum. The analysis of this chapter indicates the following.

- There was a broad consensus on the initial reforms because the sector performed very badly in the pre-reform period. All stakeholders strongly believed that privatization and minimum government interference in the sector was the right direction to go. This strong belief has been one reason why no stakeholder insisted on the reversal of reforms when the sector's good performance was severely disrupted twice. This occurrence is consistent with the framework outlined in Aksoy and Onal (2012) and has generated a successful reform. There was consensus on the reforms, cotton was not a major rent allocation mechanism, and the multinational companies did take the place of the parastatals and did not supply price services more efficiently.
- The only losers were LINTCO employees, who were not being paid regularly due to the company's bankruptcy and were easily absorbed into new private companies. Thus, no group would gain through the reversal of the reforms.
- Compared to maize and copper, cotton is not a politically sensitive sector: a relatively small number of households are involved in cotton production, its effect on food security is limited, and it is not the key foreign exchange earner of the economy. Therefore, the sector did not attract political attention and did not suffer from quick policy decisions made for short-term political gains. As a result, the reforms not only managed to survive, but also were strengthened by supplementary measures.
- The sector's dominant, internationally experienced large companies recognized its potential and made long-term commitments to it.

Faced with difficulties, they innovated to address problems instead of abandoning the sector. Absence of frequent and haphazard governmental intervention gave these companies a free hand to find the right solutions.

- The government's hands-off approach and the weak bargaining position of the farmers enabled the dominant ginners to set farm gate prices in such a way that the larger part of adjustment to declining real export prices accrued to farmers, thus minimizing the impact on their profitability—another possible factor that could explain the dominant ginners' continued commitment to the sector.
- Access to inputs on credit and a secure market for output appear to be stronger incentives for cotton producers in Zambia when compared to farm gate prices, as clearly demonstrated by the significantly faster expansion of area under cotton compared to area under maize despite a substantial decline in farm gate price of cotton relative to maize.
- Quick success in the initial few years created an environment of confidence and trust in the reforms and the main players in the sector, preventing the search for radical alternatives to reforms. The quick initial success was explained by grim initial conditions, as well as by the selection of the correct reform measures.

It is not clear what will happen over the next few years. Maize prices are expected to decline due to overproduction; there is a more competitive exchange rate and hopefully a more effective Cotton Board will develop.[18] Some of the marginal ginners responsible for side-selling have also left the industry. Cotton prices have risen in the international markets, which will allow ginning companies to pay higher prices to farmers. Whether this begins a new production cycle or a new and higher sustained growth path will depend on the success of the Cotton Board and the agreements of all actors and whether the firms can create a more commercial set of farmers.[19]

Annex 1

Ginning Capacity in Zambia (000 tons)

Table 10A1.1 Ginning Capacity in Zambia
(000 tons)

	1994/95	*1995/96*	*1996/97*	*1997/98*	*1998/99*	*1999/00*	*2000/01*	*2001/02*	*2002/03*	*2003/04*	*2004/05*	*2005/06*	*2006/07*	*2007/08*	*2008/09*	*2009/10*
Lonrho/ Dunavant	70	70	70	70	70	70	70	70	87	109	109	109	119	119	119	119
Clark/Cargill	20	20	40	40	40	40	40	40	40	60	60	60	60	60	60	60
Continental Ginneries			8	8	8	8	8	8	8	8	8	18	18	18	18	18
Z – C Mulungushi			10	10	10	10	10	10	10	10	10	10	10	10		
Mukuba			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
Amaka Holdings			22	22	22	22	22									
Chipata China Cotton											15	15	15	15	30	30
Great Lakes												10	10	10		
Alliance Cotton													10	10	10	10
Birchaand Oil Mills															10	10
Yustina														10	10	10
Olam*															x	x
Luangwa*															x	x
Independent traders*			x	x	x	x										
Total capacity	90	90	150.5	150.5	150.5	150.5	150.5	128.5	145.5	187.5	202.5	222.5	242.5	252.5	257	257

Source: Authors.
* Operate only outgrower schemes but do not have ginneries.

Annex 2

Zambia Cotton Sector Data

Table 10A2.1 Zambia Cotton Sector Data

	Seed cotton production (mil mt)	*Area under seed cotton (000 ha)*	*Seed cotton yield (kg/ha)*	*Farm gate price (kw/kg)*	*Ginning ratio*	*Unit export price (cent/kg)*	*A index price (cent/kg)*	*Nominal exchange rate (kw/$)*	*Real effective exchange rate (index)*	*GDP deflator (2000 = 100)*
1994	34	74	462	500	0.38	107	176	669	87	25
1995	45	65	688	621	0.38	128	213	864	83	34
1996	53	115	458	558	0.38	113	177	1,208	90	42
1997	92	140	658	534	0.38	110	175	1,315	104	53
1998	111	173	639	570	0.38	107	144	1,862	98	63
1999	92	150	615	444	0.39	131	117	2,388	88	77
2000	77	150	513	680	0.39	104	130	3,111	100	100
2001	77	114	675	840	0.39	112	106	3,611	114	124
2002	115	165	697	860	0.40	127	102	4,399	117	150
2003	118	150	783	1,220	0.40	89	140	4,733	103	180
2004	173	254	679	1,420	0.40	122	137	4,779	106	213
2005	198	300	718	1,220	0.41	105	122	4,464	133	250
2006	183	300	701	850	0.41	115	127	3,603	177	283
2007	86	180	463	850	0.42	122	140	4,003	165	317
2008	104	198	574	1,000	0.42	146	157	3,746	191	351

Sources: Tschirley, Poulton, and Labaste 2009 (columns 2, 3, 4, 5, 6); FAO (columns 7, 8); IMF (columns 9, 10, 11).
Note: GDP = gross domestic product.

Notes

1. The Zambian cotton sector has been studied extensively: see, in particular, Tschirley, Poulton, and Labaste (2009), Tschirley and Kabwe (2009a), and Tschirley and Kabwe (2009b). These studies provide substantial detail of the structure and performance of the sector. This chapter seeks to contribute to this literature by focusing on the factors determining the ability of the sector to respond to adverse policy changes and shocks.
2. See Tschirley and Kabwe (2009a) for a detailed discussion of these outgrower schemes.
3. For a detailed discussion of the pricing system and prices paid to farmers in Zambia and other cotton producers in Africa, see Tschirley, Poulton, and Labaste (2009).
4. Some of the smaller ginners did not maintain open records of the use of the funds they received from the COCF. Despite this, the CDT continued allocating funds to these companies (Tschirley and Kabwe 2009a).
5. All growth rates reported in this chapter are least-squares growth rates, estimated by fitting a linear regression trend line to the logarithmic annual values of the variables in the period 1994–2008.
6. These data are from Commodity Trade Statistics Database (COMTRADE) partner data. It might underestimate their exports to other Sub-Saharan African countries.
7. Note also that seed cotton production during the first and second crises was 2.5 and 5.0 times higher, respectively, compared to its pre-reform level.
8. See Tschirley and Kabwe (2009b) for similar results.
9. Distribution of benefits was estimated for the period 1997–2008 because, until 1997, lint exports were very small. Also, three-year moving averages of the unit export price and the prices received by farmers and ginners were used to see the trends more clearly.
10. It will be shown later that a larger part of this fall is explained by the substantial appreciation of the kwacha. The world prices of cotton in U.S. dollars remained stagnant in this period because of the massive production increase in China and India in response to the introduction of biotech cotton varieties.
11. Note that the farmers' shares were substantially higher in a number of other African countries during 1995–2005 (table 10.1). However, these countries have administered prices, which may not be sustainable over a longer period because of the large sectoral deficits administrative pricing generates.
12. That is, if they had worked as agricultural wage laborers instead of growing cotton, they would have made more money.
13. See Tschirley and Kabwe (2009a).

14. With funding from the German Development Agency (GTZ), Dunavant has been implementing the YIELD Program since 2005/06. The program includes demonstration farms run by lead farmers who apply the "five-finger" principle to field management (early and proper land preparation, planting with first rains, correct plant population, timely weeding, and effective pest management).
15. Since 1996, biotech cotton has been introduced successfully in a number of countries, with substantial increases in average yields. With the exception of Burkina Faso and South Africa, no African country has yet adopted this technology. Discussions in Zambia are ongoing on the adoption of biotech varieties.
16. Personal interview with CDT officials.
17. For a detailed discussion of the performance of the cotton sector under various regimes, see Tschirley, Poulton, and Labaste (2009).
18. The government has been a marginal player in this sector, and so far has not fully supported the Cotton Board.
19. The YIELD program targets larger and more reliable farmers and tries to increase their yields and convert them to more commercial production systems.

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Tschirley, D., C. Poulton, and P. Labaste, ed. 2009. *Organization and Performance of Cotton Sectors in Africa: Learning from Reform Experience*. Washington, DC: World Bank.

The agricultural reforms initiated by Sub-Saharan African countries in the 1990s were expected to induce higher growth by increasing producer incentives. The subsequent agricultural growth rates have been uneven, and this has been attributed to the lack of supporting infrastructure or the inability of smallholders to respond to the incentives.

African Agricultural Reforms: The Role of Consensus and Institutions provides a different approach to interpreting the outcomes. The authors develop a political economy framework that brings together the issues of consensus about the reforms; the role of negative shocks, especially price shocks; and the capabilities of institutions to respond to such shocks.

Using this new framework, the authors provide cross-cutting analyses that differentiate between short-run growth accelerations and sustained growth. Growth accelerations usually require the elimination of a few key constraints to economic activity. In contrast, longer-term sustained growth requires the development of institutions that can accommodate shocks and allow systems to rebound from negative developments or take advantage of positive opportunities. They also show the role of international developments such as commodity price cycles and technological developments on the growth outcomes.

Complementing the cross-cutting analyses are case studies in Kenya, Mozambique, Tanzania, Uganda, and Zambia, using cotton in China and India and coffee in Vietnam as comparators. The export commodities selected include cashews, coffee, tea, cotton, and tobacco.

The authors attribute the observed successes to the degree of political and social consensus achieved on the reforms. They find that weak consensus and the attendant reduced ability to respond to shocks is associated with reform reversals and growth collapses. Without generating an acceptable outcome among the stakeholders, attempts to develop effective and efficient support institutions can also fail as they may be corrupted and used to reestablish pre-reform distributional processes.

This book will be of interest to staff within the World Bank, as well as to practitioners in public services, civil society organizations, research institutes involved with the political economy of reforms, and other donor agencies involved in the design and implementation of reform programs.

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