A WORLD BANK COUNTRY STUDY

Education in Rwanda

Rebalancing Resources to Accelerate Post-Conflict Development and Poverty Reduction

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Foreword

This Country Study represents an important contribution to the strategic planning process for the development of education in Rwanda. It provides informative analyses of national trends up to 2001 and offers revealing comparisons with other countries in similar situations.

The report has already been used to inform Rwanda's draft Education Sector Strategic Plan of March 2003 and was discussed with interest during the joint review of the education sector held in Kigali in April 2003. I am sure that the study will continue to provide an important reference point for the ongoing Sector Wide Approach Program (SWAP) in the education planning and management process.

By way of an update, it is important to note that several new policy initiatives have been launched since the data for the report were collected in 2001. In particular, the 2002 Education Sector Policy makes clear the government's commitment to providing quality basic education to all Rwandan children. We have proposed steps, including the abolition of school fees, to make this goal a reality. We have also taken action to reduce the high repetition rates noted in the study, and I am pleased to report that they have declined from 34 percent in 2000–01 to 17 percent in 2002–03. We hope that this salutary trend will continue.

To meet the high pressures from the rising numbers of primary school graduates and the need to provide young people with the basic skills required for life and work, we intend to put in place strategies to ensure that lower secondary school education is offered to as many children as possible. Great efforts are being made to raise the quality of education through the provision of trained teachers and pedagogical materials. We have introduced a radical reform of higher education financing to reduce government subsidies to university students, which will release additional resources for investment in the primary and secondary sectors. Finally, the teaching of science and technology, especially information communication technology, will receive special attention at all levels of our education system.

All in all, I am confident that Rwanda will continue to make good progress toward achieving the United Nations Millennium Development Goals in education and that we will be able to provide the country with an educated and skilled workforce to build a prosperous and peaceful future for all.

I would like to take this opportunity to thank all those who have in one way or another made this study a success. Special gratitude goes to the World Bank team led by Jee-Peng Tan, lead economist, and the Rwandan team led by Claver Yisa, director of planning, for their commendable work.

Prof. Romain Murenzi
Minister of Education, Science, Technology, and Scientific Research
Kigali, Rwanda
June 2003

Foreword

This study is one in a series of country status reports (CSRs) on education being prepared by World Bank staff in collaboration with national teams from various Sub-Saharan African countries. The immediate objective of the CSRs is to enhance the knowledge base for policy development in the education sector. More broadly, CSRs create a basis for engaging a diverse audience in dialogue on education sector policies and for developing a shared vision for the future. These processes have become increasingly important as governments renew their commitment to reduce poverty and the international donor community pledges to provide the needed financial assistance.

In this new dynamic of international development assistance, the World Bank has oriented its corporate mission toward supporting governments in the fight against poverty, making that task its defining priority. In practice the strategy is articulated through a two-pronged approach: support for policies that accelerate economic growth, combined with explicit measures to promote a more equitable distribution of the benefits from growth. Human development, through investments in education as well as in health, plays a central role in both processes. This fact receives recognition in the emphasis placed on the two sectors in the debt relief arrangements under the Heavily Indebted Poor Countries (HIPC) Initiative. Governments have also invariably treated education and health as priority sectors in their Poverty Reduction Strategy Papers (PRSPs).

In education, two specific goals stand out: ensuring that all children receive basic schooling of adequate quality, and managing the production of graduates at post-basic levels, in terms of numbers and skills mix, so as to match the demand for skilled labor. To fulfill these objectives, an infusion of resources, from both domestic and international sources, may well be needed in a number of countries. In all countries, an equally important issue is to ensure that currently available resources are used efficiently and equitably.

Some countries have already embarked on reforms to improve performance. In the 1990s, for example, policies to encourage more effective use of teachers through multigrade teaching and double shifting were put in place to boost coverage. More remains to be done, particularly in tackling the structural constraints that encumber the education system. The challenges include defining an appropriate division of responsibility between the public and private sectors for financing and delivering education services; setting sustainable levels of teacher remuneration; and creating institutional arrangements for effective system management. Reforms in these areas are key to boosting learning outcomes, which in turn will be crucial for progress toward Education For All by 2015.

A first step is to develop a country-specific knowledge base that sheds light on the key structural weaknesses in the education system. In a large number of Sub-Saharan African countries, that knowledge base is sparse, reflecting the systematic neglect of analytical work in the past. To recapitalize it, the World Bank has initiated the preparation of CSRs, using a standard format to consolidate the available information in a policy-relevant manner.

Two features characterize the CSR, one pertaining to its technical content, the other to the process by which it is prepared. With regard to content, five aspects are worth mentioning. First the CSR pays close attention to issues of equity and the distribution of public resources for education, given the importance of these topics in the HIPC and PRSP context. Second, the analysis relies on commonly available administrative data, as well as household surveys—an approach that has helped improve the consistency and robustness of the statistical results. Third, the CSR focuses on outcomes by emphasizing indicators beyond the usual gross and net enrollment ratios. In particular, it documents the schooling careers of children as reflected in the shares of each cohort that enter grade 1 and attain the various grades on the educational ladder. This more detailed approach has highlighted socioeconomic, gender, and geographic disparities in schooling and has clarified the sources of the disparities. Fourth, the CSR uses school-level data to assess the scope for improving service delivery to the poor. Finally, the CSR makes use of data on student learning,

where available, to gauge the performance of the education system in this important domain and to identify cost-effective measures for progress.

As for process, the CSR is a product of a partnership between the World Bank and a national team from the country that is the subject of the report. This arrangement promotes training and capacity building and leads to a shared understanding of the policy issues and the context in which they present themselves. It is important to note that CSRs are diagnostic documents whose purpose is to help identify policy questions rather than to offer solutions and make recommendations. The process of policy development is more appropriately led by the national team, and the availability of a CSR provides a good foundation for disseminating the findings and stimulating a broad national dialogue on the way forward. The document also serves as a basis for preparing a rational and defensible plan for sector development to inform the country's medium-term budget planning exercise. These processes are already under way in Rwanda, as exemplified by the use of the CSR at the April 2003 joint review meeting that engaged Rwandan policymakers and donor representatives in assessing the country's proposed sector strategic development plan. On the World Bank's part, the document is facilitating ongoing discussions on the design of a new budget support credit as part of the Bank's country assistance strategy.

The publication of the CSR for Rwanda is intended to institutionalize our collective knowledge on education in Rwanda and to share that knowledge as widely as possible. It is my hope that as new knowledge emerges in the course of implementing the country's poverty reduction strategy, the CSR will be updated to track progress and distill lessons learned that may have broader application in other African countries.

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The World Bank

Abstract

Ten years after the 1994 genocide in which an estimated 10 percent of the country's population perished, Rwanda's devastated education system is now back on its feet. Classrooms have been repaired and new ones built; teachers who fled the mayhem have been reintegrated into the teaching force; arrears in teacher pay have been cleared up; a Genocide Fund has been created specifically to assist orphans; the higher education system has been diversified; and new arrangements for student finance at the tertiary level have been introduced. These successes notwithstanding, the task of transforming the rapid recovery into sustained progress has only just begun. A priority will be to ensure that all Rwandan children are able to complete a full course of primary schooling of reasonable quality and that expansion at postprimary levels proceeds at a pace commensurate with the labor market's capacity to absorb highly educated job seekers. Achieving these goals will require a rebalancing of public spending in favor of primary education—a shift that will call for continued heavy reliance on private financing at postprimary levels and reforms to reduce unit costs and student bursaries in public higher education. In addition, efforts must be made to direct public subsidies to the most vulnerable children, such as double orphans, so that they can afford to attend school. Policies to improve services delivery will also be critical to ensure that teacher deployment is consistent across schools according to the size of enrollments, that pedagogical materials are available in classrooms, and that instructional hours are increased, particularly in the first three grades, in combination with possible reforms in teacher recruitment practices. Progress will depend, too, on better supervision and incentives designed to encourage more effective classroom practices and so improve student flow and student learning throughout the system.

Acknowledgments

This report is the result of a collaborative effort by the government of Rwanda and the World Bank to deepen understanding of the current status of education in Rwanda. The Rwandan government team was led by Claver Yisa, Director of Research and Planning of Education in the Ministry of Education (MINEDUC), under the overall leadership of Prof. Romain Murenzi, Minister of Education, and Eugène Munyakayanza, formerly MINEDUC's Secretary General and now its Minister of State for Primary and Secondary Education. The World Bank team was led by Jee-Peng Tan under the overall guidance of the following Africa Region managers: Emmanuel Mbi, Laura Frigenti, and Arvil Van Adams.

The Rwandan team initially consisted of Faustin Habineza, Joseph Matsiko, Herman Musahara, and Ernest Rutungisha. As the work progressed, additional support was received from various individuals working in the Ministry of Education, including Aviti Bagabo, Sampson Kagorora, Leonard Manzi, Catherine Mukankuranga, Susy Ndaruhutse, Joseph Le Strat, and Patrick Rwabidadi. Many people outside the ministry also offered invaluable assistance with data collection and preparation. They included François Rwambonera, Conseil protestant du Rwanda; A. Aloys Guillaume, Sécretariat national de l'enseignement catholique; Joseph Murekeraho and his staff at the National Examination Council of Rwanda; Straton Nsanzabaganwa, Ministère de l'administration local et des affaires sociales; John Ruzibuka and François Katangulia, Office national de la population; Jacques Gashaka and Omar Sarr, Enquête intégrale sur les conditions de vie des ménages au Rwanda; Jean-Baptiste Rulindamanywa, Camille Rwemayire, and Evariste Nzabanita, Ministère de la fonction public et du travail; and Patrick Jondoh, UNICEF.

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Abbreviations, Acronyms, and Data Notes

AGSER	average grade-specific enrollment rate
ARR	average repetition rate
CA	certificat d'aptitude
CERAI	centres de l'enseignement rural et artisanal intégré
CERAR	centres de l'enseignement rural et artisanal de Rwanda
CESK	Centre d'enseignement supérieur de Kigali
CFATS	Centre de formation des adjoints techniques de la statistique
CPR	Conseil protestant du Rwanda
CSR	cohort survival rate
CWIQ	Core Welfare Indicators Questionnaire (in French, QUID)
DHS	Demographic and Health Surveys
EFA	Education For All
EICV	Enquête intégrale sur les conditions de vie des ménages au Rwanda (Household Living Conditions Survey)
EPLM	Ecole pratique des langues modernes
ES	école secondaire
ESGI	Ecole supérieure de gestion et d'information
ESM	Ecole supérieure militaire
ESTI	Ecole des sciences et techniques de l'information
FARG	Fonds national pour l'assistance aux rescapés du génocide et des massacres au Rwanda
FRw	Rwandan franc
FTB	Faculté de théologie de Butare
GDP	gross domestic product
GER	gross enrollment ratio
GNP	gross national product
GSK	Grande séminaire de Kabgayi
HIPC	Heavily Indebted Poor Countries (Initiative)
HIV/AIDS	human immunodeficiency virus/acquired immune deficiency syndrome
IAMSEA	Institut Africain et Mauricien de statistiques et d'économie appliquée
IDA	International Development Association
IFB	Institute of Finance and Banking (formerly the Institut supérieur des finances publiques)
IGER	implied gross enrollment ratio
IMF	International Monetary Fund
IPN	Institut pédagogique national
ISAE	Institut supérieur d'agronomie et d'élevage
ISCED	International Standard Classification of Education
ISCPA	Institut supérieur catholique de pédagogie appliquée de Nkumba
ISFP	Institut supérieur des finances publiques (now the Institute of Finance and Banking)
ISPG	Institut supérieur de pédagogie de Gitwe
KHI	Kigali Health Institute
KIE	Kigali Institute of Education
KIST	Kigali Institute of Science, Technology and Management
MDGs	Millennium Development Goals
MICS	Multiple Indicator Cluster Survey
MINALOC	Ministère de l'administration local et des affaires sociales

MINEDUC	Ministry of Education
NER	net enrollment ratio
NGO	nongovernmental organization
NPV	net present value
NUR	National University of Rwanda (in French, Université nationale du Rwanda, UNR)
OECD	Organisation for Economic Co-operation and Development
PRS	poverty reduction strategy
PRSP	poverty reduction strategy paper
PSPP	public spending per pupil
PTA	parent-teacher association
QUID	Questionnaire unifié sur les indicateurs de développement (in English, CWIQ)
RPA	Rwandan Patriotic Army
RR	repetition rate
SF	section familiale
SIMA	Statistical Information Management and Analysis database (World Bank)
SNEC	Sécretariat nationale de l'enseignement catholique
UAAC	Université adventiste d'Afrique centrale
ULK	Université libre de Kigali
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNICEF	United Nations Children's Fund
UNILAK	Université laïque de Kigali
UNR	Université nationale du Rwanda (in English, National University of Rwanda, NUR)

DATA NOTES

Unless otherwise indicated, all dollar figures are current U.S. dollars.

Fiscal year: January 1–December 31

CURRENCY EQUIVALENTS

(as of January 2002)
Currency unit = Rwandan franc (FRw)
FRw 1.00 = US$0.0022
US$1 = FRw 456.81

Executive Summary

Rwanda's recent history has been marred by the genocide of 1994 in which at least 800,000 people—about 10 percent of the population—lost their lives. Stability and security have been restored, and recovery has been under way for several years now. Rebuilding the stock of human capital is an important part of the recovery process. The Rwandan government has worked hard to make up for lost time in broadening access to education and enhancing the quality of services. Indeed, progress in education is among the core objectives of the government's economic and social development strategy, as articulated in its recent poverty reduction strategy paper (PRSP).

The importance accorded to education in Rwanda is consistent with recent developments on the international stage that have propelled the education sector into the limelight. Two of the eight Millennium Development Goals (MDGs) agreed on in the United Nations Millennium Declaration of 2000 have to do with education. Goal 2 is to ensure that by 2015 children everywhere—boys and girls alike—are able to complete a full course of primary schooling, and goal 3 calls for eliminating gender disparities in primary and secondary education, ideally by 2005 and at all levels by 2015. The Monterrey International Conference on Financing for Development, held in March 2002, arrived at a consensus that reaching the goals will require action by both rich and poor countries. Rich countries must, among other measures, boost foreign aid to poor countries, and poor countries must put in place policies and governance structures that will ensure effective use of resources to achieve the goals.

On the country level as well, the principle of linking provision of resources with results on the ground is beginning to permeate discussion of development policies. Education is one among many sectors with a claim on scarce public resources, and the strength of its claim depends increasingly on its ability to deliver tangible results. This context presents clear challenges for the managers of Rwanda's education system. To attract increased resources, whether from international sources or from within the country, the sector must show evidence of good stewardship of the resources it already receives.

This Country Study looks at the prospects for improvement in the education sector and the policies that are required to ensure that the education sector develops in an efficient, equitable, and fiscally sustainable direction. It examines the gaps in domestic financing that external resources might usefully fill and discusses the outcomes that might be agreed on as a focus for policy direction, as well as to create proper accountability structures in the system.

Purpose and Scope

The study is based on data up to 2001, the latest year for which it was possible to gather the necessary statistical information. The education system has not, of course, been standing still meanwhile, and so the snapshot picture captured by these data does not track recent developments. Among these are the actions being taken by the Rwandan government to address constraints on progress in the education sector.

To give a few instances, the latest school census returns, for 2003, suggest that there has been significant progress in reducing grade repetition in primary school. In higher education, reforms in financial arrangements have been launched. One objective is to reduce the costs of government-sponsored study abroad by, for example, redirecting students to lower-cost host countries such as South Africa and India. Initiatives to manage the costs of in-country study at the tertiary level include treating student bursaries as loans rather than as outright grants and creating the Student Financing Agency to institutionalize collection of repayments.

This report—a stock-taking exercise based on the situation at a given point in time—is best seen as a diagnostic document intended to contribute toward an understanding of the current performance of Rwanda's education system, the constraints on the system's progress, and the tradeoffs that may have to be made in the coming years. Building a shared understanding of the issues is an integral part of policy development. Many governments, including Rwanda's, are already engaged in consultations with partners and civil society as part of the process of defining their poverty reduction strategies. In education the importance of consultation can hardly be exaggerated. The success of policies hinges on how they are implemented, and this in turn depends greatly on how well the problems are understood and on the extent of agreement on the proposed solutions. The groups involved in any reform, and whose agreement needs to be sought, are many and diverse, including as they do policymakers, education planners, teachers, school managers, parents, and students.

This report is, accordingly, aimed at a broad audience. In the first instance, it is directed toward Rwanda's policymakers in the education sector and toward education practitioners and researchers. It should also be of interest to policymakers and analysts in other parts of the government, particularly those charged with managing the country's overall development strategy and with aligning public spending with that strategy. The study contains information and analyses that will serve as useful tools for the government's development partners—from donors to citizens at large—as they engage actively in discussing and articulating the country's vision for the education sector and in designing and implementing policies to put that vision into effect.

The report does not pretend to address the full gamut of issues that Rwanda's policymakers may face. Its coverage is limited to key economic factors that are especially relevant in the PRSP context—cost, finance, service delivery, and educational outcomes—and it focuses in particular on those factors that lend themselves to quantification. Although admittedly incomplete, this treatment yields a picture of the broad structural characteristics of the system, the implicit patterns of resource allocation, and the effectiveness of service delivery.

Progress to Date in the Education Sector

Despite the untold havoc caused by the 1994 genocide, the Rwandan education system has recovered remarkably well, at least quantitatively.

Increased Enrollments

The most impressive aspect of the system's recovery is the rapid growth of enrollments. Only five years after the genocide, the number of children in primary school had already surpassed the number that would have been enrolled had the system expanded at historical rates of increase. The current gross enrollment ratio of 107 percent exceeds the corresponding ratio for the average low-income country in Africa today. In secondary education the number of students has grown 20 percent a year since 1996, implying that the system is now nearly three times as large as it was then. Although the gross enrollment ratio at the secondary level remains below the average for low-income Sub-Saharan Africa (13 percent compared with 20 percent), the gap would have been wider had the system stagnated after the genocide. In higher education, enrollments rose even more rapidly—from 3,400 students in 1990–91 to almost 17,000 by 2001–02, a nearly fourfold increase over a decade. The tertiary system's coverage is now comparable to the average of about 200 students per 100,000 population for low-income Sub-Saharan Africa.

Diversified Public-Private School System

As the system has expanded, it has done so in ways that have nudged it toward a good balance between the public and private sectors. At the base of the education pyramid, the government has made consistently strong efforts to extend the coverage of the public system. As a consequence, the share of enrollments in private primary schools has remained modest, at less than 1 percent. At the secondary level, enrollments grew as fast in the public as in the private sector in the postgenocide years, and the share of students attending private schools has remained steady at about 40 percent—down from 62 percent in the 1980s, but still much higher than the average of 20 percent for low-income Sub-Saharan Africa. In higher education the private sector grew in fits and starts in the two decades before 2000, but its share is unmistakably increasing over time, having reached about 38 percent in 2001–02, from about 8 percent at the start of the 1980s. The diversity of postsecondary institutions and the mix of public sector and private sector providers is a strength of the system, giving it the flexibility to meet the growing demand for places at that level.

Good Basis for Further Development

The expansion of the system has been taking place within a structure consisting of a six-year primary cycle, a three-year *tronc commun* (lower secondary) cycle, a three-year upper secondary cycle, and, typically, a four-year cycle of higher education. A meritocratic examination system for selection of entrants to the various levels of schooling is in place. The 6-3-3-4 education structure, along with the examination-based selection mechanism, provides a sensibly configured system for managing the sector's expansion.

Studies show that Rwandan children who complete six years of primary schooling usually remain permanently literate and numerate as adults. Making completion of primary school universal would help build the human capital base needed for broadly based economic and social development, and the system is already structured in line with this objective. In postprimary schooling, the selection arrangements for progression from one level to the next give managers of the system administrative levers for calibrating the pace of expansion of enrollments according to the availability of resources and the absorptive capacity of the market for highly educated labor.

Relatively Broad Access

Rwanda's education system compares favorably with that of other low-income countries in Africa with respect to access by different socioeconomic groups, especially at the primary level. (The gender, geographic, and income-group disparities that emerge mainly at higher levels are discussed in the next section.) School participation rates are relatively high, and noteworthy efforts have been made to ensure access by orphans, a particularly disadvantaged group. The 1994 genocide left Rwanda with one of the highest orphanhood rates in the world; nearly 40 percent of the

children who were 7 to 14 years old in 2000 had lost at least one parent. Yet the gap in enrollments between orphans and other children is noticeable only among the most vulnerable children—those who have lost both parents (double orphans) or who live apart from their parents. Apparently, there exist relatively well-developed safety nets that have managed to ensure high primary school participation rates even among orphans. In secondary education orphans are at least as well represented as nonorphans. This remarkable outcome owes much to the government's decision in 1998 to establish the tax-funded Genocide Fund as a mechanism for assisting orphans in secondary school.

The Challenges Ahead

In the coming years, Rwanda will face second-generation problems that are beginning to emerge following the system's successful rebound from the devastation of the genocide. Priorities are accordingly shifting, from implementing emergency measures to reestablish the functioning of the system, to charting an appropriate and fiscally sustainable course for the sector's long-term development. Here, we summarize some of the main systemic issues that policymakers will likely have to grapple with in the foreseeable future.

Managing Student Flow and Output of Graduates

Primary education. To realize the goal of giving all children the opportunity to complete a full course of primary schooling, it is necessary to raise entry rates to grade 1 and to increase the likelihood that children will continue to the end of the cycle. In Rwanda, where entry rates have been historically high, at 90 percent, the challenge is to identify and help the last 10 percent of the population that is yet to enroll in primary school. With regard to survival to the end of the cycle, Rwanda's performance is respectable: its estimated 73 percent compares well with the rate in other low-income countries and with its own record of 44 percent in 1990–91. Yet this rosy situation is unlikely to persist, given the exceptionally high rate of grade repetition in the system—about 34 percent in 2000–01, or more than three times that of a decade earlier. In line with what is widely believed (based on cross-country experience) to be good practice, it would make sense for the country to aim for a medium-term target of, say, a 10 percent improvement in the repetition rate; to implement measures designed to rationalize policies and practices regarding grade-to-grade promotion; and to take steps to improve learning outcomes and so minimize the need for grade repetition. As noted earlier, the government has begun implementing such policies, and the latest data show that repetition rates have fallen to about 17 percent in 2002–03.

Secondary and higher education. The pressures to expand access beyond primary education are beginning to mount as larger cohorts of children complete the lower cycles of schooling. In designing policies governing the progress of students from level to level, it is useful to distinguish between the *tronc commun* and upper secondary cycles. The former can be thought of as a continuation of the primary cycle. From this viewpoint, an appropriate medium-term objective would be to universalize access to the lower secondary cycle, to the extent that resources permit.

The upper secondary cycle is more aptly viewed as a preparatory phase for higher education. Because graduates from upper secondary and higher education are being groomed at great expense for jobs in the modern economy, it is important to ensure that the number and skills mix of the graduates are compatible with the prospective demand for skilled labor. In the immediate postconflict period, pervasive shortages of highly educated workers were felt throughout the government and in the private sector. These shortages stimulated a rapid growth in enrollments, particularly in higher education. Now that the stock of human capital is gradually being replenished, in part through the return of the Rwandan diaspora, and signs of potential graduate unemployment are beginning to emerge, it would be wise to review the situation and adapt admission policies in upper secondary and higher education accordingly.

Mobilizing and Making Effective Use of Resources

Support for educational development has been and continues to be strong in Rwanda. In the past few years the convergence of international and domestic commitment to education has helped boost public spending on education, which in 2001 reached an all-time high of 5.5 percent of gross domestic product (GDP).

Yet closer examination shows that the increase has been dominated by spending on capital investments. Although such investments have obviously been needed to rehabilitate devastated facilities and expand capacity, at some point adequate resources will have to be directed toward sustaining the smooth day-to-day functioning of the system. In this regard, the record is not as satisfactory: current spending on education has stagnated at 1980 levels—just over 3 percent of GDP. Even at this level of expenditure, the education sector already claims more than a quarter of the government's total current budget (net of debt interest payments); the share is even higher if education-related spending channeled through other government organs is counted. Increased donor funding for the education sector, provided flexibly through budget support, could help rebalance spending in favor of current costs. But even in the best of circumstances, and looking at all sources of funding, the scope for rapid and large increases in the sector's share of public current spending is probably limited. Making better use of existing resources and using them to leverage private contributions must therefore be a centerpiece of efforts to advance the sector's goals.

Making better use of public resources. There is room for improving allocation of public funds among levels of education and categories of expenditure. Primary education, which is so fundamental to development, now receives only about 45 percent of public current spending on education, whereas higher education gets nearly 40 percent.

The strong focus on higher education, which currently serves only 2 percent of the population in the relevant age group, has predictably inequitable results. First, Rwanda's unit costs in higher education are among the highest in the world today and are about 75 times the unit costs in primary education. Second, the best-educated 10 percent in a cohort claims more than 70 percent of the cumulative public spending on education received by that cohort. It is thus no surprise that Rwanda's system is one of the least structurally equitable in Sub-Saharan Africa. Redirecting spending toward primary education is the only way to rectify the situation.

A second direction for improving the use of public funds is to restructure its functional distribution. To see the potential for improvement, it is helpful to break spending down conceptually into three categories: overhead, service delivery at the facility level, and student welfare. Overall, the system devotes barely two-thirds of spending to service delivery, and it is natural to wonder whether the objectives of the system are being achieved with this pattern of allocation.

On closer examination, the main reason for the pattern in higher education is that spending at that level is heavily skewed toward student welfare services and bursaries for local and overseas study. In recent years these items have accounted for nearly half the government's current spending on the subsector. The distribution is less skewed at the secondary level, but even there, provision of food for students claims between 5 and 6 percent of current spending. At the primary level, nothing is currently spent on school feeding programs or other welfare services, but some improvements in allocation can still be made, notably by channeling resources away from management overhead and toward better deployment of classroom teachers and increased provision of pedagogical materials.

Mobilizing private resources. Households are the main source of nongovernment spending on education. Their overall contributions are significant, equivalent to roughly 40 percent of government expenditure on the sector. More can be done, however, to shift the weight of the household contribution toward postprimary levels of education. As of this writing, the government has introduced new policies for student finance in higher education that will eventually require students to repay their government-financed bursaries. The government also continues to encourage

privately financed institutions in secondary and higher education so as to ensure that the private sector remains a key source of funding for expansion of places at these levels.

Using Explicit Criteria to Deploy Teachers across Schools

Because the bulk of resources for primary and secondary education reaches the school or the classroom in the form of teachers, the deployment of teachers is an important aspect of how well public resources serve the education system's intended beneficiaries. In a well-managed system, the number of teachers that a school receives would be closely related to the size of enrollments. In Rwanda the relation is not as tight as might be expected on the basis of experience in other low-income African countries. A primary school serving 500 pupils, for example, may receive as few as 5 teachers or as many as 15. This diversity in allocation implies that resources are inequitably distributed across schools, giving rise to highly disparate learning environments. A few public primary schools are so well endowed that their teachers handle only one teaching shift instead of the two required of most teachers in the public system. Not surprisingly, the better-endowed schools are typically located in Kigali Ville, the capital, while the worst-endowed ones are often concentrated in certain provinces such as Byumba, Gisenyi, Kigali Rural, Kibungo, and Kibuye. Province-level differences, however, explain only a small part of the pattern; our analysis suggests that within-province differences are even more pronounced. The corollary is that teacher deployment within provinces can probably be better managed to produce greater consistency in the availability of teachers across schools.

Balancing the Accessibility of Schools against Scale Economy Considerations

The spatial distribution of schools is important because it determines the accessibility of the facilities to the intended beneficiaries. Yet the closer that schools are to students' homes, the more likely they are to serve small catchment areas, and the higher are their unit costs. The problem is to strike a good balance between accessibility and the cost of service delivery. As with other issues, the answer depends on the level of education.

At the primary level, children are too young to travel far, so the issue of accessibility is highly pertinent. Yet the current structure of Rwanda's primary school network tends to emphasize size over proximity: children in half the households covered in a recent survey take more than 30 minutes to reach the nearest primary school, and the school they attend is likely to be among the three-quarters of the country's public schools that enroll more than 450 pupils. Large schools, however, confer few economies of scale; unit costs are relatively flat beyond enrollments of about 450. Consideration could therefore be given to extending the primary school network so as to situate schools closer to pupils' homes. This would reduce both the physical barriers to school participation and the opportunity cost of attending.

At postprimary levels, students are able to travel farther, making physical distance less of a constraint on enrollment, and economies of scale begin to set in because specialized teaching arrangements become increasingly common. In Rwanda schools providing instruction at the *tronc commun* level tend to be small and to have high unit costs. Per student costs in schools with 400 or more students are less than two-thirds those in schools enrolling between 100 and 200 students and four-fifths those in schools enrolling between 200 and 300 students. Yet schools that enroll 300 or fewer students account for more than 55 percent of enrollments. Our calculations show that moving to a situation in which no school enrolls fewer than 400 students would reduce the unit cost of service delivery by 20 percent systemwide—arguably, not a trivial saving in a context of scarce resources. As enrollments expand in the coming years, it is important to accommodate the increase by raising enrollments in existing lower secondary schools to an economic size rather than by building more new schools for small catchment areas.

In upper secondary education, as in higher education, enrollments are relatively small and are likely to grow slowly as long as the absorptive capacity of the modern sector labor market remains limited. It is therefore important for schools and institutions to take advantage of scale economies

in service delivery, which may require some consolidation of course offerings. Only 14 percent of students at the upper secondary level attend a school serving 400 or more students, and students at each school tend to be spread thinly across fields of specialization. There is also evidence of duplication among public institutions and between the public and private sectors in some fields of study. These results suggest that in managing the expansion of these levels, policymakers might seek to minimize proliferation of course offerings, particularly where demand is weak and the potential for scale economies in service delivery is limited.

Managing Classroom Conditions and Processes to Enhance Student Learning

A crucial test of the performance of an education system is its effectiveness in transforming the resources at its disposal into learning outcomes. In both primary and secondary education there seems to be room for improvement: the performance of schools, as measured (however imperfectly) by examination scores, relates only weakly to the amount of resources they receive. This evidence raises questions about the effectiveness of the mix of school inputs that support service delivery and, more important, the incentives for performance.

Inputs in primary education. In an ideal, well-funded world, pupils would receive sufficient instructional time in small classes taught by well-qualified teachers and with ample supplies of books and other learning materials. In resource-constrained environments, tough tradeoffs have to be made, and policymakers must find the mix of inputs that works best under the constraints. In Rwanda the input mix in public primary schools favors teacher qualifications at the expense of class size and instructional time. The country's pupil-teacher ratio of 57 to 1 is currently among the highest in the world, and it translates into a situation in which most teachers in the first three grades of the cycle have to teach two shifts of pupils. As a result, instructional time for pupils in these grades averages only about 500 hours a year. (The average is 1,000 hours in the upper grades in Rwanda, and other low-income countries have set a target of 850 to 1,000 hours for primary instruction on the basis of international best practice.) Reducing the pupil-teacher ratio by hiring more teachers would help address the problem, but in a tight budgetary situation this will require changes in the input mix.

Adjusting the educational qualifications for recruitment of teachers is one option for managing the tradeoff. All new primary school teachers are currently hired from among those who have completed upper secondary education. Although recruiting at this level has advantages in theory and may be appropriate as a long-run objective, in the current context of Rwandan schools, such teachers are no more effective than those with only lower secondary education and are more costly. Given the differences in wages between the two levels of teacher qualification, it may be worth relaxing the recruitment criteria so as to make it financially feasible and sustainable to reduce the pupil-teacher ratio.

Inputs in secondary education. At the secondary level, the issue of teacher qualifications is also highly relevant. Most teachers in the *tronc commun* cycle satisfy the minimum qualification requirement (that is, they have at least an upper secondary school diploma), and some even have a university degree. By contrast, half of all teachers in upper secondary schools are probably underqualified, having only an upper secondary school diploma themselves. Any strategy to improve learning outcomes must seek to raise the educational profile of teachers in that cycle. The obvious solution is to set and apply higher standards for recruitment, but as a stopgap remedy, policymakers might consider redeploying the existing cadre of secondary school teachers between the *tronc commun* and upper secondary levels according to their qualifications.

Incentives. Although choosing the right input mix is important, it is by no means the entire answer to poor performance. Because schooling is a social process involving multiple actors, outcomes ultimately depend on how people behave. Putting in place the right incentives to align behavior with the goal of enhancing student learning is a key challenge in managing for results. The potential interventions in this regard are as diverse as the contexts in which people live and work, but the principle of establishing clear accountabilities and matching them with spending

and management authority at all levels is probably relevant everywhere. Cross-country experience also highlights the importance of defining and monitoring tangible indicators of progress as a way of increasing the incentives for better performance.

Minimizing Barriers to Access

As noted above, socioeconomic gaps in enrollments are narrower in Rwanda than in other low-income countries. But this should not be a reason for complacency. More can be done to reach the most vulnerable children, including double orphans, street children who do not benefit from systematic adult supervision, children living in rural areas, and children from the poorest 40 percent of households. Double orphans are easily identified, and systematic efforts can and must be made to improve their prospects in life. For the other groups, diverse types of assistance are likely to be needed. Exploratory and pilot interventions are probably appropriate in seeking the best way to serve them.

In secondary and higher education, participation rates among children from the top income quintile far outstrip those in the rest of the population. Girls are as likely as boys to enroll in secondary school, but they lag significantly behind in higher education. The study's findings suggest that although financial assistance might help the lagging groups in the same way as it is helping orphans in secondary education under the Genocide Fund, this kind of intervention probably needs to be combined with efforts to improve learning outcomes. Such measures are important because in a meritocratic selection system based on examination results, enlarging the representation of lagging groups is possible only to the extent that these groups are able to compete for the coveted places in postprimary education.

Conclusion

Nearly a decade after the 1994 genocide, Rwanda's leaders can look back with pride and satisfaction at the country's record of achievements in education. A devastated system has been put back on its feet. Classrooms have been repaired and new ones built to accommodate the growing numbers of students; teachers who fled the mayhem and have returned have been reintegrated into the teaching force; arrears in teacher pay have been cleared up; the Genocide Fund has been established specifically to assist orphans; and a diversified system has been created in higher education.

Yet the task ahead remains daunting, as the recovery phase gives way to the work of nurturing the long-term development of the education sector. Concerns about efficiency, equity, and fiscal sustainability will inevitably become increasingly relevant as the country seeks to advance educational progress in a resource-constrained environment. It is hoped that the findings of this study will contribute to the discussion by forging a common understanding of the issues and by drawing attention to the emerging challenges.

Résume Analytique

L'histoire récente du Rwanda a été perturbée par un génocide en 1994. Au cours de ce génocide, au moins 800.000 personnes, soit environ 10 pour cent de la population, ont perdu la vie. La stabilité et la sécurité ont été restaurées et le processus de redressement est en cours depuis plusieurs années. La reconstruction du potentiel de capital humain est une partie importante de ce processus. Par ailleurs, le gouvernement s'est également efforcé de compenser le temps perdu dans l'élargissement de l'accès à l'éducation et le renforcement de la qualité des services. En effet, le progrès en éducation figure parmi les objectifs essentiels de la stratégie de développement économique et social du gouvernement comme articulé dans son récent document de stratégie de réduction de la pauvreté (DSRP).

L'importance accordée à l'Education au Rwanda est consistante avec les récents développements qui, sur le plan international, a placé le secteur de l'Education sous les projecteurs de l'actualité. Au titre de la déclaration des Nations Unies pour le Millénium 2000, deux des huit Objectifs de Développement (ODM) retenus traitent de l'Education. L'objectif 2 est de s'assurer que d'ici 2015, partout, les garçons comme les filles pourront achever une scolarité primaire complète, et l'objectif 3 réclame l'élimination des disparités entre les genres dans l'enseignement primaire et secondaire, idéalement en 2005 au plus tard. Selon la conférence internationale de Monterrey de 2002 sur le financement du développement, il se dégage aussi un consensus que la réalisation des objectifs nécessitera l'action conjointe des pays riches et pauvres. Les pays riches doivent accroître l'aide aux pays pauvres (entre autres mesures) qui, à leur tour, doivent mettre en place des politiques appropriées et des structures de bonne gouvernance pour assurer l'utilisation efficace des ressources afin d'atteindre les objectifs visés.

Au niveau du pays, le principe de lier les ressources aux résultats sur le terrain commence à imprégner la discussion sur les politiques de développement. Le secteur éducatif est l'un des nombreux secteurs qui réclament des ressources publiques rares et la force de sa revendication dépend de plus en plus de sa capacité de fournir des résultats tangibles. Ce contexte présente des défis

clairs aux responsables du système éducatif au Rwanda. Pour attirer des ressources accrues aux niveaux national et international, le secteur doit mettre en évidence la bonne gestion des ressources déjà disponibles.

Cette étude examine les perspectives d'amélioration du secteur éducatif et des politiques appropriées en vue de s'assurer que le secteur se développe de façon efficace, équitable et fiscalement durable. Elle examine les lacunes de financement au plan national que les ressources externes pourraient utilement combler, et discute des résultats qu'on pourrait accepter comme base d'orientation des politiques, ainsi que de la création de structures de responsabilité propre dans le système.

But et portée

Cette étude est basée sur des données collectées jusqu'en 2001, dernière année pour laquelle il a été possible d'obtenir des informations statistiques appropriées. Le système éducatif n'est pas resté, bien sûr, statique; le tableau que ces données présentent ne couvre donc pas les récents développements intervenus dans le secteur. Parmi ces derniers, les actions prises par le Gouvernement rwandais pour s'attaquer à certaines des contraintes dans le développement du secteur éducatif.

A titre d'exemples, les résultats du dernier recensement scolaire de 2003 ont démontré que des progrès remarquables ont été réalisés dans la réduction du redoublement dans l'enseignement primaire. Des réformes ont été introduites dans les finances de l'Enseignement Supérieur. L'un des objectifs vise à réduire les coûts des études à l'étranger financés par le Gouvernement: par exemple, des étudiants ont été redirigés vers des pays moins chers comme l'Afrique du Sud et l'Inde. Des initiatives de gestion des coûts des études faites sur place ont été également prises: des bourses ont été transformées en prêts, contrairement aux subventions d'antan; une Agence de Financement des Etudiants, visant à institutionnaliser le remboursement des prêts, a été mise en place.

Ce rapport, basé sur la situation en un moment donné, est mieux perçu comme un document diagnostic destiné à contribuer à une compréhension de la performance actuelle du système éducatif au Rwanda, les contraintes qui freinent son progrès, et les choix à faire dans la planification du développement du système au cours des années à venir. L'instauration d'un consensus sur les questions constitue une part intégrale d'une politique de développement. Bon nombre de Gouvernements, y compris celui du Rwanda, se sont déjà engagés dans des consultations avec les partenaires et la société civile comme partie du processus de définition de leurs stratégies de réduction de la pauvreté. Dans le secteur de l'éducation, l'importance de la concertation peut à peine être exagérée. Le succès des politiques dépend de la façon dont elles sont mises en œuvre et ceci dépend à son tour, à un haut degré, de la bonne compréhension des problèmes et du degré d'entente sur les solutions proposées. Les groupes impliqués dans toute réforme et ceux dont l'avis est nécessaire sont nombreux et variés; on compte parmi eux les décideurs, les planificateurs de l'éducation, les enseignants, les directeurs d'école, les parents et les étudiants.

Ce rapport vise en conséquence un grand public. En premier lieu, il s'adresse aux décideurs, aux praticiens et chercheurs du secteur de l'éducation au Rwanda. Il devrait également être d'intérêt aux décideurs et analystes des autres secteurs du Gouvernement, en particulier, ceux chargés de contrôler la stratégie globale de développement du pays et d'aligner des dépenses publiques sur cette stratégie. Cette étude comporte l'information et les analyses qui serviront d'outils utiles aux partenaires au développement du Gouvernement—des donateurs aux citoyens en général—au moment où ils s'engagent activement dans les discussions et articulations de la vision du pays pour le secteur de l'éducation et dans la conception et la mise en œuvre des politiques en vue de réaliser cette vision.

Ce rapport ne prétend pas aborder toute la gamme de questions auxquelles les décideurs du Rwanda pourraient faire face. Il est limité aux aspects économiques clés qui sont particulièrement appropriés dans le contexte de DSRP. Ceux-ci concernent le coût, les finances, la prestation de service et les résultats de l'éducation, en particulier les aspects qui se prêtent à la quantification.

Tout en admettant son caractère incomplet, le document fournit une image des grandes caractéristiques structurelles du système, du modèle implicite d'attribution des ressources et de l'efficacité de la prestation de service.

Progrès de l'enseignement jusqu'à ce jour

En dépit des ravages indescriptibles provoqués par le génocide de 1994, le système éducatif rwandais a récupéré remarquablement bien, au moins en termes quantitatifs.

Augmentation des inscriptions

L'aspect le plus impressionnant du redressement du système est le rythme *croissant des inscriptions* après le génocide. Cinq (5) ans seulement après l'événement, le nombre d'enfants inscrits à l'école primaire avait déjà dépassé le nombre qui aurait été inscrit si le système avait connu une croissance aux taux de progression historiques. Actuellement à 107 pour cent, le taux brut d'inscription dépasse le taux correspondant pour la moyenne des pays à faible revenu en Afrique à ce jour. Dans l'enseignement secondaire, le nombre d'élèves a augmenté de 20 pour cent par an depuis 1996, impliquant que le système est maintenant presque trois fois plus grand que ce qu'il était précédemment. Tandis que le taux brut d'inscription au niveau secondaire demeure en-dessous de la moyenne pour l'Afrique subsaharienne des pays à faible revenu (13 pour cent au lieu de 20 pour cent), l'écart aurait été encore plus grand si le système avait stagné après le génocide. Dans l'enseignement supérieur, les inscriptions ont grimpé plus rapidement encore, allant de 3.400 étudiants en 1990–1991 à presque 17.000 en 2001–2002, une augmentation qui a presque quadruplé en l'espace d'une décennie. La couverture du système de l'Enseignement Supérieur est maintenant comparable à la moyenne d'environ 200 étudiants pour une population de 100.000 en Afrique subsaharienne à faible revenu.

Diversification du système éducatif

Le système s'est développé tout en maintenant *un bon équilibre entre les secteurs public et privé*. A la base de la pyramide de l'enseignement, le Gouvernement a fait un effort considérable en vue d'étendre la couverture du secteur public. Comme conséquence, la plupart des inscriptions dans les écoles privées sont demeurées modestes à moins de 1 pour cent. Au niveau secondaire, les inscriptions ont augmenté aussi rapidement dans le secteur public que privé dans les années d'après génocide, et la proportion des étudiants inscrits dans les écoles privées est demeurée stable à environ 40 pour cent, ce qui est plus bas que les 62 pour cent des années 80, mais toujours beaucoup plus élevé que les 20 pour cent en moyenne dans les pays à faible revenu en Afrique subsaharienne. Dans l'enseignement supérieur, le secteur privé s'est développé tant bien que mal pendant les deux décennies jusqu'en 2000, mais la proportion d'étudiants inscrits a augmenté indubitablement avec le temps, soit environ 38 pour cent en 2001–2002 au lieu d'environ 8 pour cent au début des années 80. La diversité des établissements post-secondaires et le mélange de prestataires publics et privés du secteur constituent une force du système, le dotant d'une flexibilité pour satisfaire la demande croissante de places à ce niveau d'études.

Une base solide pour un développement ultérieur

L'expansion du système s'est effectuée dans une structure qui prévoit un cycle primaire de six ans, un cycle de tronc commun de trois ans (cycle secondaire inférieur), un cycle secondaire supérieur de trois ans et un cycle de quatre ans d'Enseignement Supérieur. Un système d'évaluation basé sur le mérite a été mis en place pour contrôler la sélection des étudiants des divers cycles d'études. La structure éducative 6-3-3-4, avec le mécanisme de sélection basé sur les examens constitue un système raisonnablement structuré pour contrôler l'expansion du secteur.

Des études indiquent que les enfants rwandais qui ont achevé les six ans d'école primaire savent, presque toujours de façon permanente, lire et compter même à l'âge adulte. Réaliser l'éducation primaire universelle contribuerait à la reconstruction de la base du capital humain

nécessaire pour un développement économique et social élargi, et le système est déjà structuré en conformité avec cet objectif. Dans l'enseignement post-primaire, les arrangements de la sélection pour la progression, d'un niveau à l'autre donne aux responsables du système les leviers administratifs pour adapter le rythme de l'expansion des inscriptions à la disponibilité des ressources et à la capacité d'absorption par le marché d'une main d'œuvre hautement qualifiée.

Accès relativement élargi

Le système rwandais se compare favorablement à celui des autres pays à faible revenu en Afrique, en termes d'accès des différents groupes socio-économiques, particulièrement au niveau de l'enseignement primaire. Les disparités de genre, de géographie, de revenu qui émergent principalement dans l'Enseignement Supérieur sont discutées dans la section suivante. Les taux de fréquentation de l'école sont relativement élevés, et des efforts remarquables ont été faits en vue de garantir l'accès aux orphelins, un groupe particulièrement défavorisé. Le génocide de 1994 a laissé le Rwanda avec un des taux d'orphelins les plus élevés au monde, avec presque 40 pour cent des enfants âgés de 7 à 14 ans en 2000 ayant perdu au moins un parent. L'écart des inscriptions entre les orphelins et les autres enfants n'est remarquable que parmi les enfants les plus vulnérables (ceux qui ont perdu les deux parents ou ceux qui vivent séparés de leurs parents par exemple). Apparemment cette situation est due à l'existence de filets de sécurité relativement bien développés qui ont permis d'assurer des taux de fréquentation élevés à l'école primaire, même parmi les orphelins. Dans l'enseignement secondaire, les orphelins sont au moins aussi bien représentés que les non-orphelins. Ce résultat remarquable doit beaucoup à la décision du Gouvernement en 1998 de créer le Fonds de Génocide, alimenté par une taxe, comme mécanisme d'aide aux orphelins dans l'enseignement secondaire.

Les défis de l'avenir

Dans les années à venir, le Rwanda devra faire face aux défis des problèmes de deuxième génération, qui commencent déjà à se poser, suite à l'heureux rebondissement du système après la dévastation du génocide. L'accent se déplace ainsi d'une situation où les mesures urgentes pour rétablir le fonctionnement du système étaient prioritaires, à une situation où la préoccupation consiste à donner une direction appropriée et fiscalement soutenable au développement à long terme du secteur. Un sommaire de certaines des questions principales au niveau systémique auxquelles les décideurs devront probablement s'attaquer à dans un proche avenir est présenté ci-dessous.

Gestion du flux d'étudiants et production de diplômés du système

Enseignement primaire. Pour atteindre l'objectif qui consiste à donner à tous les enfants la chance de terminer leur cycle primaire, il est nécessaire d'accroître les taux d'accès en première année et de renforcer la probabilité que les enfants continuent jusqu'à la fin du cycle. Au Rwanda, les taux d'entrée ont été historiquement élevés et atteignent 90 pour cent. Ainsi le défi ici consiste à identifier et à aider les derniers 10 pour cent de la population qui refusent d'aller à l'école. En ce qui concerne la survie jusqu'à la fin du cycle, la performance du Rwanda est respectable: le taux actuel, estimé à 73 pour cent, se compare favorablement au taux d'autres pays à faible revenu et aux 44 pour cent du Rwanda dans les années 1990–1991. Cependant, il est peu probable que ce bon résultat persiste; en effet, le taux de redoublement de classe dans le système est particulièrement élevé—environ 34 pour cent en 2000–2001, soit plus de 3 fois le taux de la décennie précédente. Sur la base de ce qui est généralement admis comme une bonne pratique selon les expériences dans d'autres pays, il serait raisonnable que le Rwanda vise une moyenne d'environ 10 pour cent et mette en place des mesures en vue de rationaliser les politiques et les pratiques relatives au passage d'un niveau à un autre, et d'améliorer les résultats des élèves afin de réduire au minimum le besoin de faire doubler les classes. Comme indiqué plus haut, le Gouvernement a commencé à réaliser de telles

politiques et les dernières statistiques indiquent que les taux de redoublement ont diminué à environ 17 pour cent en 2002–2003.

Enseignement secondaire et supérieur. Les pressions en vue de l'accès à l'Enseignement Secondaire et Supérieur commencent déjà à se faire sentir; en effet, des cohortes plus importantes d'enfants achèvent maintenant les cycles inférieurs d'instruction. Pour développer des politiques appropriées régissant la progression des étudiants d'un niveau à l'autre, il est utile de distinguer le cycle de tronc commun du cycle secondaire supérieur. Le premier peut être considéré comme une continuation du cycle primaire; ainsi, dans la mesure où les ressources le permettent, il serait approprié de viser l'accès universel à ce cycle comme objectif à moyen terme.

Le cycle secondaire supérieur quant à lui est considéré à juste titre comme une phase préparatoire à l'enseignement supérieur. Les diplômés de ces niveaux sont formés à grands frais pour des emplois dans l'économie moderne; il est donc important de s'assurer que le nombre de diplômés formés et la diversité de leurs qualifications sont compatibles avec la demande prospective de main d'œuvre qualifiée. Dans le contexte post-conflit immédiat, de grandes pénuries de travailleurs hautement qualifiés étaient senties dans l'administration et dans le secteur privé, et ces pénuries ont stimulé une croissance rapide des inscriptions, en particulier dans l'Enseignement Supérieur. Maintenant que le potentiel de capital humain s'est graduellement reconstitué en partie par l'immigration de la diaspora rwandaise et que des signes de chômage potentiel des diplômés commencent à apparaître, il serait sage de réexaminer la situation et d'adapter en conséquence les politiques d'admission dans l'enseignement secondaire supérieur et l'enseignement supérieur.

Mobilisation et utilisation efficiente des ressources

L'appui au développement de l'enseignement a été et continue d'être solide. Au cours des dernières années, la convergence de l'engagement national et des engagements internationaux ont contribué à faire monter les dépenses publiques pour l'enseignement au Rwanda au taux historique jamais atteint de 5,5 pour cent du PIB en 2001.

Cependant, un examen attentif révèle que l'augmentation a été dominée par des dépenses d'investissement en infrastructure. Bien que de tels investissements aient été nécessaires pour remettre en état les installations détruites et en augmenter la capacité, tout le système à un certain moment aurait dû requérir des ressources adéquates pour soutenir son fonctionnement régulier. A cet égard, le système a moins réussi; en effet, les dépenses actuelles pour l'enseignement sont demeurées au niveau de celles des années 1980, juste au-dessus de 3 pour cent du PIB. Il est néanmoins important de noter que même à ce niveau des dépenses, le secteur bénéficie déjà de plus du quart du budget actuel du Gouvernement (moins le paiement des intérêts de la dette); la contribution du Gouvernement serait encore plus élevée si on incluait les dépenses liées à l'enseignement drainées par d'autres organes du Gouvernement. L'augmentation du financement des donateurs du secteur, pour une utilisation flexible à travers l'appui au budget, pourrait aider à rééquilibrer les dépense en faveur des coûts récurrents. Cependant, même dans le meilleur des cas, les chances pour une augmentation importante et rapide des ressources du secteur dans les dépenses publiques récurrentes sont limitées. Faire un meilleur usage des ressources existantes et s'en servir pour susciter des contributions privées doit donc être une pièce maîtresse des efforts pour faire aboutir les objectifs du secteur.

Une meilleure utilisation des ressources publiques. Il serait nécessaire d'améliorer les allocations aux divers niveaux d'enseignement et aux catégories de dépenses. L'enseignement primaire, qui si fondamental pour le développement, ne reçoit que 45 pour cent des dépenses récurrentes publiques consacrées à l'éducation, alors que l'enseignement supérieur en obtient presque 40 pour cent.

La très forte concentration sur l'enseignement supérieur combinée avec le fait que l'enseignement supérieur ne représente présentement que 2 pour cent de la population concernée produit un résultat inéquitable prévisible: les coûts unitaires de l'enseignement supérieur au Rwanda fig-

urent parmi les plus élevés au monde (environ 75 fois ceux de l'enseignement primaire) et les 10 pour cent les mieux formés dans une promotion absorbent plus de 70 pour cent des dépenses publiques cumulatives à l'éducation reçues par la cohorte. Il n'est donc pas surprenant que le système rwandais soit l'un des moins structurellement équitables en Afrique subsaharienne. La réorientation des dépenses vers l'enseignement primaire est le seul moyen de rétablir la situation.

La restructuration de la distribution fonctionnelle constitue une deuxième direction en vue d'améliorer l'utilisation des fonds publics. Il est utile de conceptualiser les dépenses sous trois rubriques: frais généraux, prestation de service au niveau des écoles et bien-être de l'étudiant. De façon générale, le système consacre à peine les deux tiers des dépenses à la prestation de service; il est donc normal de se demander si les objectifs du système sont atteints avec ce modèle d'allocation.

A l'examen approfondi, la raison principale de ce modèle s'explique par le fait que les dépenses pour l'Enseignement Supérieur sont fortement orientées vers les services d'assistance sociale de l'étudiant et les bourses d'étude (pour des études dans le pays et à l'étranger) qui, ces dernières années, ont représenté presque la moitié des dépenses courantes du Gouvernement pour le sous secteur. La distribution est moins déviée au niveau secondaire; même ici les dépenses pour l'alimentation des élèves représentent 5 à 6 pour cent des dépenses récurrentes. Au niveau primaire aucune dépense n'est actuellement faite pour la restauration à l'école ou pour d'autres services d'assistance sociale, mais on peut également améliorer les allocations, notamment en diminuant les frais généraux de gestion en faveur d'un meilleur déploiement des enseignants et de l'acquisition de plus importantes quantité de matériels didactiques.

Mobilisation des ressources privées. Les ménages constituent la source la plus importantes des dépenses non gouvernementales sur l'éducation. Leurs contributions globales sont considérables, équivalentes approximativement à 40 pour cent des dépenses publiques du financement de l'éducation. On pourrait mieux faire sur le plan de l'éducation, cependant, pour re-orienter les dépenses des ménages vers les niveaux de l'éducation post-primaire. A la rédaction de ce rapport, le Gouvernement a présenté de nouvelles politiques pour le financement de l'Enseignement Supérieur qui feront rembourser les bourses d'études octroyées aux étudiants sous forme de prêt financé par le Gouvernement. Le Gouvernement continue également d'encourager les établissements du secondaire et du supérieur privés afin de s'assurer que le secteur privé demeure une source principale pour l'expansion de l'offre de places à ses niveaux.

Des critères explicites pour le déploiement des enseignants dans les écoles

Puisque la majorité des ressources destinées au financement de l'éducation primaire et secondaire parvient à l'école ou à la salle de classe sous forme d'enseignants, le déploiement des enseignants constitue un aspect important de la gestion des ressources publiques pour servir le système éducatif des bénéficiaires ciblés. Dans un système bien géré, le nombre d'enseignants d'une école aurait une relation étroite avec l'importance des inscriptions. Au Rwanda, cette relation n'est pas aussi étroite que l'on pourrait s'y attendre en se basant sur l'expérience d'autres pays africains à faible revenu. Une école primaire accueillant 500 élèves, par exemple, pourrait recevoir aussi peu que 5 enseignants ou un effectif aussi important que 15. Cette diversité dans l'attribution implique que des ressources sont inéquitablement distribuées aux écoles et que par conséquent les conditions d'apprentissage sont fortement disparates. Quelques écoles publiques sont si bien dotées qu'elles peuvent permettre à leurs enseignants d'assurer seulement tour d'enseignement au lieu des deux habituellement exigés de la plupart des enseignants dans le système public. Comme on pourrait s'y attendre, les écoles les mieux dotées sont typiquement situées dans Kigali Ville; les mal loties sont souvent concentrées dans des provinces telles que Byumba, Gisenyi, Kigali-Rural, Kibungo et Kibuye. Les différences de niveau au sein des provinces n'expliquent cependant qu'une petite partie de la situation. Notre analyse suggère que les différences à l'intérieur d'une province sont même plus prononcées. Le corollaire est que le processus du déploiement des enseignants dans chaque province peut probablement être mieux géré pour produire une plus grande uniformité dans la disponibilité des enseignants au sein des écoles.

Equilibrer l'accessibilité des écoles avec les considérations d'économies d'échelle
L'implantation spatiale des écoles est importante parce qu'elle détermine leur accessibilité aux bénéficiaires cibles. Cependant, plus les écoles sont situées à proximité des habitations des élèves, plus il est probable qu'elles servent de petits secteurs de recrutement scolaire, et donc plus élevés sont les coûts unitaires. Comment trouver alors un bon équilibre entre l'accessibilité et le coût de la prestation de service? Comme ailleurs, la réponse dépend du niveau de l'enseignement.

Au niveau primaire, les enfants sont trop jeunes pour faire de grands déplacements; la question de l'accessibilité devient alors fortement pertinente. Pourtant le réseau actuel des écoles primaires au Rwanda tend à privilégier la taille par rapport à la proximité: les enfants dans la moitié des ménages, selon une enquête récente, mettent plus de 30 minutes pour atteindre les écoles les plus proches; et ces écoles sont susceptibles d'être parmi les trois quarts des écoles publiques du pays qui accueillent plus de 450 élèves. L'accent mis sur les écoles de grande taille permet peu d'économies d'échelle cependant, puisque les coûts unitaires sont relativement uniformes au-delà de l'inscription d'environ 450 élèves. Dans l'enseignement primaire, on pourrait donc accorder une attention particulière à l'extension du réseau des écoles afin de les situer plus près des habitations des élèves. Le résultat devrait être la réduction de la barrière physique à la fréquentation scolaire ainsi que la réduction du coût occasionné par cette fréquentation.

Aux niveaux post-primaires, les élèves peuvent voyager plus loin, et la distance physique devient moins une contrainte qui limite les inscriptions; par la même occasion, les économies d'échelle commencent à apparaître parce que les installations pour les enseignements spécialisés deviennent de plus en plus communs. L'équilibre entre l'accessibilité et les économies d'échelle pourrait ainsi être différemment réalisé. Au Rwanda, une part considérable des écoles du cycle de tronc commun tend à être des écoles de petite taille qui fonctionnent à des coûts unitaires élevés. Les écoles de 400 élèves coûtent deux tiers moins cher par élève que celles qui accueillent 100 à 200 élèves, et elles coûtent les quatre cinquièmes de celles qui accueillent 200 à 300 élèves. Pourtant les écoles de ces deux dernières catégories accueillent plus de 55 pour cent des inscrits. Nos calculs montrent qu'une situation où aucune école n'inscrirait pas moins de 400 élèves réduirait le coût unitaire de la prestation de service de 20 pour cent au niveau de l'ensemble du système, probablement une économie non négligeable dans un contexte de ressources rares. Ainsi, comme les inscriptions augmenteront dans les années à venir, il est important d'harmoniser la croissance en augmentant les inscriptions des écoles existantes jusqu'à ce qu'elles atteignent une taille économiquement acceptable, plutôt qu'en construisant plus de nouvelles écoles pour de petits secteurs de recrutement.

Dans l'enseignement secondaire supérieur comme dans l'enseignement supérieur, les inscriptions sont relativement faibles et sont susceptibles de se développer lentement aussi longtemps que la capacité d'absorption du marché du travail du secteur moderne demeure limitée. Cette tendance implique qu'il est même plus important pour les écoles et institutions de tirer profit des économies d'échelle dans la prestation des services et ceci peut exiger une certaine consolidation de leurs offres de cours. Au Rwanda, seuls 14 pour cent des élèves du secondaire supérieur vont à une école de 400 étudiants ou plus, et les étudiants de chaque école ont tendance à se disperser dans plusieurs domaines de spécialisation. Dans l'enseignement supérieur, il y a également une évidence de duplication entre les institutions publiques d'une part, et entre les secteurs public et privé d'autre part, dans certains domaines d'étude. Ces résultats suggèrent qu'en contrôlant l'expansion de ces niveaux, les décideurs pourraient chercher à réduire au minimum la prolifération des offres de cours, particulièrement là où la demande est faible et le potentiel pour des économies d'échelle dans la prestation de service limité.

Gérer les conditions et les processus de classe en vue d'améliorer l'apprentissage de l'étudiant.
Un test crucial de performance du système éducatif est son efficacité dans la transformation des ressources mises à sa disposition en résultats scolaires. Dans l'enseignement primaire et secondaire, il apparaît évident que des possibilités d'améliorer la performance des écoles existent; en effet, la performance des écoles, mesurée (même de façon imparfaite) par les résultats aux examens, n'a

qu'un rapport très faible avec le niveau des ressources qu'elles reçoivent. Ceci soulève deux types de question: l'efficacité de la combinaison des ressources qui soutiennent la prestation des services; et de façon très importante, les incitations à la performance.

Intrants de l'enseignement primaire. La situation idéale, sans contrainte financière, serait que les élèves disposent d'un temps d'instruction suffisant, soient enseignés dans de petites classes par des enseignants compétents et aient accès à un approvisionnement suffisant en livres et autres matériels didactiques. Mais dans un environnement de ressources limitées, des choix difficiles doivent se faire et les décideurs doivent trouver les combinaisons de ressources qui fonctionnent le mieux sous ces contraintes. Au Rwanda, la combinaison des ressources dans les écoles primaires publiques favorise la qualification des enseignants aux dépens de la taille de la classe et du temps d'instruction. Le ratio élève-enseignant de 57 à 1 du pays se situe actuellement parmi les plus élevés au monde et se traduit en une situation dans laquelle la plupart des enseignants des trois premiers niveaux du cycle d'enseignement sont obligés d'enseigner deux vagues d'élèves. En conséquence, le temps d'instruction des élèves dans ces niveaux s'élève en moyenne à environ cinq cents (500) heures par an, au lieu de mille (1000) heures dans les niveaux supérieurs et de la fourchette de huit cent cinquante (850) à mille (1000) heures que d'autres pays à faible revenu visent présentement en se basant sur les meilleures pratiques internationales. Réduire le ratio élève-enseignant (ce qui nécessiterait le recrutement d'un plus grand nombre d'enseignants) aiderait à résoudre le problème, mais dans un contexte de budgets serrés, ceci exigera un ajustement de la combinaison des ressources.

L'ajustement du niveau de recrutement des enseignants est une option possible pour gérer ce choix. Actuellement tous les nouveaux enseignants sont recrutés parmi ceux qui ont achevé l'enseignement secondaire supérieur. Tandis que le recrutement à ce niveau a ses avantages en principe (et peut être approprié comme objectif à long terme), la réalité est que de tels enseignants ne sont pas plus efficaces que ceux qui n'ont achevé que l'enseignement secondaire inférieur, dans le contexte actuel des écoles rwandaises. Mais compte tenu des différences de salaires entre les deux types d'enseignants, cela vaudrait peut-être la peine d'assouplir les critères de recrutement afin de réaliser la réduction du ratio élèves/enseignant de façon financièrement faisable et durable.

Intrants de l'enseignement secondaire. Dans l'enseignement secondaire, la question de la qualification des enseignants est aussi hautement pertinente. Dans le cycle du tronc commun, la plupart des enseignants satisfont à la qualification minimum (ce qui veut dire qu'ils ont au moins un diplôme secondaire supérieur) et certains ont même un diplôme d'université. En revanche, la moitié des enseignants dans les écoles secondaires supérieures sont probablement sous qualifiés, n'ayant eux-mêmes qu'un diplôme secondaire supérieur. Toute stratégie pour améliorer les résultats de l'apprentissage doit donc chercher à relever le profil éducationnel des enseignants du cycle secondaire supérieur. La solution évidente est de fixer et d'appliquer des normes claires pour le recrutement; mais si le problème doit être résolu plus rapidement, les décideurs pourraient chercher à rationaliser le déploiement du cadre actuel des enseignants de cycle secondaire en les réaffectant (dans la mesure du possible) entre le tronc commun et le cycle secondaire supérieur selon leur qualification.

Mesure d'encouragement. Bien que le choix de la bonne combinaison des ressources soit important, il ne constitue en aucun cas toute l'explication d'une faible performance. Puisque la scolarisation est un processus social qui implique des acteurs multiples, les résultats dépendent finalement du comportement des gens. Mettre en place les bonnes incitations pour aligner les comportements sur l'objectif qui consiste à relever le niveau de l'élève constitue ainsi un défi clé dans la gestion des résultats. Les interventions potentielles à cet égard sont aussi diverses que le contexte dans lequel les gens vivent et travaillent, mais le principe d'établir des responsabilités claires et de les associer avec l'autorité de dépense et de gestion à tous les niveaux est probablement approprié partout. Les expériences à travers le pays ont également mis en évidence l'importance de la définition et du contrôle des indicateurs tangibles de progrès comme moyen pour augmenter les incitations en vue d'une meilleure performance.

Réduire au minimum les barrières à l'accès

Comme précédemment indiqué, les écarts socio-économiques dans les inscriptions sont plus réduits au Rwanda que dans d'autres pays à faible revenu. Ce résultat ne devrait cependant pas pousser à la complaisance. On peut et on devrait faire davantage pour atteindre les enfants les plus vulnérables, y compris les orphelins de père et de mère, les enfants de la rue qui ne bénéficient pas de la surveillance systématique des adultes, les enfants vivant dans les zones rurales et ceux des 40 pour cent des ménages les plus pauvres. Les doubles orphelins—manifestement les plus vulnérables—sont facilement identifiables et des efforts systématiques peuvent et doivent être faits pour améliorer leurs perspectives dans la vie. Pour les autres groupes, l'aide nécessaire devrait être diversifiée. Des interventions pilotes et exploratoires sont probablement appropriées pour trouver la meilleure manière d'être à leur service.

Dans l'enseignement secondaire supérieur, les taux de fréquentation des enfants du quintile supérieur dépassent de loin ceux du reste de la population. Les filles ont les mêmes chances que les garçons de s'inscrire dans l'enseignement secondaire, mais elles traînent sensiblement derrière les garçons dans l'enseignement supérieur. En ce qui concerne le choix des interventions pour réduire les disparités socio-économiques des taux de fréquentation, les conclusions du rapport suggèrent que l'aide financière pourrait aider les groupes à la traîne de la même manière qu'elle aide les orphelins dans l'enseignement secondaire dans le cadre du Fonds de Génocide; cependant, l'intervention devrait probablement être associée à des efforts d'amélioration des résultats des études. De tels efforts sont importants car, dans un système de sélection basée sur le mérite, élargir la représentation des groupes à la traîne n'est possible que si ces groupes sont capables de rivaliser pour les places convoitées dans l'enseignement post-primaire.

Conclusion

Presque une décennie après le génocide, les dirigeants du Rwanda peuvent être fiers et satisfaits de tout ce qu'ils ont pu réaliser dans le domaine de l'éducation. Ils ont remis un système dévasté sur pied: des salles de classe ont été réparées et de nouvelles ont été construites pour faire face au nombre croissant d'élèves; les enseignants qui ont fui la violence et sont rentrés ont été réintégrés dans l'enseignement; les arriérés de salaire des enseignants ont été régularisés; le Fonds du Génocide a été créé spécifiquement pour aider les orphelins; et un système diversifié a été mis en place dans l'enseignement supérieur.

Cependant, la tâche restante demeure impressionnante au moment où la phase du redressement cède la place au travail de consolidation et de développement à plus long terme du secteur. Les soucis d'efficacité, d'équité et de stabilité fiscale deviendront inévitablement de plus en plus réels au moment où le pays cherche à faire progresser le système éducatif dans un environnement de ressources limitées. Il faut espérer que les résultats de cette étude pourront contribuer à la discussion en créant une compréhension commune des problèmes et en attirant l'attention sur certains des défis émergeants.

CHAPTER 1

RWANDA: DEMOGRAPHY, ECONOMY, AND THE GOVERNMENT BUDGET

The recent poverty reduction strategy paper (PRSP) for Rwanda envisions a key role for education in the government's efforts to improve the social and economic well-being of the population (Rwanda 2002a). The emphasis on education is consistent with a growing international consensus—encapsulated in the United Nations Millennium Declaration of 2000 and the Millennium Development Goals (MDGs)—that progress in education cannot be left out of the fight against poverty. This confluence of public opinion is already leading to support for increased funding for education, both within Rwanda and on the part of international donors.[1] Yet one can expect that any increase in resources will be contingent on the effective use of existing resources. The consensus also carries with it the implicit expectation of tangible progress toward full coverage of the primary-school-age population, improved student learning, and a better fit between the amount and mix of skills produced by the school system and the demands of the labor market.

The recent developments present exciting opportunities for educational development in Rwanda, but they also pose serious challenges. To set the stage for an examination of the choices and issues that face Rwanda's education system, this chapter presents a brief overview of the characteristics of the population—highlighting in particular the prevalence of orphanhood among school-age children and youths—as well as the country's macroeconomic conditions, including historical and cross-country perspectives, and its public finances. Box 1-1 provides summary background information on Rwanda.

1. An indication of the potential for increased external funding is the World Bank's launch, on June 12, 2002, of the Education For All (EFA) Fast Track Initiative on behalf of a new EFA Partnership. The partnership includes various bilateral donors active in education, as well as the European Union, the United Nations Educational, Scientific, and Cultural Organization (UNESCO), the United Nations Children's Fund (UNICEF), and the multilateral development banks. On the domestic side, countries benefiting from the Heavily Indebted Poor Countries (HIPC) Initiative have made a commitment to allocate 40 percent of the debt relief monies for investment in education (World Bank 2003).

Box 1-1: Rwanda at a Glance

Geography
Known poetically as the "Land of a Thousand Hills," Rwanda is a landlocked nation bordered on the north by Uganda, on the south by Burundi, on the east by Tanzania, and on the west by the Democratic Republic of Congo. The country enjoys a mild tropical climate with two rainy seasons, February to April, and November to January. A habitat that extends over parts of Rwanda, Uganda, and the Democratic Republic of Congo is home to the only 650 mountain gorillas left in the world today. With an area of 26,338 square kilometers (10,169 square miles) and an estimated 310 inhabitants per square kilometer (based on the results of the August 2002 census), Rwanda is one of the most densely settled countries in Africa. The pressure of people on scarce land poses a constant threat to social harmony and the physical environment.

People
According to preliminary results from the 2002 census, Rwanda's population numbers 8.16 million. The official languages are Kinyarwanda, French, and English; local dialects include Igikiga, Bufumbwa, Rutwa, and Hutu.

Economy
With a per capita gross domestic product (GDP) of only US$242 in 2000, Rwanda is one of the poorest countries in the world. Its agriculture-dominated economy, consisting mainly of small and increasingly fragmented farms producing to meet subsistence needs, has changed little over time. Coffee and tea continue to be the country's principal exports. The manufacturing sector accounts for 20 percent of GDP and is dominated by import-substituting industries. In the 1960s and 1970s prudent financial policies, coupled with generous external aid and favorable terms of trade, fostered sustained growth, but in the 1980s, when the price of coffee plummeted, growth became erratic. GDP then declined sharply during the four years of civil war that culminated in the genocide of 1994. Recently, GDP has again been growing steadily under a program of improved tax collection, accelerated privatization of state enterprises, and continued improvements in export crop and food production.

Politics, civil war, and genocide
Rwanda gained its independence from Belgium in July 1962. A massacre of the minority Tutsis by the majority Hutus began in 1959, sending hundreds of thousands of Tutsis into exile in neighboring countries. Since then, Rwanda has been through one episode of violence after another. Widespread massacres of Tutsis again took place during 1990–93. In an attempt to stem ethnic strife, the Arusha Peace Agreement was signed on August 4, 1993, but the death of President Juvénal Habyarimana in April 1994 sparked a genocide of unprecedented swiftness that, by one conservative estimate, left up to 800,000 Tutsis and moderate Hutus dead at the hands of Hutu militia. The Rwandan Patriotic Army (RPA) launched a counterstrike and captured Kigali, the capital city, on July 4, 1994.

Over 2 million refugees fled to Tanzania and the Democratic Republic of Congo (then called Zaire). On July 19, 1994, a "Government of National Unity" was established, and a fragile process of recovery began to take hold. The country continued to experience large movements of people. Following unrest in the eastern part of Zaire, more than 600,000 refugees moved back to Rwanda in November 1996. This massive wave was followed at the end of December 1996 by the return of another 500,000 from Tanzania. At present, it is estimated that fewer than 100,000 Rwandans, thought to be remnants of the defeated Hutu militia, remain outside the country.

Relations with the World Bank
Rwanda became a member of the World Bank on September 30, 1963, and received its first World Bank credit in 1970 for a roads and highway project. Since then, it has received policy advice, technical assistance, and project and program financing in support of the country's economic development. The World Bank Group's

International Development Association (IDA) and the International Monetary Fund (IMF) have agreed to support a comprehensive debt reduction package for Rwanda under the Enhanced Heavily Indebted Poor Countries (HIPC) Initiative. The package will save Rwanda a cumulative total of about US$810 million in debt service over the coming years and will reduce by 71 percent the net present value of Rwanda's debt outstanding as of end-1999.

Sources: Based on the following online resources accessed during May 2002: Central Intelligence Agency, *The World Factbook: Rwanda*, <http://www.cia.gov/cia/publications/factbook/geos/rw.html>; Embassy of Rwanda, "General Information: The People," <http://www.rwandemb.org/info/geninfo.htm#peo>; Valerie Percival and Thomas Homer-Dixon, 1995, "Environmental Scarcity and Violent Conflict: The Case of Rwanda," Occasional Paper, Project on Environment, Population and Security (Washington, D.C.: American Association for the Advancement of Science and the University of Toronto), <http://www.library.utoronto.ca/pcs/eps/rwanda/rwanda1.htm>; Republic of Rwanda, "History of a People," <http://www.rwanda1.com/government/>; SIL International, "Languages of Rwanda," <http://www.ethnologue.com/show_country.asp?name=Rwanda>; U.S. Department of State, Bureau of African Affairs, "Background Note: Rwanda," November 2001, <http://www.state.gov/r/pa/ei/bgn/2861.htm#econ>; World Bank, "Countries: Rwanda: History," <http://www.worldbank.org/afr/rw2.htm>; World Bank, "Rwanda to Receive US$810 Million in Debt Service Relief: The World Bank and IMF Support Debt Relief for Rwanda under the Enhanced HIPC Initiative," News Release 2001/192/S, <http://wbln0018.worldbank.org/news/pressrelease.nsf/673fa6c5a2d50a67852565e200692a79/16a382f805bb75bf852569bd006b344e?Open document>.

The Demographic Context

Rwanda's population grew from 3.6 million in 1970 to 8.2 million in 2002 (see table 1-1). At the country's historical rates of population growth—averaging 3.8 percent a year in the 1970s and more than 3 percent a year in the 1980s—the population in 2002 would have been much bigger had it not been for the horrific genocide in 1994, which claimed at least 800,000 lives. The data in the table document a still incomplete recovery from the massacre:

- The urban share of population has nearly doubled, to 10.5 in 2000 from the 5.5 percent recorded in 1991, perhaps reflecting the congregation of displaced persons in the capital and in other cities where relief services may be more easily accessed.
- The share of the population that cannot afford a minimally adequate diet has swelled from 51 percent in 1991 to 60 percent in 2000.
- The under-five mortality rate, a good indicator of overall health conditions, has deteriorated by nearly 30 percent since 1991.
- Although women are having fewer children—an average of 5.8 births per woman over the reproductive lifespan in 2000, compared with 8.3 in 1978—the rate remains high and provides one explanation for Rwanda's exceptionally high level of maternal mortality. For comparison, maternal mortality in neighboring Tanzania and Uganda, estimated using data from similar surveys and a comparable methodology, was found to be only about half as high (Rwanda 2002b).
- As in most of Africa, HIV/AIDS poses a serious health threat. According to the Joint United Nations Programme on HIV/AIDS (UNAIDS), the prevalence rate among Rwandan adults ages 15–49 exceeded 11 percent in 1999. Although the rate is not as high as in, for example, South Africa, Zambia, or Zimbabwe, containing the spread of the disease remains a challenge—one that calls for a determined and sustained response from the government and its partners.

Incidence of Orphanhood

Orphanhood is a characteristic feature of the demographic makeup of many countries affected by the HIV/AIDS epidemic, but in Rwanda the problem has been greatly exacerbated by the 1994 genocide. Table 1-2 presents data based on the 2000 Multiple Indicator Cluster Survey (MICS)

TABLE 1-1: POPULATION SIZE, RWANDA, 1970–2002, AND POVERTY RATES AND SELECTED HEALTH INDICATORS, 1970–2000

Indicator	Census year 1970	1978	1991	2000
Total population (millions)	3.6	4.8	7.2	8.2[a]
Population increase from year in previous column (% per year)	—	3.8	3.1	1.2[b]
Primary-school-age (ages 7–12) population as % of total	—	—	17.7	15.7
Urban share of population (%)	3.5	4.6	5.5	10.5
Percentage of population living in poverty[c]	—	—	51.2	60.3
Urban areas	—	—	—	19.4
Rural areas	—	—	—	65.7
Selected health and demographic indicators				
HIV/AIDS prevalence rate among adults ages 15–49 (%)	—	—	—	11.2
Under-five mortality (deaths per 1,000 live births)	210	—	151	196
Maternal mortality (deaths per 100,000 live births)[d]	—	—	—	1,071
Total fertility rate (births per woman over reproductive lifespan)	—	8.3	6.2	5.8

— Not available.

a. Refers to the population in 2002 (based on preliminary returns from the 2002 census).

b. Refers to the annual growth rate between 1991 and 2002.

c. Those unable to afford a food basket yielding a minimum caloric food intake and unable to satisfy minimum nonfood needs. Minimum caloric food intake is defined as 2,500 kilocalories per adult equivalent per day in the 2000 survey; the threshold in the earlier survey is unknown. The data for 1991 refer to the results from a survey conducted in 1993, as reported in *World Development Indicators 2002*.

d. Refers to estimate for 1995–2000, based on the 2000 Demographic and Health Survey for Rwanda (Rwanda 2002b).

Sources: For population, 1970, 1978, and 1991; urban share of population, 1970, 1978, and 1991; share of school-age population, 1970, 1978, and 1991; and intercensal population growth rates, 1970–91: Rwanda (1994b). For urban share of population and share of population living in poverty, 2000: Rwanda (2000b). For HIV/AIDS infection rate: UNAIDS, at <www.uaids.org>. For share of population living in poverty, 1993; under-five mortality rate and total fertility rate, 1978 and 1991; population and share of school-age population, 2000: United Nations Population Division estimates and projections as reported in the World Bank's Statistical Information Management and Analysis (SIMA) database and in *World Development Indicators 2002*. For total fertility rate, 2000: Rwanda DHS report (Rwanda 2000b). Estimated population growth, 1991–2002, is computed using population data shown in the table.

sponsored by the United Nations Children's Fund (UNICEF), which collected information on more than 9,000 children below age 15 in the sampled households. An average of 28.5 percent of these children had lost at least one parent, usually the father. Among 10-to-14-year-olds, the share was much higher, exceeding 40 percent. Five percent of the children in the sample had lost both parents; again, the share among older children was significantly higher.

Cross-Country Comparison of the Incidence of Orphanhood

Figure 1-1 shows relevant cross-country data on orphanhood rates for around 2000. The rate in Rwanda among children ages 7–14 was estimated at nearly 40 percent. This figure is more than 1.5 times as high as the rates in Uganda and Zimbabwe, more than 2.5 times those in Malawi, Mozambique, and South Africa, and nearly 4 times those in Kenya and Tanzania.[2] Although the

2. Estimated orphanhood rates in such countries as Uganda and Mozambique reach 20 percent or close to it. It is thus likely that Rwanda's orphanhood rate would be at least as high.

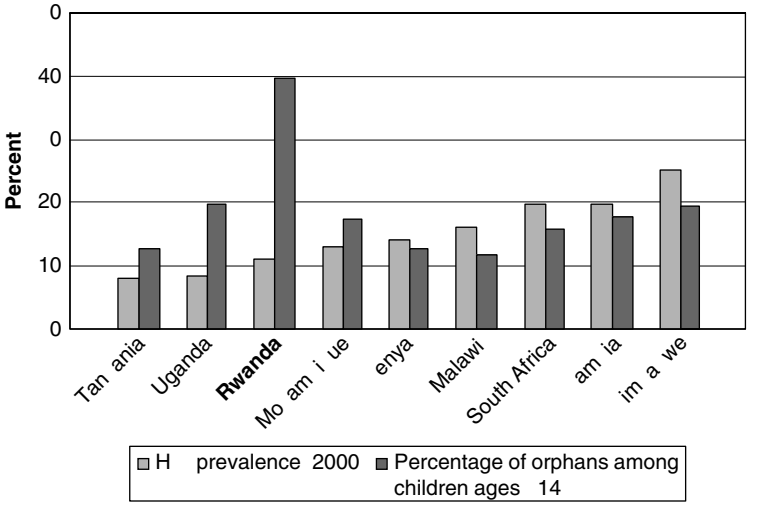
TABLE 1-2: ORPHANS AND CHILDREN LIVING APART FROM BIOLOGICAL PARENTS, RWANDA, CIRCA 2000

	One parent dead						
	Mother dead (%)	Father dead (%)	Total, one parent dead (%)	Both parents dead (%)	One or both parents dead (%)	Living away from parents (%)	Sample or Population size (number)
From Multiple Indicator Cluster Survey, 2000, by age group, in years[a]							
0–3	0.7	8.8	9.5	0.5	9.9	2.7	2,541
4–6	3.1	18.7	21.8	3.2	25.1	11.7	1,862
7–9	4.0	24.1	28.1	6.3	34.4	14.3	1,633
10–12	5.2	27.4	32.6	7.9	40.5	17.1	1,793
13–14	5.8	28.6	34.4	10.3	44.7	20.4	1,251
All age groups, 0–14	3.4	20.1	23.5	5.0	28.5	12.0	9,080
Estimated population nationwide, by age group, in years (thousands)							
0–6	28	208	235	26	261	105	1,594
7–12	59	332	391	92	482	202	1,284
13–14	27	134	162	49	210	96	471

a. Percentages are weighted by provincial sampling weights. Because the incidence of orphanhood among boys and girls is highly comparable, separate figures by gender are not shown.

Source: Authors' calculations based on data from the 2000 MICS survey.

FIGURE 1-1: ADULT HIV/AIDS PREVALENCE RATES AND SHARE OF ORPHANS AMONG CHILDREN AGES 7–14, RWANDA AND OTHER EAST AFRICAN COUNTRIES, CIRCA 2000



Note: Orphans refers to children ages 7–14 who have lost at least one parent. Data refer to 1992 for Malawi, 1996 for Tanzania, 1997 for Mozambique, 1998 for Kenya, South Africa, and Zambia, 1999 for Zimbabwe, and 2000 for Rwanda and Uganda.

Source: For HIV/AIDS prevalence rates, UNAIDS, at <www.unaids.org>; for orphanhood rates for Rwanda, table 1-2 and for other countries, Ainsworth and Filmer (2002).

HIV/AIDS epidemic has created many orphans in all these countries, the much higher rate in Rwanda leaves no doubt as to the devastating legacy of the 1994 genocide.

The high prevalence of orphanhood in Rwanda has obvious implications for the education system. Orphans have few or no means to invest in their schooling without significant help from others. The sheer size of the problem calls for action on a commensurate scale, probably with government leadership in support of efforts by nongovernmental organizations (NGOs), local communities, and concerned individuals. In 1998 the government set up a Genocide Fund to mobilize resources to provide systematic financial support to orphans.[3] The fund was established by law and is capitalized by an allocation of 5 percent of domestic revenues. The first disbursements were made in 2000 to about 33,000 students. The effort clearly has a long way to go, since the fund currently supports only orphans in secondary school. As in any scheme providing financial aid, an important challenge will be to make sure that funds reach their intended beneficiaries, particularly considering that cases of fraudulent claims have already been reported.

Beyond the financial cost, an even more daunting task is that of educating and nurturing large numbers of traumatized children who have lost the most significant adults in their lives. The challenge will undoubtedly require that frontline workers—in this case, teachers and school administrators—go far beyond the ordinary duties of classroom teaching to address the psychological needs of their charges as well.

Macroeconomic Conditions

Table 1-3 shows Rwanda's per capita gross domestic product (GDP) in 1980 and 2000 and the average annual growth rate of GDP in the two decades separating those years. For comparison, the table also reports similar data for countries in Africa and Asia with per capita GDP comparable to

3. The French name of the Genocide Fund is Fonds national pour l'assistance aux rescapés du génocide et des massacres au Rwanda (FARG).

TABLE 1-3: ECONOMIC PERFORMANCE OF RWANDA AND SELECTED COUNTRIES, 1980–2000

Country	GDP per capita as multiple of Rwanda's		Average GDP growth rate, 1980–2000 (% per year)
	1980	2000	
Rwanda	**1.0**	**1.0**	**1.1**
(Per capita GDP in constant 1995 US$)	(321)	(242)	
Sierra Leone	0.91	0.61	–1.2
Malí	0.95	1.19	2.2
Nigeria	0.98	1.05	1.8
Níger	1.02	0.84	0.9
Kenya	1.05	1.36	2.8
Madagascar	1.07	1.02	1.1
Benin	1.13	1.71	3.6
Lesotho	1.14	2.28	4.0
Gambia, The	1.17	1.53	3.5
Ghana	1.23	1.71	3.2
Nepal	0.46	1.00	4.8
Bangladesh	0.70	1.54	4.7
India	0.70	1.90	5.5
Pakistan	0.99	2.14	5.0

Source: World Bank Statistical Information Management and Analysis (SIMA) database, as of June 5, 2002.

or lower than Rwanda's in the 1980s. Rwanda's record is dismal in comparative perspective. GDP expanded at only 1.1 percent a year between 1980 and 2000, and per capita GDP in 2000 was only about three-quarters as high as in 1980. The performance of the economy over the two decades was comparable to that of Madagascar, better than that of Sierra Leone, and significantly worse than in Kenya, Benin, Lesotho, The Gambia, and Ghana. Rwanda's slow growth comes into even sharper relief in light of the record of growth in low-income Asia, whose economies expanded at average rates of around 5 percent a year during the period. By 2000, Nepal, which started with a per capita GDP less than half that of Rwanda's in 1980, had caught up with Rwanda, while Bangladesh, which lagged Rwanda by 30 percent in 1980, had achieved a per capita GDP 50 percent higher than Rwanda's.

Although it is beyond the scope of this report to evaluate Rwanda's growth prospects, the comparative data suggest that more rapid growth should be possible. Faster growth would make it easier to reduce poverty—Devarajan (2001) estimates that a 1 percent increase in the growth rate could reduce the poverty rate by between 1 and 2 percent—and improve educational and other social outcomes. It is widely recognized, however, that the trickle-down benefits of growth alone are inadequate (Devarajan 2001). Going one step further, Devarajan and Renikka (2002) argue that even increases in public spending would have limited impact and that progress is made by targeting public spending to fund the right types of services for the right groups of people; by ensuring that the money reaches frontline service providers; by improving the incentives for service providers to serve their clients; and by addressing the constraints, financial or otherwise, that households may face in making use of the services offered. Subsequent chapters will address some of these issues.

Overall Patterns of Government Finance

The time-series data cited in this section show the expected sharp discontinuities around 1994, the year of the genocide. Because the data for the mid-1990s are probably less comparable with those for other years, we begin with the 1980s to enable observation of long-term trends during the two decades. On the revenue side (table 1-4), revenues, including grants, ranged between 11 and 14 percent of GDP during the 1980s. In the 1990s, they were generally higher—between 13 and 18 percent—except in 1994. Because grants make up a significant and generally rising share of these revenues (40 percent of total revenues in 2001), the volume of revenue mobilized domestically has grown only slowly in the two decades, from about 8.5 percent of GDP in the early 1980s to about 10 percent by the late 1990s and early 2000s. Compared with other countries, this level of domestic revenue generation is on the modest side: the corresponding averages around 2000 were 15.8 percent of GDP for 30 low-income African countries,

TABLE 1-4: GOVERNMENT REVENUE, RWANDA, 1981–2001

	Total government revenue, including grants			Government revenue, excluding grants			
		As share of GDP			As share of GDP		Grants as share of total revenue (%)
Year	Billions of current FRw	%	Index (1981 = 100)	Billions of current FRw	%	Index (1981 = 100)	
1981	14.9	12.2	100.0	10.4	8.5	100.0	30.1
1982	15.2	11.6	95.5	11.7	8.9	104.6	23.5
1983	15.4	10.9	89.1	11.6	8.1	95.6	25.1
1984	17.9	11.3	92.5	14.3	9.0	105.5	20.3
1985	21.2	12.2	100.1	17.2	9.9	116.2	18.9
1986	23.5	13.8	113.5	19.8	11.6	136.9	15.7
1987	23.1	13.5	110.8	19.7	11.5	135.3	14.7
1988	22.9	12.5	102.5	17.1	9.4	110.0	25.0
1989	24.4	12.7	104.1	19.2	9.9	116.8	21.6
1990	27.5	12.9	105.6	21.6	10.1	118.8	21.4
1991	36.1	15.1	123.8	25.0	10.4	122.8	30.7
1992	44.3	16.2	133.2	27.6	10.1	118.7	37.8
1993	44.0	15.6	128.1	25.9	9.2	107.7	41.2
1994	7.5	4.6	37.4	6.0	3.6	42.8	20.1
1995	61.5	18.1	149.0	23.1	6.8	80.2	62.4
1996	70.8	16.7	137.1	39.4	9.3	109.2	44.3
1997	95.8	17.2	141.0	58.0	10.4	122.2	39.4
1998	99.0	15.9	130.9	66.0	10.6	124.9	33.3
1999	101.9	15.8	129.9	63.5	9.9	115.9	37.7
2000	132.3	19.0	156.0	68.5	9.8	115.6	48.2
2001	139.5	18.2	149.6	83.9	11.0	128.8	39.9

Note: FRw, Rwandan francs; GDP, gross domestic product.

Source: Authors' calculations, based on data from the World Bank Africa Live Database (April 24, 2002, version). See also appendix table A1-1.

17.4 percent for 11 non-African low-income countries, and 11.6 percent for the seven countries other than Rwanda with per capita GDP between US$200 and US$300.[4] A World Bank (1999) study on development prospects in Madagascar (which has a per capita GDP comparable to Rwanda's) is instructive in this regard: it suggests that Rwanda would need to raise domestic revenue generation to around 15 percent to finance its poverty reduction agenda.

We turn next to the expenditure side (table 1-5). As a percentage of GDP, total public current and capital spending in the late 1990s and early 2000s was about the same as in the 1980s—that is, around 20 percent. The ratio of public spending to total revenues was lower in the late 1990s and early 2000s than in the 1980s and early 1990s, a trend that is consistent with rising total revenue in the past two decades. Current spending net of interest—one measure of the cost of running the government—has remained relatively stable throughout the two decades, although the data for the most recent years, 1998 to 2001, show a slight increase over the averages in the 1980s. Interest on the public debt is not as burdensome as in some other low-income countries; it accounted for around 4–6 percent of total spending, or about 1 percent of GDP, throughout the period, except for the years around 1994. The interest paid on external debt has been smaller in recent years than in the 1980s and the first half of the 1990s. It reached a historical low of less than 25 percent in 2001.

Public Spending on Education

In this section we examine the trend in public spending on education in the overall context of public finances described above. Particular attention is given to whether the emerging modest rise in public spending in recent years has translated into a similar tendency in spending on education. We then look at how the increase, if any, has been distributed between capital investment and the running cost of service delivery.

As table 1-6 shows, total public spending on education was noticeably higher from 1999 onward than in the 1980s, reaching 5.5 percent of GDP and more than a quarter of total government spending in 2001, compared with an average of 3.4 percent of GDP and less than a fifth of total government spending in the mid-1980s. Expressed as a share of domestic government revenues, the increase in spending on education is even more striking: by 2001, education spending accounted for more than half of such revenues, compared with an average of 33 percent in the mid-1980s.

The increase in spending on education reflects rising capital investments in the sector rather than increased allocations for service delivery. In the three years 1999, 2000, and 2001—the years with the highest historical levels of total spending on education relative to GDP—the current share of total spending averaged 73 percent, compared with more than 94 percent in the mid-1980s. As a result, current spending on education as a share of GDP in the late 1990s and early 2000s was only slightly better than the average of 3.1 percent during the 1980s. The shift in spending toward capital investment after 1994 is consistent with the efforts to rebuild educational infrastructure destroyed during the genocide. Yet at some point, one would expect current spending to begin growing as well, given that the capital investment is presumably meant to translate into expanded service delivery for a larger population of students.

Although it is not our purpose to make a detailed assessment of the prospects for an increase in current spending on education, a few patterns and developments are noteworthy. An increase in current spending on education would depend on three underlying parameters and their expected trends: domestic revenues, external resource flows, and the share of education in public current spending. The first and last parameters are unlikely to rise dramatically, given their historical trends in Rwanda and the fact that education already claims more than a quarter of total public current spending net of debt interest payments. That leaves, as a source of higher spending on education, increased external support.

4. The data are based on the World Bank Africa Live Database (April 24, 2002, version). The averages for the low-income African samples exclude data for Angola, Eritrea, Lesotho, and Nigeria, where, for various reasons, government revenues as a percentage of GDP are exceptionally high, exceeding 30 percent.

TABLE 1-5: GOVERNMENT SPENDING, RWANDA, 1981–2001

Year	Billions current of FRw	Total spending			Current spending net of interest payments		Interest on all public debt		
		As share of GDP		As ratio of total government revenue	As % of total spending	As % of GDP	As % of total spending	As % of GDP	Share of interest on external debt (%)
		%	Index (1981 = 100)						
1981	22.6	18.4	100	1.51	57.8	10.6	1.7	0.3	57.9
1982	25.7	19.6	106	1.68	54.3	10.6	2.3	0.5	47.1
1983	28.6	20.1	109	1.85	53.6	10.8	2.5	0.5	66.6
1984	23.9	15.0	81	1.33	62.1	9.3	4.4	0.7	67.0
1985	28.4	16.3	89	1.34	56.1	9.2	4.3	0.7	68.9
1986	31.6	18.6	101	1.34	57.7	10.7	4.4	0.8	69.7
1987	37.3	21.7	118	1.61	57.5	12.5	4.9	1.1	67.9
1988	34.6	18.9	103	1.52	60.8	11.5	5.9	1.1	66.2
1989	35.7	18.5	101	1.46	60.1	11.1	5.7	1.1	63.5
1990	42.1	19.7	107	1.53	64.9	12.8	5.1	1.0	70.0
1991	55.6	23.2	126	1.54	62.1	14.4	7.7	1.8	76.3
1992	65.8	24.1	131	1.49	61.6	14.9	7.9	1.9	73.7
1993	65.2	23.1	126	1.48	57.4	13.3	9.4	2.2	73.8
1994	26.6	16.1	87	3.53	55.7	8.9	27.8	4.5	66.2
1995	69.5	20.5	111	1.13	49.3	10.1	11.3	2.3	51.4
1996	95.3	22.5	122	1.35	51.4	11.5	7.2	1.6	42.0
1997	109.6	19.6	107	1.14	52.2	10.2	6.2	1.2	44.3
1998	117.4	18.9	103	1.19	59.3	11.2	4.9	0.9	40.6
1999	126.9	19.7	107	1.25	63.5	12.5	4.6	0.9	40.7
2000	131.8	18.9	103	1.00	62.8	11.9	4.9	0.9	30.8
2001	164.2	21.4	116	1.18	60.5	13.0	4.0	0.9	24.2

Note: FRw, Rwandan francs; GDP, gross domestic product.

Source: Authors' calculations, based on data from the World Bank Africa Live Database (April 24, 2002, version). See also appendix table A1-1.

The prospects for greater external support appear promising, although still tentative at this stage. Like other countries, Rwanda benefited from debt relief under the Heavily Indebted Poor Countries (HIPC) Initiative, and the expectation is that it, like the other countries, will use the resources thus freed to increase spending on education.[5] Another reason for optimism about the availability of increased donor funding for education is the growing international consensus on and support for the Millennium Development Goals (MDGs), one of which is completion of primary education by all children by 2015. The MDGs are challenging donors to increase external funding

5. It is recognized, however, that Rwanda is already spending a large proportion of its domestic budget on education and that the health sector is, in relative terms, seriously underfunded. Hence, the health sector may receive priority over education in benefiting from the HIPC money.

TABLE 1-6: GOVERNMENT SPENDING ON EDUCATION, RWANDA, 1981–2001

	Total spending on education			Current spending on education		
Year	As % of GDP	As % of total spending	As % of government revenues net of grants	As % of total public spending on education	As % of GDP	As % of current spending net of debt interest payment
1981	—	—	—	—	2.7	25.2
1982	—	—	—	—	3.0	27.8
1983	—	—	—	—	3.2	29.8
1984	3.3	22.1	36.8	97.2	3.2	34.5
1985	3.1	18.9	31.2	94.3	2.9	31.8
1986	3.5	18.7	29.7	93.8	3.2	30.3
1987	3.5	16.1	30.5	92.4	3.2	25.9
1988	—	—	—	—	3.1	27.0
1989	—	—	—	—	3.0	26.5
1990	—	—	—	—	2.9	22.9
1991–95	—	—	—	—	—	—
1996	3.2	14.5	35.0	62.6	2.0	17.6
1997	3.4	17.5	33.1	59.1	2.0	19.9
1998	3.1	16.7	29.6	71.1	2.2	20.0
1999	4.3	21.9	43.8	78.1	3.4	27.0
2000	4.0	21.0	40.3	80.9	3.2	27.0
2001	5.5	25.6	50.2	60.2	3.3	25.5

— Not available.
Note: GDP, gross domestic product.
Source: Authors' calculations, based on data from the World Bank Africa Live Database (April 24, 2002, version). See also appendix table A1-1.

for education; one early outcome has been the launching in June 2002 of the Education For All (EFA) Fast Track Initiative.

The confluence of international opinion and domestic prioritization in favor of education is likely to enhance the availability of resources for the sector. But given the keen competition for resources, both among countries and across sectors within Rwanda, the reality is likely to consist of a gradual growth in current spending on education rather than a massive rise over a short period. Whatever the magnitude of future increases, an ever-present task is to ensure that all resources, especially those currently available to the sector, are used as effectively as possible. The chapters that follow examine various aspects of the effectiveness issue. Here, we simply note that there is evidence at both the country level and the school level suggesting the potential for improvement in this regard.

Conclusion

The idea that education can play a key role in the government's poverty reduction strategy currently enjoys support within Rwanda, as well as in the international donor community. To deliver on this expectation, the education sector faces the triple challenge of ensuring that no child is

denied the chance to complete primary school; that students at all levels make adequate progress in acquiring the knowledge and skills to equip them for adult life; and that the mix and number of graduates from the education system correspond to the economy's demand for skilled labor. In Rwanda the legacy of the 1994 genocide and the continuing spread of HIV/AIDS add to the difficulty of an already demanding task.

Putting more money into the sector is probably a necessary, although by no means sufficient, part of meeting the challenge. Public spending on education in Rwanda reached a historical high in 2001, but because much of the increase after 1994 has gone into capital investment, current spending to support the day-to-day running of the system remains at about the level prevailing in the 1980s—slightly more than 3 percent of GDP. In low-income African countries that already put all their children through primary school, total current spending on education at all levels currently averages about 4.5 percent of GDP. Raising public spending to this level will not be easy in Rwanda, given the country's historically small tax base and the large proportion (about 25 percent) of the government's discretionary spending that already goes for education. Donor funding can potentially help supplement government spending. Although the prospects are good in light of international commitment to the MDGs, the competition for such resources is keen, and the amount available may cover only a part—and possibly not a large part—of the potential shortfalls in funding for the sector.

Even as increased funding for education is sought, it is important to recognize that it is not the only, or even the most important, part of a strategy for enhancing the contribution of education to the country's social and economic development. Making good use of currently available resources is at least as important, and in Rwanda's tight public budget context, efforts in this direction can hardly be ignored. Tough questions arise in this regard. Are public funds financing the right types of services, and do they benefit the intended population groups? Are the allocations reaching down to the school level, where teachers and school administrators are ultimately responsible for delivering services? Are teachers and their managers given the right incentives to deliver services effectively, and do students and their families receive appropriate incentives, where needed, to encourage school participation? In the next chapter, we begin our examination of these questions by providing a broad overview of the coverage of the education system, including enrollment trends and student flow patterns.

CHAPTER 2

ENROLLMENT TRENDS AND PATTERNS OF STUDENT FLOW

Despite severe setbacks following the 1994 genocide, Rwanda's education system has made a remarkable recovery, in numerical if not in qualitative terms, particularly at the primary level. Yet the rebound in the space of just seven years is already beginning to give rise to what might be termed second-generation challenges, including the risk of backsliding in the face of resource and capacity constraints. Two of the most pressing of these challenges relate to (a) the potential erosion in educational quality as enrollments expand rapidly in a context of difficult tradeoffs in resource use and (b) the inevitable buildup of pressures to expand postprimary education, as growing numbers graduate from the primary and secondary cycles.

Aggregate Enrollments by Level of Education

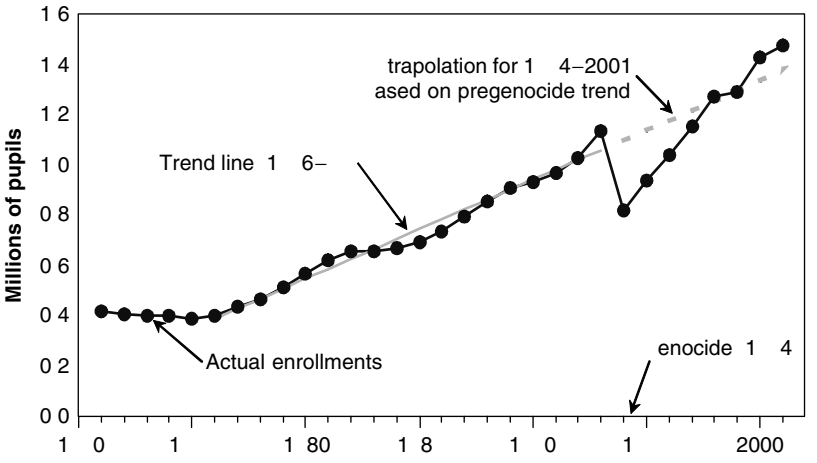
Rwanda's education system has a 6-3-3-4 structure: six years of primary schooling, three years of lower secondary schooling (*tronc commun*), three years of upper secondary schooling, and an average of four years of higher education. This section documents the numbers of students enrolled at the various levels and the growth in enrollments over time. A consistent time series exists for primary and higher education from the 1970s. For secondary education the series covers only the postgenocide period because the data from earlier years suffer from reporting problems and from inconsistencies in definition.

Primary Schooling

Primary school enrollments stagnated at around 0.4 million pupils in the first half of the 1970s and then began to climb steadily at an average rate of 3.9 percent a year between 1975 and 1993 (see figure 2-1).[1]

1. The duration of the primary cycle changed twice during the period covered by figure 2-1, going from six to eight years in 1980–81 and back to six years in 1992–93. (The first change was formalized by law in 1985 and the second in 1991.) To ensure comparability in the data for the entire period, the enrollments in years when the eight-year cycle was in effect were adjusted downward by about 12 percent, reflecting the share of students in the last two grades in the eight-year cycle.

FIGURE 2-1: ENROLLMENT TRENDS IN PRIMARY SCHOOLING, RWANDA, 1971–2001



Source: See appendix table A2-1.

Total enrollments stood at 1.2 million children in 1993, but when schools reopened after the genocide, there were nearly 30 percent fewer pupils. Amazingly, enrollments rebounded immediately and have been growing vigorously ever since. By 2001, the number of children in the system had reached 1.5 million, surpassing what might have been expected had the system expanded at the same rate as in the pregenocide years. The rapid pace of enrollment growth is striking, perhaps reflecting the government's deliberate efforts to expand basic educational opportunities as part of the nation's recovery plan. Throughout the period, private schooling has played a minimal role, accounting for less than 0.8 percent of primary school enrollments throughout the 1990s. The historical growth in enrollments is therefore largely a public sector phenomenon, involving schools financed almost entirely by the government and managed either by the government itself or, in the case of what are termed *libre subsidié* schools, by churches and other organizations.

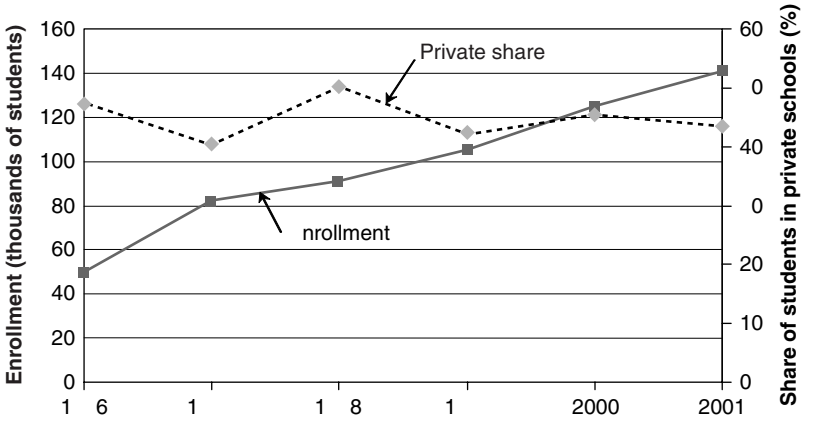
Secondary Education

The available data for secondary education refer to the years since 1996.[2] Figure 2-2 shows the number of students in the formal secondary school system and the share of the private sector. From a base of only 50,000 students in 1996, the system grew to more than 141,000 students by 2001, implying a growth rate of more than 20 percent a year, much faster than the 7 percent a year growth rate at the primary level during the same period.[3] The share of students in private

2. As shown in appendix table A2-1, the available data for secondary education reflect enrollments that are not always consistently aggregated across the state, *libre subsidié*, and private sectors. (*Libre subsidié* schools are funded by the government but are run by nongovernmental organizations.) Furthermore, the system's structure changed during the 1980s and early 1990s in that the three-year postprimary vocational training offered in the centres de l'enseignement rural et artisanal intégré (CERAI), the girls-only section familiale (SF), and the boys-only centres de l'enseignement rural et artisanal de Rwanda (CERAR) was discontinued after 1992. The big jump in reported enrollments in general secondary education for 1992 (62,701, compared with just 45,098 for the previous year) suggests that some of the enrollments may have included students who were previously enrolled in the CERAI, SF, and CERAR programs. These features of the data make it impossible to construct a consistent time series except for the years since 1996.

3. If the CERAI, SF, and CERAR courses are considered part of secondary schooling, total enrollments in secondary education in 1988–91 (just before these programs were discontinued) would average about 66,000. Taking this as the base would imply that access to some form of secondary schooling was expanding at the rate of about 7 percent a year between the period 1988–91 and 2001—which is still an impressive pace.

FIGURE 2-2: ENROLLMENT TRENDS IN SECONDARY EDUCATION, RWANDA, 1996–2001



Source: See appendix table A2-1.

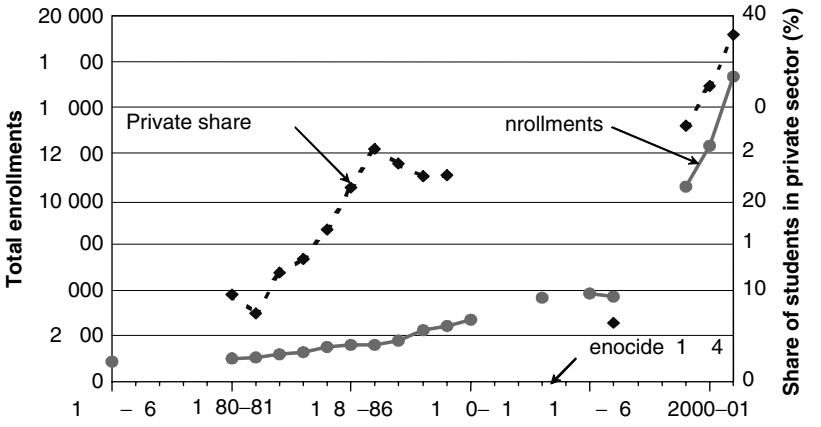
schools has remained relatively stable at about 45 percent, suggesting that enrollments grew equally fast in the private and public sectors. The private sector share in Rwanda is much greater than the average of about 20 percent for a sample of 25 African countries for which relevant data are available; of these, only Botswana, Mauritius, Tanzania, and Zimbabwe have more of their secondary students in the private sector than does Rwanda.

Higher Education

Enrollments in higher education have also grown rapidly (see figure 2-3). From a base of some 1,200 students in 1980–81 in a single public institution, the Université nationale du Rwanda, and a few private institutions, the system's enrollment had by 2001–02 expanded to nearly 17,000 students spread across six public and eight private institutions.[4] Enrollments grew at about 10.6 percent a year between 1980–81 and 1990–91, but growth in the postgenocide years quickened to an average rate of about 29.0 percent a year between 1996–97 and 2001–02. Throughout the past three decades, the private sector in higher education has expanded faster than the public sector. The share of enrollments in the private sector increased from 9.5 percent in 1980–81 to 22.6 percent in 1989–90 and rose even more in the postgenocide period, particularly in the past few years, reaching nearly 38 percent by 2001–02.

4. The private institutions in operation in 1980–81 were as follows: Institut Africain et Mauricien de statistiques et d'économie appliquée, Grand séminaire de Nyakibanda, Faculté de théologie de Butare, Grand séminaire de Kabgayi, and Centre d'enseignement supérieur de Kigali. Currently, the public institutions are the Université nationale du Rwanda, Kigali Institute of Science, Technology and Management, Kigali Institute of Education, Kigali Health Institute, Institut supérieur d'agronomie et d'élevage, and Institut supérieur des finances publiques. The private institutions include the Université libre de Kigali, Université laïque de Kigali, Institut supérieur de pédagogie de Gitwe, Université adventiste d'Afrique centrale, Grand séminaire de Nyakibanda, Faculté de théologie de Butaré, Grand séminaire de Kabgayi, and Centre d'enseignement supérieur de Kigali. Some private institutions that existed in earlier years have closed or have merged with other institutions; these include the Institut Africain et Mauricien de statistiques et d'économie appliquée, Institut supérieur catholique de pédagogie appliquée de Nkumba, and Ecole supérieure de gestion et d'information.

FIGURE 2.3: ENROLLMENT TRENDS IN HIGHER EDUCATION, RWANDA, 1975–2002



Note: Breaks in the series denote years when classes were canceled (*années blanches*) or for which data are unavailable.

Source: See appendix table A2-1.

Trends in Educational Coverage

The next question concerns how the expanding enrollments are related to the coverage of the school-age population by the education system. Coverage is typically measured using gross and net enrollment ratios. The gross enrollment ratio (GER) is defined as the ratio between all students enrolled in a given cycle of education and the population in the official age range for that cycle. The net enrollment ratio (NER) is defined in a similar way, except that the numerator includes only students in the official age range for that cycle of schooling. In Rwanda the age range for primary schooling is 7–12 years and for secondary schooling, 13–18 years. For higher education, the standard practice is to define the age range as the five-year bracket following the last year of the range for secondary schooling (ages 19–23 in the case of Rwanda). At this level of education, the inconsistency between the ages of the enrolled and reference populations tends to be wider than in the lower levels of schooling, reflecting the cumulative effects of late entry and grade repetition earlier in the system, as well as the likelihood that many secondary school graduates will work for a few years before enrolling in higher education. Instead of the gross enrollment ratio, some analysts therefore prefer the number of students per 100,000 population as a measure of coverage in higher education.

Coverage in 1991–92 and in 2000–01

In this section we focus mainly on the gross enrollment ratio to simplify the presentation and facilitate cross-country comparison.[5] Table 2-1 shows estimates for 1991–92 and 2000–01 based

5. Education systems in which children begin their schooling on time and few repeat a grade can expect to have gross and net enrollment ratios that are practically the same. When the ratios do diverge, both late entry and grade repetition play a role, although it is impossible to ascertain their relative contribution merely on the basis of the size of the divergence between the two ratios. The further up the educational ladder one goes, the more problematic is the net enrollment ratio as a measure of coverage because of the growing inconsistency in the age ranges of the numerator and denominator populations stemming from the cumulative effects of late entry and grade repetition in earlier cycles of schooling. If, for example, 20 percent of the students in each entering class in secondary school are one year older than the official entry age for this cycle (because they started their primary schooling late or repeated a grade) and there is no grade repetition in secondary school, the net enrollment ratio would suggest a level of coverage that is about 20 percent lower than the reality, simply because the over-age students have been excluded from the calculation.

TABLE 2-1: GROSS ENROLLMENT RATIOS (GERS) BY LEVEL OF EDUCATION, RWANDA, 1991–92 AND 2000–01

Educational level and type of estimate	1991–92[a]	2000–01[b]
Primary		
Survey-based GER estimate (%)		
DHS	73.9	106.6
QUID	—	108.3
Census-based GER estimate (%)	72.5	107.3
Number of pupils in grades 1–6 (thousands)[c]	962.3	1,428.7
Population ages 7–12 (thousands)	1,327.2	1,332.0
Secondary		
Survey-based GER estimate (%)		
DHS	20.4	17.0
QUID	—	10.8
Census-based GER estimate (%)	21.8	12.3
Number of students in secondary grades 1–6 (thousands)[d]	202.5	125.1
Population ages 13–18 (thousands)	928.1	1,014.3
Higher		
Survey-based GER estimate (%)		
QUID	—	1.3
Census-based GER estimate (%)	0.5	1.9
Total enrollment	3,389	12,757
Population ages 19–23 (thousands)	604.4	660.6

— Not available.

Note: DHS, Demographic and Health Surveys; QUID, Questionnaire unifié sur les indicateurs de développement (also known as Core Welfare Indicators Questionnaire, CWIQ).

a. The survey-based estimates refer to 1992; the census-based estimates refer to 1991, the year of the population census.

b. The survey-based estimates refer to 2001; the census-based estimates refer to 2000.

c. In 1991–92 primary schooling lasted eight years. Only pupils in grades 1–6 are included here, to ensure comparability with the GER estimate for 2000–01, when the cycle was only six years.

d. To enhance the comparability of the data for 1991–92 and 2000–01, the data for 1991–92 refer to enrollments in general secondary school, the three-year postprimary vocational training centers (CERAI, SF, and CERAR), and grades 7 and 8 of the primary cycle.

Source: The survey-based estimates of the GER rely on data collected in the 1992 and 2000 Rwanda Demographic and Health Surveys and those collected in the 2001 QUID. The census-based estimates rely on enrollment data collected by the Ministry of Education through its annual census of schools (see appendix table A2-1) and on population data from the 1991 population census and the United Nations population projections for 2000 as reported in the World Bank's Statistical Information Management and Analysis (SIMA) database.

on alternative sources of data for each of the three levels of education.[6] For primary schooling, the estimates for both periods are highly consistent, with GERs of about 73–74 percent for the earlier period and 107–108 percent for the later period. Primary schooling lasted eight years in 1991–92; to ensure comparability with the estimates for 2000–01, the calculations have been adjusted so that the GER refers to six years of schooling. According to these results, the education system is now reaching a larger share of school-age children than it did in the early 1990s.

6. Besides being good practice, the use of alternative data sources to verify the estimates is particularly important in a country such as Rwanda where the routine work of collecting school statistics has suffered severe disruption in recent years and is only now being gradually revived.

Later chapters of this report, however, show that the system's progress in quantitative terms has probably not been matched by a concomitant gain on the qualitative front.

For secondary education, the estimates show greater consistency across data sources for 1991–92 than for 2000–01. Taken as a whole, the general picture appears to suggest a probable decline in coverage over the period. This interpretation needs to be placed in the context of the structural changes in the school system between the two dates. In 1991–92 the primary cycle lasted eight years, and significant numbers entered the three-year postprimary vocational schools (CERAI, SF, and CERAR).[7] Here, computations of the GER for 1990–91 include the numerator enrollments in grades 7 and 8 of the primary cycle and those in the postprimary vocational schools. The two extra years of primary schooling in the eight-year cycle and the vocational courses are obviously not comparable to the three-year *tronc commun* (lower secondary) cycle in the current educational structure, but the treatment here is arguably valid for comparing changes in the course of the 1990s in access to schooling beyond the first six years of the primary cycle. Although coverage may not yet be quite as extensive as in the early 1990s, the current system is perhaps more equitable in that it offers all children who make it to the secondary cycle a chance for continued progression up the educational ladder—rather than foreclosing this prospect by channeling a large proportion of primary school graduates into a vocational path that in fact has been an educational cul-de-sac.

In higher education there are two estimates of the gross enrollment ratio for 2000–01: 1.3 percent according to survey results, and 1.9 percent calculated from enrollment and population data. One explanation for the smaller size of the survey-based estimate is that the data were collected just before the most recent explosion in enrollments—from 10,058 in 1999–2000 to 12,757 in 2000–01 and to 16,668 in 2001–02. These data suggest that coverage of higher education as measured by the GER has increased nearly fourfold since 1990–91.

Cross-Country Comparison

Table 2-2 presents averages for low-income countries worldwide and in Sub-Saharan Africa, as well as data for selected African countries.[8] For higher education, the table includes enrollments per 100,000 population as a complementary measure of coverage.

Rwanda's GER for primary education is substantially higher than the averages for low-income countries in Sub-Saharan Africa and in the world, whereas its ratio for secondary education is significantly lower and that for higher education is comparable to the corresponding averages.[9] These patterns suggest that access to primary schooling relative to the other levels is probably wider in Rwanda than in other low-income settings. It is to be emphasized that this conclusion does not in itself offer a sufficient basis for policy development. For example, if the ratio for primary schooling is high because of widespread grade repetition, the education system may continue to suffer from poor rates of access to and retention within this level of schooling. In secondary education the ratio may be modest in international comparisons, but the pattern needs to be further evaluated by looking at the lower and upper secondary levels separately. In higher education the comparability of the country's gross enrollment ratio with GERs for other low-income countries does not necessarily imply that public policy has been successful. What is more important is whether the output of graduates matches the labor market's capacity to absorb the graduates in productive employment. The next section documents patterns of student flow; chapter 8 examines the education–labor market issue.

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7. Enrollments in the three-year vocational schools (described in note 2) were between 25,000 and 26,000 in 1990–91, compared with between 36,000 and 39,000 in the general secondary schools (see appendix table A2-1).

8. Despite its flaws, the GER serves our purpose here, as the data for this indicator are readily available for a large number of countries.

9. In higher education the data for 2001–02 suggest that the country has now more or less caught up with the Sub-Saharan African GER average. The number of students per 100,000 population is also at the level that one would expect for a country at Rwanda's level of economic development (see figure 8-1 in chapter 8).

TABLE 2-2: COVERAGE OF THE EDUCATION SYSTEM IN RWANDA AND SELECTED COUNTRIES, LATE 1990S–2000

Country	Per capita GNP, 2000 (1995 US$)	Gross enrollment ratio (%)			Higher education enrollment per 100,000 population
		Primary	Secondary	Higher	
Rwanda, circa 2000–01[a]	**241**	**107**	**13**	**1.9**	**200**
Selected African countries, circa 1997					
Mozambique	115	60	7	0.5	41
Ethiopia	146	43	12	0.8	
Tanzania	193	67	6	0.6	43
Niger	208	29	7	—	
Chad	216	58	10	0.6	54
Madagascar	246	97	16	2.0	194
Burkina Faso	275	39		0.9	90
Kenya	328	85	24	—	—
Uganda	355	74	12	1.9	154
Benin	411	78	18	3.1	208
Mauritania	495	79	16	3.8	374
Country group averages[b]					
Low-income Sub-Saharan African countries	411	75	20	1.9	207
All low-income countries	456	84	33	5.2	575

— Not available.

Note: GNP, gross national product.

a. The ratios for primary and secondary education are the averages of the estimates shown in table 2-1. For higher education, the ratio in the next-to-last column is the estimate based on enrollment counts and population projections, which best captures the magnitudes of the recent increases in enrollments. For the last column, the indicator is calculated using total enrollments in higher education for 2001–02 and the population of 8.7 million projected by the United Nations Population Division, as reported in the World Bank's Statistical Information Management and Analysis (SIMA) database.

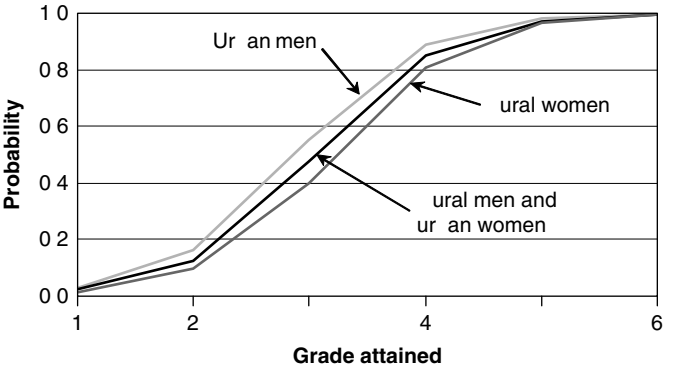
b. Data on gross enrollment ratios refer to the averages for 27, 23, and 17 low-income Sub-Saharan African countries and 42, 37, and 30 low-income countries at the primary, secondary, and higher levels, respectively. Data on higher education enrollments per 100,000 population are for 27 Sub-Saharan African countries and for 40 countries worldwide with per capita GNP below US$755 in 1996.

Source: For data on enrollment ratios, UNESCO Website, <http://www/unescostat.unesco.org>; for data on per capita GNP, *World Development Indicators* (various years).

From Cross-Sectional Indicators of Coverage to Student Flow Patterns

Because schooling usually requires a multiyear time commitment to yield tangible returns, it is important to go beyond the aggregate indicators of enrollments documented so far. The schooling careers of children need to be examined, relying on such measures as the entry rate to a given cycle of schooling, the share of entrants who reach the end of the cycle, frequency of grade repetition, and transition rates between cycles.

FIGURE 2-4: RELATION BETWEEN EDUCATIONAL ATTAINMENT AND PROBABILITY OF BEING LITERATE, RWANDA, 2001



Note: Refers to the subsample of the population age 15 and above.
Source: Authors' estimates based on the 2001 Questionnaire unifié sur les indicateurs de développement (QUID).

At the primary level, where the curriculum is typically designed to impart basic literacy and numeracy skills, children who never enroll are unlikely to acquire these skills, and those who enroll but drop out prematurely are unlikely to become permanently literate and numerate. In Rwanda data from a 2001 household survey show a clear correlation between adults' educational attainment and literacy: the probability of being literate is nearly 100 percent for those who have attained at least five years of primary schooling but less than 50 percent for those attaining only three years (figure 2-4). For a given level of attainment, the probabilities for women are lower than for men. These results suggest that it is particularly important for girls to survive to the end of the primary cycle to achieve permanent literacy in adulthood.[10]

At postprimary levels of education, access and survival to the end of the cycle remain important, not least because both are prerequisites for entry to subsequent levels. The curricula likewise offer training in an integrated set of skills, so that premature exit would imply a failed investment, to the extent that the departing student would not have mastered what was being taught.

The grade repetition indicator mentioned above is important for two reasons. First, grade repetition is likely to reduce the probability that a student persists to the end of the cycle, in part because it signals to parents that their child is not progressing academically—which would naturally predispose them to withdraw the child from school. Second, a repeater costs twice as much per grade attained as a student who has not repeated the grade, and yet there is no strong evidence that grade repetition necessarily improves learning outcomes. High rates of grade repetition are therefore uneconomic, in that substantial resources are tied up by students for whom the extra year spent repeating the same grade may at best yield only modest gains in learning.

Student Flow Patterns in Primary Schooling

This section examines the overall pattern of entry rates to first grade, survival rates to subsequent grades in the primary cycle, and the prevalence of repetition at each grade. (Socioeconomic disparities in these parameters are presented in chapter 4.) A later section looks at the transition between the primary and secondary cycles.

10. The results from another survey, the 2000 Rwanda Multiple Indicator Cluster Survey (MICS), show a similar pattern of rising probability of being literate as educational attainment increases, although the gaps between men and women in urban and rural areas are wider than those shown in figure 2-4. The results for Rwanda are comparable to those based on data from the MICS in other African countries, including Burundi, Guinea-Bissau, Niger, Senegal, Sierra Leone, and Togo.

TABLE 2-3: PERCENTAGE ENTRY RATE TO GRADE 1, RWANDA, 1991–92 AND 2000–01

Source of data	1991–92	2000–01
School statistics and 1991 population census	88	—
Household surveys		
DHS	85	88
QUID	—	87

— Not available.

Note: DHS, Demographic and Health Surveys; QUID, Questionnaire unifié sur les indicateurs de développement.

For 1991–92, the estimate in the first row is the number of new entrants reported in the school statistics divided by the population of 7-year-olds enumerated in the census. In the other cells, which are based on household survey data, the estimates correspond to the share of children ages 10–13 who report ever enrolling in school; the age range was chosen to avoid underestimation associated with possible late entry into first grade.

Source: Authors' estimates based on data from Ministry of Education school statistics, which are collected through an annual census of schools; the population census of 1991; the 1992 and 2000 DHS; and the 2001 QUID.

Rate of Entry to Grade 1

Before presenting the results, a comment on the estimation methodology is in order. One method consists of dividing the number of new entrants to first grade by the cohort corresponding to the official age for entering this grade (age 7 in Rwanda).[11] For both of the years considered, 1991–92 and 2001–01, data on the numerator were available from school statistics. For the denominator, however, actual data by single years of age were available at the time of analysis for the population census of 1991 but not yet for the population census of 2002. The calculation for 2000–01 would have had to rely on population projections, but because of the large movements of people after 1994, such projections, particularly for single age groups, are probably not sufficiently reliable for our purpose. Accordingly, no estimate of the entry rate for 2000–01 based on this method is shown here.

A second approach to estimating the entry rate can be used when survey data are available. It involves computing the share of children who report never enrolling in school and subtracting the result from 100 percent.[12] The data needed to implement this approach are available for Rwanda for both 1991–92 and 2000–01. For the latter year, two sources are available, both of which are used here. Although survey data represent only a sample of the population, their advantage over school and census statistics is that both the numerator and the denominator refer to the same individuals, thus ensuring internal consistency in the data.

The results appear in table 2-3. The estimates for both 1991–92 and 2000–01 are highly comparable across data sources, a feature that enhances our confidence in the estimates. The current entry rate, averaging 88 percent, is remarkably high for a country with Rwanda's per capita GDP. Still, it is important to note that the rate is, at best, only marginally better than the average of about 85 percent at the start of the 1990s. The results imply that gains in the entry rate to first grade can probably be ruled out as a major source of the large increase in the GER, from 73

11. Because some children may enter earlier or later than the official age, the calculation should ideally be adjusted by dividing the number of entrants by the population corresponding to the average age of the entering class. This adjustment is unlikely to alter the estimates substantially unless significant differences exist in the size of the single-age cohorts around age 7.

12. The calculation refers to children in the 10–13 age bracket. Setting the lower bound at 10 years allows for the possibility that some never-enrolled children may eventually enroll. The upper bound is intended to strike a good balance between two conflicting considerations: (a) ensuring reasonably sized cells for the calculations and (b) minimizing the influence of behavior patterns associated with older cohorts.

percent in 1991–92 to more than 100 percent in 2000–01. Inducing the remaining children to enroll thus continues to be an important policy challenge in expanding primary school coverage in Rwanda.[13]

Survival Rates in the Primary Cycle

Survival rates are, again, estimated for 1991–92 and 2000–01. Strictly speaking, survival rates should refer to the schooling careers of true cohorts as the members make their way through the school system. In the best of circumstances, such tracking is difficult because of the data requirements and the complex calculations. In settings such as Rwanda, where the dynamic of student flow has been complicated by the reintegration of children who reenrolled in the years following the genocide, the data needs and the computational algorithm are even more demanding. Beyond these problems, perhaps the more serious drawback is that the results, relating as they do to the experience of children who entered school at least six years ago, may not be sufficiently up-to-date to inform policy development.

An alternative approach is to construct pseudocohort survival profiles based on cross-sectional data for two adjacent school years. This method involves computing grade-to-grade transition rates that are then linked to obtain the pattern for the entire primary cycle. For example, if the transition rate between grades 1 and 2 is 85 percent, and that between grades 3 and 4 is 75 percent, the survival rate from grade 1 to grade 3 would be computed as 64 percent ($= 0.85 \times 0.75$). By extension to subsequent grades, the process eventually yields the survival rate to the final grade in the cycle. The result is a pseudoprofile because it blends the experience of the different cohorts currently in school. The stability of the profile depends on the extent to which cohorts are similar in their pattern of grade-to-grade progression.

Pseudocohort survival rates can be computed using school statistics as well as survey data, and we use both sources for the calculations on Rwanda. Using school statistics, the grade-to-grade transition rates are computed from data on nonrepeaters in adjacent grades in the two years.[14] For example, if in year X there were 20,000 nonrepeaters in grade 1, and in year $X + 1$ there were 18,000 nonrepeaters in grade 2, the transition rate between grades 1 and 2 would be 90 percent ($= 18{,}000/20{,}000$).[15] Using survey data, the calculation is feasible if for each child who attended school last year information exists on the following variables: (a) the highest grade attained by the child and (b) whether he or she is still enrolled in the current school year. These variables can be used to compute the grade-specific dropout rates. By subtracting from 100 percent, we obtain what would be, in the absence of differences in repetition across grades, the grade-to-grade survival rates. Where these differences are significant, as they are in Rwanda, an adjustment is required to avoid double counting; this is done by multiplying the rates obtained thus far by the ratio between the shares of nonrepeaters in the relevant pairs of grades.[16] Once computed, these adjusted grade-specific rates can be linked together as before to obtain the pseudocohort survival rate to the end of the cycle.

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13. Chapter 4 examines the characteristics of the unschooled population and presents evidence on the correlates of ever attending school.

14. To avoid double counting, only nonrepeaters are used in the calculation.

15. The method assumes regularity in schooling behavior; that is, children enter the system only in grade 1 and make the transition between school years in one of three categories: as repeaters, dropouts, or graduates to the next grade. Although this assumption is probably valid for the calculations for 1991–92, it is unlikely to hold for 2000–01, given the large population movements following the genocide in 1994 and the reintegration of returning children whose schooling was interrupted by the war.

16. Suppose, for example, that the dropout rate between grades 1 and 2 is 5 percent and the share of nonrepeaters is 80 percent in grade 1 and 75 percent in grade 2. The survival rate between grades 1 and 2, adjusted for differences in grade repetition in the two grades, would then be 89 percent [$= (100 - 5) \times (75/80)$].

TABLE 2-4: PERCENTAGE SURVIVAL RATES IN PRIMARY SCHOOLING, RWANDA, 1991–92 AND 2000–01

Primary grade	1991–92	2000–01[a]
1	100	100
2	85	100
3	74	96
4	64	91
5	53	77
6	44	73
7	35	n.a.
8	29	n.a.

n.a. Not applicable because the primary cycle was shortened from eight to six years in 1992.

a. Estimates have been adjusted for differences in grade repetition between contiguous grades. See the text for further explanation.

Source: For 1991–92, authors' estimates based on data from Ministry of Education school statistics; for 2000–01, authors' estimates based on data from two household surveys: the 2001 Questionnaire unifié sur les indicateurs de développement (QUID) and the 2001 Rwanda Multiple Indicator Cluster Survey (MICS).

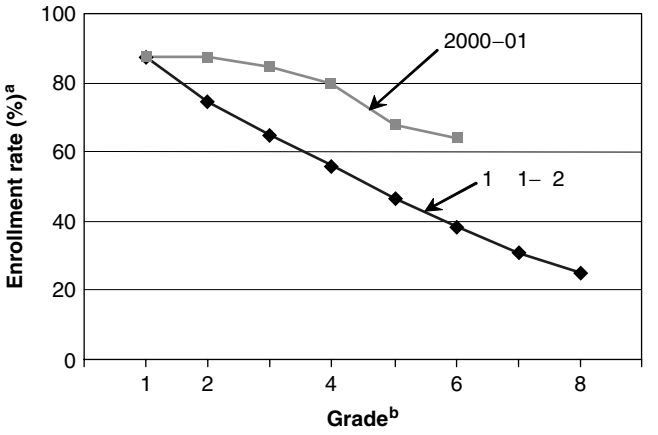
Applying the foregoing methods, we obtain the estimates for 1991–92 and 2000–01 that appear in table 2-4.[17] They show a significant improvement in cohort survival over the course of a turbulent decade: whereas in 1991–92, 44 pupils in a cohort of 100 reached grade 6, in the later year 73 did—an astonishing gain of 66 percent. The increase is indeed remarkable, given the context. If sustained, the improvement augurs well for the spread of literacy in Rwanda; as we saw above, adults with at least a fourth grade education have a more than 80 percent chance of being literate. Yet there is concern that the gain in survival rate may not be sustained, a possibility examined in greater detail below in light of the patterns of grade repetition.

The information on entry rates and survival rates can be combined to obtain grade-specific enrollment rates for 1991–92 and 2000–01 (figure 2-5).[18] These rates show the share of the school-age population enrolled in each grade, providing a finer-grained picture of coverage than is possible with the gross enrollment ratio, which is averaged over the entire cycle of six years. Given the current pattern of entry and survival rates, we can expect that about 37 percent of the present generation of school-age children would not achieve complete primary schooling: about a third of this group would never enter school, about a fifth would drop out between grades 1 and 4, and about 44 percent would drop out after grade 4. These results suggest that attracting children to school and keeping them past fourth grade remain priorities in the effort to produce a future generation of literate and numerate Rwandan citizens.

17. The calculations for 1991–92 rely on school statistics because survey data were unavailable for that year. Only survey data are used for 2000–01, for the reasons explained in the text.

18. To illustrate, the enrollment rate in grade 3 would be the entry rate multiplied by the survival rate from grade 1 to grade 3.

FIGURE 2-5: GRADE-SPECIFIC ENROLLMENT RATES IN PRIMARY SCHOOLING, RWANDA, 1991–92 AND 2000–01



a. See the text discussion for definition and computation method.
b. The primary cycle was eight years in 1991–92 and six years in 2000–01.
Source: Computed from the data in tables 2-3 and 2-4.

Grade Repetition

Estimates for grade repetition for 1990–91 and 2000–01 appear in table 2-5. For 1990–91, the table shows only one set of estimates, which is based on Ministry of Education school statistics, the only available source for that year. For 2000–01, there are two sets of estimates based on two independent sources: the ministry's school statistics and the 2001 Multiple Indicator Cluster Survey.[19] The comparability between the two sets of estimates increases our confidence in the reliability of the underlying data.[20] The results reveal an astonishing threefold rise in repetition rates between 1990–91 and 2000–01. In both years, grade repetition occurs most frequently in grade 1, but its prevalence rises noticeably in the upper grades, reaching 38 percent in grade 5. By contrast, the pattern in 1990–91 shows a declining share of pupils repeating as they progress up the educational ladder through the last grade in the eight-year cycle.

The underlying changes that led to the significant rise in grade repetition are unclear, but what is clear is that the increase is one reason why Rwanda's gross enrollment ratio rose so quickly in the past decade—from 73 percent in 1991–92 to 109 percent in 2000–01.[21] There are, a priori, three possible sources for the increase in the gross enrollment ratio: an increase in the entry rate to first grade, an increase in the survival rate to the end of the cycle, and an increase in grade repetition. Between 1991–92 and 2000–01, the entry rate to first grade did not improve. Of the other two factors, grade repetition contributed an estimated 57 percent of the increase in

19. Other household surveys implemented around 2000, such as the 2000 QUID and the 2001 Household Living Conditions Survey (in French, Enquête intégrale sur les conditions de vie des ménages au Rwanda, EICV), do not include questions that would permit estimates of the repetition rate.

20. Even though the rates for 1990–91 cannot be verified against survey data, they are consistent with other indicators of coverage, including the gross enrollment ratio, entry rates to first grade, and survival rates to the end of the cycle, and are therefore fairly reliable for the purpose here.

21. Note that these ratios, computed by dividing enrollments by the relevant population, are reasonably consistent with those implied by the student flow indicators reported so far. The implied gross enrollment ratio (IGER) is given by the relationship IGER = AGSER × (1 + ARR), where AGSER is the average grade-specific enrollment rate across grades in the cycle and ARR is the average repetition rate. The IGER is estimated to be 69 percent for 1991–92 and 104 percent for 2000–01.

TABLE 2-5: PERCENTAGE REPETITION RATES IN PRIMARY SCHOOLING, RWANDA, 1990–91 AND 2000–01

Primary grade	1990–91	2000–01		2000–01 rate as multiple of 1990–91 rate[a]
		School statistics	Survey data (MICS)	
1	16.2	41.5	40.4	2.6
2	13.2	28.8	29.2	2.2
3	11.4	30.3	27.9	2.7
4	9.0	34.4	22.6	3.8
5	8.2	37.6	31.1	4.6
6	8.0	29.2	25.8	3.7
7	6.8	n.a.	n.a.	n.a.
8	9.7	n.a.	n.a.	n.a
Cycle average[b]				
Grades 1–6	11.0	33.6	29.5	3.1
Grades 1–8	10.3	n.a.	n.a.	n.a.

n.a. Not applicable because the primary cycle was shortened from eight to six years in 1992.

Note: MICS, Multiple Indicator Cluster Survey.

a. To maintain consistency in the data source, both the numerator and denominator refer to rates based on Ministry of Education school statistics.

b. Figures are unweighted averages.

Source: For 1990–91, authors' estimates based on Ministry of Education school statistics for school years 1989–90 and 1990–91; for 2000–01, authors' estimates based on Ministry of Education school statistics for 1999–2000 and 2000–01 and on the 2001 Rwanda MICS.

the gross enrollment ratio during the period, while the gain in the survival rate to the end of the cycle—from 44 percent in 1991–92 to 73 percent in 2000–01—contributed the remaining 43 percent.[22] Thus, although educational coverage undeniably expanded rapidly over the course of the 1990s, much of the growth reflects increased recycling within the system.

The high rates of grade repetition raise concerns about the sustainability of the gains in cohort survival rates. Regression analysis of cross-country data suggests that grade repetition correlates negatively with cohort survival rates.[23] For a country at Rwanda's level of per capita gross national product (GNP), a repetition rate of 33.6 percent would be consistent with a cohort

22. The calculation is as follows. During the period, the entry rate to grade 1 stagnated at around 88 percent, while the survival rate rose from 44 to 73 percent and the repetition rate rose from 11 to 34 percent. Suppose the repetition rate in 2000–01 had remained unchanged at 11 percent. The implied gross enrollment ratio would have been 84 percent [= (88 + 88 × 0.73)/2) × (1 + 0.11)]. Thus, of the 35 percentage point increase (= 104 – 69) in the implied gross enrollment ratio between 1991–92 and 2000–01, 15 percentage points (= 84 – 69), or 43 percent of the total, can be attributed to the increase in the cohort survival rate and 20 percentage points (= 104 – 84), or 57 percent of the total, can be attributed to the increase in grade repetition.

23. On the basis of data for 57 low-income countries, and controlling for the entry rate to grade 1 (EG1), for per capita GNP in constant 1993 dollars, and for public spending per pupil as a multiple of per capita GNP (PSPP), the relation between the cohort survival rate (CSR) and the repetition rate (RR) is estimated as follows: CSR = 38.3 + 0.05 × EG1 – 0.88 × RR + 5.53 × ln(per capita GNP) + 41.8 × PSPP. The coefficient estimates for RR and ln(per capita GNP) are statistically significant at the 1 and 5 percent confidence levels, respectively.

survival rate of around 47, controlling for the entry rate to grade 1 and the level of public spending per primary school pupil. These results imply that although Rwanda's cohort survival rate (73 percent) exceeds the regression-predicted level, the equilibrium rate may well be lower if the current high rates of grade repetition persist. A decline would hardly be surprising, as parents' willingness to send a child to school and keep the child there may wane in the face of signals, conveyed by frequent grade repetition, that the child is in fact failing to keep up with the schoolwork.

Efficiency of Student Flow

What do these student flow patterns imply about the system's internal efficiency? One way to answer this question is to compare the resources that the system actually consumes to produce its annual output of primary school graduates with the resources that it would have spent in the absence of grade repetition and dropout. The calculations and results appear in table 2-6.

Consider, for example, the data for 1991–92. Given the patterns of cohort survival and grade repetition in that year, and calibrating the calculations to a starting cohort of 1,000 pupils, the resources spent in grade 1 would amount to 1,193 pupil-years [= 1,000/(1 – 0.162)]. In grade 2, only 849 of the initial 1,000 pupils remain, implying that the resources spent on them would be 978 pupil-years [= 849/(1 – 0.132)]. Continuing in this way for all six grades and adding up the

TABLE 2-6: SUMMARY INDICES OF STUDENT FLOW EFFICIENCY IN PRIMARY SCHOOLING, RWANDA, 1990–91 AND 2000–01

	1990–91			2000–01		
Primary grade	Number remaining[a]	Repetition rate (%)	Pupil-years invested[b]	Number remaining[a]	Repetition rate (%)	Pupil-years invested[b]
1	1,000	16.2	1,193	1,000	41.5	1,709
2	849	13.2	978	1,000	28.8	1,404
3	743	11.4	839	964	30.3	1,384
4	640	9.0	704	910	34.4	1,387
5	534	8.2	582	775	37.6	1,242
6	439	8.0	477	728	29.2	1,028
Cumulative pupil-years	4,205 (2,634)[c]		4,772	5,376 (4,366)[c]		8,154
Index of student flow efficiency[d]						
Dropout related[e]		0.63			0.81	
Repetition related[e]		0.88			0.66	
Overall[f]		0.55			0.54	

Blanks denote not applicable.

a. From initial cohort of 1,000.

b. Refers to the pupil-years needed to educate new entrants as well as repeaters in the corresponding grade. See the text for an explanation of this computation.

c. Refers to the pupil-years invested only in the pupils who reach grade 6 without repeating a grade.

d. The index is defined as the ratio between the cumulative pupil-years invested in a system with no student flow problems and the actual cumulative pupil-years invested given the current pattern of dropout and grade repetition. An education system with no dropout and no grade repetition would have an index of 1.0. See the text for further explanation of this computation.

e. The numerator of the dropout-related index includes only the pupil-years associated with dropping out. The numerator of the repetition-related index includes only the pupil-years associated with grade repetition.

f. Takes account of the pupil-years associated with both dropout and grade repetition

Source: Authors' estimates based on the cohort survival and repetition rates reported in tables 2-4 and 2-5.

pupil-years spent in each grade, a cumulative total of 4,772 pupil-years (= 1,193 + 978 + 839 + 704 + 582 + 477) for the whole cycle is derived. This global amount can be compared with the total of only 2,634 pupil-years (= 439 × 6) needed to produce the 439 first-graders in the cohort who reach the last grade without repeating a grade. Thus, the system operates at only 0.55 times (= 2,634/4,772) the efficiency (1.0) of a system in which no one drops out or repeats a grade. When the wastage associated with dropout alone is considered, the implication is that a total of 4,205 pupil-years (= 1,000 + 849 + 743 + 640 + 534 + 439) was spent to produce the 439 graduates. Thus, the dropout-related efficiency index is 0.63 (= 2,634/4,205). Alternatively, counting only the wastage associated with grade repetition implies a total investment of 4,772 pupil-years, when only 4,205 would have sufficed; the repetition-related efficiency index is 0.88 (= 4,205/4,772).[24]

Comparison of the results for 1990–91 and 2000–01 suggests that the overall efficiency of student flow has not changed much over the decade. Consistent with the rise in the cohort survival rate, the index that takes into account only the impact of dropout was better in 2000–01 than in 1990–91 In contrast, the index associated with the impact of grade repetition alone has deteriorated, reflecting the rise in grade repetition over the decade. If grade repetition persisted at the current level and the cohort survival rate fell to, say, the regression-predicted level of 47 percent, the system's student flow efficiency index would drop to 0.42, compared with the current value of 0.54. At 0.42, Rwanda's index would then be among the lowest among low-income countries in Africa. Arresting this potential decline in student flow warrants a high-priority place on the policy development agenda.

Cross-Country Comparison

Figure 2-6 shows data on entry rates to grade 1 and survival rates to grade 5 for Rwanda, as well as repetition rates for 10 other African countries for which data for around 2000 are available. (Because the primary cycle in some countries is only five years, the figure shows survival rates for five years of schooling rather than the six years in the Rwandan system.) Rwanda ranks among the countries with high entry rates to first grade and high survival to grade 5, but these positive features are marred by the fact that it has the highest rate of grade repetition. In systems where grade repetition is widespread—as it is in Mozambique, Madagascar, Cameroon, and Benin in the sample—the cohort survival rate has typically been lower, falling, for example, to only 40 percent in Madagascar. To the extent that patterns of student flow in these systems reflect steady-state conditions, the risk of a decline in Rwanda's currently high cohort survival rate cannot be ruled out or ignored.

To complete the discussion, we compute the summary index of student flow for the 10 other African countries, using the same method as for Rwanda in the previous section.[25] The results, plotted against the countries' per capita GDP in 1999, are shown in figure 2-7. Rwanda is in the middle of the pack. Although it does better than, say, Madagascar and Mozambique, significant room for improvement remains.

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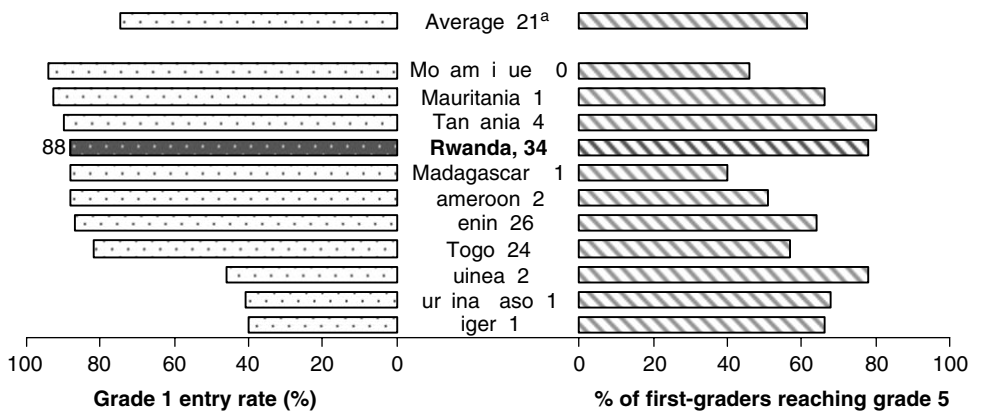
24. In passing, we note that the data in table 2-6 can be checked for their consistency with the gross enrollment ratios (GERs) reported in table 2-1, which are estimated using the classical approach of dividing the total number of pupils by the population ages 7–12. These ratios are 73 percent in 1991–92 and 107 percent in 2000–01. Consider first the data for 1990–91 in table 2-6. If all children entered grade 1, the implied GER would be 89.5 percent (= 4,772/6,000); but with a grade 1 entry rate of between 85 and 88 percent (see table 2-3), the ratio is in fact around 69 percent. This calculation yields a result that is comparable to the actual ratio of 73 percent for 1991–92. For 2000–01, the data in tables 2-3 and 2-6 imply a GER of 120 percent [= (8,154/6,000) × 0.88], which is much higher than the actual ratio of 107 percent. To evaluate the source of the discrepancy, consider another estimate based only on the survival rate to the terminal grade (0.728, from table 2-6), the overall repetition rate (34 percent, from table 2-5); and the entry rate to grade 1 (88 percent, from table 2-3). These three pieces of information imply a GER of 102 percent {= [(100 + 72.8)/2] × 0.88 × 1.34}. The result is much closer to the actual GER of 107 percent, which suggests that the grade-to-grade survival rates in table 2-6 are probably overestimated.

25. To ensure comparability across countries, the indices are for five years of primary schooling.

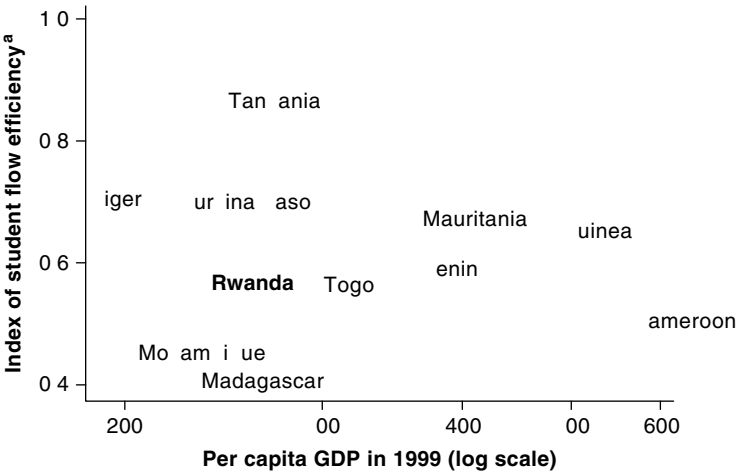
FIGURE 2-6: PRIMARY SCHOOL STUDENT FLOW INDICATORS IN RWANDA AND IN SELECTED SUB-SAHARAN AFRICAN COUNTRIES, CIRCA 2000



a. The number following each country name is the primary school repetition rate, in percent. The average is for the countries shown in the figure, excluding Rwanda.

Source: For Rwanda, tables 2-3 and 2-4; for data on survival rates for the other countries, UNESCO (2001); for entry and repetition rates for the other countries, World Bank education sector country status reports.

FIGURE 2-7: EFFICIENCY OF STUDENT FLOW IN RWANDA AND IN SELECTED SUB-SAHARAN AFRICAN COUNTRIES, CIRCA 2000



Note: GDP, gross domestic product.

a. The index has a value of 1.0 in a system with no dropout or grade repetition. See the text for details on its computation.

Source: Authors' calculations based on data in figure 2-6.

TABLE 2-7: SECONDARY SCHOOL TRANSITION AND SURVIVAL RATES, RWANDA, 1991–92 AND 2000–01

Indicator	1991–92	2000–01
Transition rates between cycles of schooling (percent)[a]		
From primary to *tronc commun* cycle	—	60
From *tronc commun* to upper secondary cycle		100
Percentage of entrants reaching end of each subcycle[b]		
Tronc commun		69
Upper secondary		79
Secondary 1–6	60	57

Blanks denote not applicable.

— Not available.

a. Refers to the transition rate between the last grade of one cycle and the first grade of the next cycle. The rates were not computed for 1991–92 because of data constraints associated with structural changes in the system.

b. In 1991–92 the secondary cycle lasted six years, with no selection during the cycle. The system was restructured in the postgenocide era into two subcycles, each lasting three years. Students follow a common first cycle (*tronc commun*) before proceeding to the specialized streams in the upper secondary cycle.

Source: Based on Ministry of Education school statistics for school years 1991–92, 1999–2000, and 2000–01.

Student Flow Patterns in Secondary Schooling

We turn now to an examination of children's schooling careers in secondary education, including the pattern of transition between the primary and secondary cycles and survival and repetition rates within secondary schooling.

Transition Rates and Cohort Survival Rates

As in many education systems, formal selection for secondary schooling in Rwanda is based on a student's performance in the national examination at the end of the primary cycle. At present, an estimated 60 percent of primary school pupils who reach grade 6 eventually make the transition to secondary schooling (whether public or private), even though some of them do so only after repeated attempts (table 2-7).[26] This rate of transition exceeds the average of 50 percent for Francophone Africa in the 1990s and is comparable to the average of 60 percent in Anglophone Africa; it is, however, inferior to the rates in low-income countries in Asia and Latin America, which average 78 and 71 percent, respectively (Mingat and Suchaut 2000).

At the secondary level, selection takes place at the end of the *tronc commun* cycle. As table 2-7 suggests, nearly all the students who currently reach the end of that cycle continue to the upper secondary cycle. For comparison, in Burkina Faso and Madagascar—countries that are similar to Rwanda in their levels of per capita GDP and their rates of transition between the primary and secondary cycles—the shares of lower secondary school completers who proceed to the upper secondary cycle are only 60 and 46 percent, respectively.

Table 2-7 also documents survival rates in secondary schooling. In the *tronc commun* cycle 69 percent of the entrants reach the end of the cycle, and in the upper secondary cycle the share is 79 percent. Of those who start secondary school, we can thus expect 57 percent to complete

26. Although data from the 2000 Multiple Indicator Cluster Survey (MICS) can also be used to estimate the transition rate, small cell sizes make the results unreliable. We therefore report here only the results based on the Ministry of Education school statistics.

TABLE 2-8: PERCENTAGE REPETITION RATES IN SECONDARY SCHOOLING, RWANDA, 1990–91 AND 2000–01

		2000–01		
Secondary grade	**1990–91**	**Overall**	**Public schools[a]**	**Private schools**
Repeaters as percentage of students enrolled				
1	2.8	17.4	15.9	19.0
2	10.4	13.8	15.0	12.1
3	10.2	8.5	8.3	8.8
4	8.5	11.5	10.6	13.0
5	9.5	11.0	12.5	9.2
6	4.6	4.7	3.6	6.2
All grades, 1–6	7.5	12.4	12.2	12.8
Unweighted averages				
Tronc commun cycle		13.2	13.1	13.3
Upper secondary cycle		9.1	8.9	9.4
All grades, 1–6	7.7	11.1	11.0	11.4

Blanks denote not applicable.
a. Includes state and libre *subsidié* schools.
Source: Ministry of Education school statistics for school years 1990–91 and 2000–01.

the entire six years of the secondary cycle. The rate today is largely unchanged from that in the early 1990s.[27]

Repetition Rates

The average repetition rate for all six grades of secondary schooling rose from 7.7 to 11.1 percent in the course of the 1990s (table 2-8). The pattern of grade repetition has also changed somewhat: although almost no students repeated the first year of secondary education in 1990–91, the repetition rate is now 17.4 percent in this grade, the highest rate in the entire secondary cycle. In 2000–01 grade repetition was as high in the public as in the private sector, and the pattern across grades was comparable between the two sectors. As is consistent with the lack of rigorous selection between the *tronc commun* and upper secondary cycles (and probably for higher education as well), grade repetition in the last grade of each cycle was not dramatically higher than in the other grades. The pattern contrasts with that in Madagascar, for example, where the repetition rate in the final grade of lower secondary school was three times that for the other grades in the cycle.

Efficiency of Student Flow

Table 2-9 presents indices of student flow efficiency, computed using the same method that was applied to the data for primary schooling. As before, the more efficient is the flow of students through the system, the closer is the index to unity. The results show that the flow was somewhat more efficient in 2000–01 than in 1990–91, reflecting the gains in survival rates to the end of the cycle.

27. In education systems with stable and slowly changing student flow processes, the student flow profiles for the primary and secondary cycles can be combined to yield a complete profile covering all 12 years in the two cycles. In Rwanda these conditions do not hold. The survival rates presented here are broadly consistent with historical rates of transition between the primary and secondary cycles and repetition rates in secondary schooling.

TABLE 2-9: SUMMARY INDEX OF STUDENT FLOW EFFICIENCY IN SECONDARY SCHOOLING, RWANDA, 1990–91 AND 2000–01

Cycle	1990–91[a]	2000–01
Tronc commun		0.71
Upper secondary		0.80
All secondary, grades 1–6	0.74	0.77

Blanks denote not applicable.

a. In 1990–91 the secondary cycle lasted six years, with no selection during the cycle, so no separate index was computed for the *tronc commun* and upper secondary cycles. An education system with no dropout and no grade repetition would have an index of 1.0. See table 2-6 and related text for details on how the index is calculated.

Source: Based on Ministry of Education school statistics for school years 1991–91, 1999–2000, and 2000–01 and the 2001 Questionnaire unifié sur les indicateurs de développement (QUID).

Policy Perspectives on Management of Student Flow

In the context of the government's poverty reduction strategy, the student flow patterns documented above have at least two important implications for education sector policies.

1. Education policy should ensure that all children attain at least a complete primary education so that all are equipped with the basic skills of literary and numeracy needed to make a decent living in adulthood.
2. Beyond primary schooling, the education system's production of skilled workers to support economic growth also warrants attention. In the years following the 1994 genocide, the priority was to replenish the depleted stock of human capital as rapidly as possible. As the stock recovers to its pregenocide levels, expansion will increasingly depend on the labor market's capacity to absorb highly educated workers in productive employment (see chapter 8).

Although a full treatment of these issues, particularly those pertaining to the labor market, is beyond the scope of this chapter, the student flow data presented in the foregoing sections provide a basis for distilling some implications for managing the quantitative expansion of the education system.

Primary Education

Entry rates in primary education have historically been high, at nearly 90 percent. One issue is therefore to identify the last 10 percent or so of the population that is still excluded and to target interventions accordingly. (See chapter 4 for a more detailed discussion of patterns of disparities in schooling.) Survival rates to the end of the cycle warrant even closer attention. As argued earlier in the chapter, the current rate of 73 percent is respectable compared with rates in other low-income countries but is probably unsustainable in light of the extremely high rates of grade repetition. An immediate concern, accordingly, is to lower the repetition rate. A medium-term target of, say, 10 percent at most is feasible in the light of other countries' experience but would probably require measures to rationalize class promotion policies and improve classroom pedagogical practices.

TABLE 2-10: DISTRIBUTION OF PRIMARY SCHOOLS AND NEW FIRST-GRADERS BY HIGHEST GRADE OF INSTRUCTION OFFERED BY THE SCHOOL, RWANDA, 2000–01

	% of schools			% of new first-graders			
Highest grade of instruction offered	State	*Libre subsidié*	Overall[a]	State	*Libre subsidié*	Overall[a]	Cumulative share
1	0.4	0.8	0.7	0.1	0.4	0.3	0.3
2	2.0	1.4	1.6	0.7	0.7	0.7	1.0
3	2.9	2.3	2.6	1.5	1.2	1.4	2.4
4	3.1	2.6	2.8	2.8	1.5	1.8	4.2
5	8.3	5.0	6.0	5.4	3.3	4.1	8.3
6	83.3	87.9	86.3	89.5	92.9	91.7	100.0
All schools[b]	100.0	100.0	100.0	100.0	100.0	100.0	
	(551)	(1,446)	(2,028)	(89,134)	(229,353)	(320,952)	

Blank denotes not applicable.
a. Includes data for private schools.
b. Figures in parentheses refer to the number of schools or pupils on which the percentages were computed.
Source: Ministry of Education census of primary schools, 1999–2000.

One approach is to define two or three subcycles within primary schooling and to apply automatic promotion within each subcycle and performance-based promotion between subcycles. An argument for this arrangement is that skills covered by the curriculum overlap between contiguous grades, particularly in the beginning years, when pupils are simply getting used to school and are learning the rudiments of reading, writing, and arithmetic. Automatic promotion would avoid unnecessary compartmentalization of the learning process and create space for children to acquire foundational skills at their own pace. A complementary—and arguably indispensable—tool for managing grade repetition is to make sure that teachers are equipped with techniques for formative evaluation and receive relevant professional support from head teachers, inspectors, and others, so that pupils' learning gaps can be systematically identified and remedied before the children come up for evaluation for promotion to the next subcycle.[28]

Grade repetition aside, supply-side constraints could also impede progress toward achieving universal survival to the end of the primary cycle. One such constraint is the possibility that some schools may lack the staff or the facilities to offer the complete cycle of schooling. In such settings, students leave school prematurely not because they want to, but because they have nowhere else to go in the system. Because supply-side constraints are by definition amenable to policy intervention, it is useful to assess the scale of the problem and the impact that removing these constraints might have on survival rates.

Table 2-10 contains relevant information on this point. It shows the distribution of schools and of new first-graders according to the highest grade of instruction in which pupils are currently enrolled. Schools with no pupils enrolled in the sixth grade make up about 13 percent of all schools and account for about 8 percent of all first-graders in the system. These schools fall into two categories: either they are new and are still in the process of completing the grades offered,

28. As part of the agreement under the HIPC Initiative, countries such as Benin, Burkina Faso, and Mozambique have committed to lowering their primary school repetition rates. Automatic promotion and support for teachers in managing grade repetition are among the interventions that these countries are putting in place to achieve this objective.

or they are constrained by lack of facilities or teachers from offering the complete cycle. The available data do not allow us to distinguish between the two types, but for the sake of illustration, suppose that all of the schools are incomplete because of supply-side constraints and that transfers from incomplete to complete schools occur infrequently. Under these assumptions, if all schools offered the full primary cycle of instruction, the cohort survival rate would rise from its current level of 73 percent to 80 percent (= 73/(1 – 0.083). Under more realistic assumptions, the impact would be smaller. In Rwanda, therefore, the incompleteness of the course of instruction offered can probably be ruled out as a major reason why primary school pupils quit school before finishing the cycle.

Beyond Primary Schooling

The immediate problem in both secondary and higher education is to manage the mounting pressure for expansion as ever larger cohorts of students in the preceding cycles complete their schooling. One helpful way to think about the problem is to view the *tronc commun* cycle as a continuation of primary education and the upper secondary cycle as preparation for higher education. This view receives support from the argument that primary school leavers are still somewhat immature for gainful employment and that continuation in school for a few more years would help round out their preparation for adult life. It explains why governments in some low-income countries have set their sights on achieving universal basic education (defined as the primary through the lower secondary cycle) as a long-term social objective.

Beyond the *tronc commun* cycle, economic considerations become more important in development of policies affecting student flow. Although it is true that a modernizing economy requires highly trained workers to function well, experience shows that producing such workers faster than the labor market can employ them in relevant jobs typically does not accelerate economic growth but instead creates educated unemployment or underemployment and, as a consequence, social frustration and unrest among the affected individuals.

What do these concepts imply for the management of student flow beyond primary education in Rwanda? Without entering into a full-blown evaluation here that takes into account fiscal implications as well, we consider some simple projections of student numbers to help clarify one aspect of the problem. Table 2-11 shows the current distribution of enrollment by grade in the primary and secondary cycles. The structure of enrollment is very steep: the numbers of students in the lower grades is substantially greater than those in the upper grades. The pressure for

TABLE 2-11: GRADE-SPECIFIC ENROLLMENTS IN PRIMARY AND SECONDARY EDUCATION, RWANDA, 2000–01

	Primary cycle		Secondary cycle[a]	
Year in cycle	Total	Nonrepeaters	Total	Nonrepeaters
1	494,614	270,266	38,643	31,929
2	324,804	234,273	30,683	26,462
3	238,897	167,044	20,927	19,152
4	189,865	123,549	19,608	17,349
5	145,478	88,938	17,634	15,695
6	81,914	58,923	13,668	13,019
Total	1,475,572	942,993	141,163	123,606

a. Consists of two subcycles, *tronc commun* and upper secondary school, each lasting three years.
Source: Ministry of Education school statistics for 2000–01.

expansion is thus likely to mount rapidly in the coming years.[29] In the primary cycle, the cohort survival rate is currently estimated at 73 percent. If this rate were maintained, the number of new students entering grade 6 in 2006 would be around 197,000 pupils, or more than six times the current cohort of entrants to the first year of secondary schooling. Even if the survival rate were to fall to 50 percent (as is likely if repetition rates remain at their current high levels), the projected number of pupils would still be large—about 135,000 new pupils, or more than four times the number of entrants to the first grade of the *tronc commun* cycle.

How many sixth-graders in 2006 will be able to continue to the *tronc commun* cycle depends on how quickly it would be feasible (both physically and fiscally) to expand places in the secondary cycle. Between 1995 and 2000, the entire system, including both the public and private sectors, expanded at the rate of 18,200 places a year, or 3,000 places annually per grade in the cycle. If the system continued to expand at this rate and repetition rates remained unchanged, 48,000 new entrants to the first year of the *tronc commun* cycle could be accommodated in 2007.[30] In that year the transition rate between the primary and *tronc commun* cycles would thus be about 24 percent if the survival rate in the primary cycle were 73 percent, and 35 percent if the survival rate were 50 percent. Even if it were feasible to double the pace of expansion of secondary school places to 6,000 places per grade annually, the transition rate between the primary and *tronc commun* cycles would still be lower than at present: 31 percent if the survival rate in the primary cycle were 73 percent, and 46 percent if it were only 50 percent.

Although admittedly rough, these projections suggest that in the foreseeable future the *share* of primary school completers continuing on to secondary school will very likely decline even as the absolute size of enrollments in secondary schools grows substantially.[31] The selection process would accordingly need to become even more efficient than it is now in identifying students who have good potential to benefit from continuing past the primary cycle.

The data in table 2-11 also have implications for the development of upper secondary education. In 2000–01 the system admitted nearly 32,000 new entrants to the first grade in the secondary cycle. If the survival rate in the *tronc commun* cycle remains unchanged at 69 percent, the projected number of candidates for upper secondary schooling will exceed 22,000 in 2003–04, or about 1.27 times the size of the cohort that entered the upper secondary cycle in 2000–01. Currently, almost all students who finish the *tronc commun* cycle eventually go on to upper secondary schooling, and 79 percent reach the end of the cycle. Continuation of these patterns implies that by 2007, a total of 18,000 upper secondary graduates a year (about 40 percent more than the current cohort size of about 13,000) will be seeking either employment or entry to higher education.

We can expect these projections to increase in future years as the number of places in lower secondary school is expanded to accommodate the rising tide of primary school completers. For example, suppose that the number of new entrants to lower secondary school grows to 48,000 students a year by the end of the decade, on the assumption that about 3,000 places are added annually. If the student flow patterns within secondary schooling remained as at present, with limited selection between the *tronc commun* and upper secondary cycles, by 2015 there would be

29. Note that the current size of the entering cohort in first grade is of the same order of magnitude as the projected population of 6-year-olds in the coming decades, implying that the scale of the problem is likely to persist in the future.

30. This assumes that repetition rates in the first year of the cycle remain at the present 17.4 percent. The number of places for new entrants to the first year of the cycle would thus be the sum of the current number of new places (32,929) and the number of new places created at the assumed rate [= $3,000 \times (1.0 - 0.174) \times 6$], or a total of 47,797 places.

31. This decline obviously does not invalidate the long-term goal of achieving universal basic education through lower secondary schooling, but physical constraints, quite apart from the fiscal ones, make that goal infeasible in the immediate future.

at least 27,000 upper secondary school leavers each year seeking either a job or a place in higher education. At issue, then, is whether the labor market will be able to absorb this large an annual output of workers with at least an upper secondary education. Although it is perilous to project labor market developments in Rwanda's evolving postgenocide context, the scale of the increase in graduate output warrants a closer look at the options for managing student flow. Strengthening mechanisms to tighten selection into upper secondary schooling, particularly in the publicly funded sector, would seem to be a logical place to start.

Conclusion

This chapter has documented the coverage of the education system and its evolution over time. The absolute number of students at all levels of education has recovered from the severe disruption caused by the genocide and now exceeds pregenocide levels. The private sector share of enrollments remained unchanged during the 1990s: less than 1 percent in primary education, more than 40 percent at the secondary level, and nearly 40 percent in higher education. At the primary level, the gross enrollment ratio is now significantly greater than at the start of the 1990s and is comparable to the average for other low-income Sub-Saharan African countries. The ratio for higher education has also tripled since the early 1990s, although it remains smaller than the average for comparable countries. In secondary education, where the trend is difficult to establish because of structural changes in the system during the 1990s, the ratio in 2000–01 was somewhat lower than the average for low-income countries in Sub-Saharan Africa.

Nearly 90 percent of Rwandan children currently start school—about the same share as in the early 1990s—and 73 percent eventually make it to grade 6, up from about 44 percent. There is obviously still scope for improvement in both access and survival. But even maintaining the cohort survival rate at 73 percent poses a significant challenge, given the extremely high rates of grade repetition that characterize the system. At nearly 34 percent, Rwanda's repetition rate in primary education is one of the highest in the world, and cross-country experience suggests that its persistence is likely to depress the survival rate, perhaps to as low as 50 percent. Reduction of grade repetition therefore appears to warrant priority attention as part of the country's strategy for achieving universal primary education.

As primary schooling improves and expands, the pressure to increase the supply of places at postprimary levels will inevitably mount. Simple projections based on conservative assumptions suggest that the number of potential candidates for entry into lower secondary school at middecade (that is, around 2005) could easily be four times the size of the current cohort of entrants to that cycle, and the number of potential candidates for entry into upper secondary school could be at least 30 percent larger than now. By the middle of the next decade (around 2015), given current patterns of student flow in the secondary cycle, the number of upper secondary school graduates seeking either employment or entry to higher education could easily be twice the current output from the system.

In light of these projections, the task of managing student flow throughout the secondary cycle presents two challenges in the next 5 to 15 years. The first is to maintain the current relatively high levels of within-cycle survival rates in both the *tronc commun* and upper secondary cycles. The second is to strengthen the existing selection mechanisms between the primary and *tronc commun* cycles and between the *tronc commun* and upper secondary cycles. To the extent that the pace of expansion of places in the *tronc commun* cycle is impeded by physical and resource constraints, a heavier burden would be placed on the selection process to ensure that high-potential candidates are not lost to the system. For the upper secondary cycle, the rapidly increasing pool of lower secondary school leavers suggests that tighter selection at the entry point might be needed to manage downstream pressure to expand higher education. This task will only become more urgent if the labor market develops signs of a weakening capacity to absorb highly educated workers into productive employment.

CHAPTER 3

EDUCATION FINANCE

Aggregate public spending on education in Rwanda has been rising steadily since 1996. The prospects for continued expansion are good, given the new climate of support for human development, both internationally and within the country. But even more important than the aggregate amount of resources is the way they are used. In this chapter we examine the volume of national spending on education, including spending by households; the composition of public spending on education by level; and international perspectives on the pattern of spending in Rwanda. The results provide a factual basis for discussing future directions for managing resource allocation to ensure that sectoral priorities are adequately funded. The most important of these priorities is to enable all children to complete a full course of primary schooling under conditions that promote student learning.

National Spending on Education

In Rwanda, as in most other countries, the government is the main source of funding for education. Contributions by households are also significant, however, particularly in secondary education, where privately financed schools currently cater to about 43 percent of students.

Spending by the Government

Total spending on education reached a high of 5.5 percent of GDP in 2001, but much of the increase in the postgenocide years reflects rapid increases in capital spending (table 3-1). Nonetheless, aggregate current spending in relation to GDP was 65 percent higher in 2001 than in 1996. Across levels of education, the increased spending has mostly benefited higher education, whose share of expenditures rose from just under 15 percent in 1996 to more than 37 percent by 2001. Secondary education also gained, but its allocation of current spending rose only modestly, from about 15 percent in 1996 to nearly 18 percent in 2001. The combined result of these trends in higher and secondary education has been a dramatic fall in the share of primary education, from 70 percent in 1996 to just over 45 percent in 2001. Despite the large increase

TABLE 3-1: LEVEL AND DISTRIBUTION OF PUBLIC SPENDING ON EDUCATION, RWANDA, 1982–2001

Year	Total spending on education as % of GDP		Capital spending as % of total	Share of current spending by level of education (%)[a]			Current spending on primary education as % of GDP
	Total	Current		Primary[b]	Secondary	Higher	
1982		3.0		62.7	24.0	13.2	1.9
1983		3.2				12.9	
1984	3.3	3.2	2.8			12.6	
1985	3.1	2.9	5.7	59.5	27.2	13.3	1.7
1986	3.5	3.2	6.2	60.0	27.6	12.4	1.9
1987	3.5	3.2	7.6	61.1	26.8	12.1	2.0
1988		3.1		59.0	25.5	15.4	1.8
1989		3.0					
1990–95							
1996	3.2	2.0	37.4	70.1	15.2	14.7	1.4
1997	3.4	2.0	40.9	64.6	16.0	19.4	1.3
1998	3.1	2.2	28.9	49.3	15.7	35.0	1.1
1999	4.3	3.4	21.9	47.7	18.5	33.8	1.6
2000	4.0	3.2	19.1	45.2	17.4	37.4	1.5
2001	5.5	3.3	39.8	45.2	17.6	37.3	1.5

Blanks denote not available.

a. Some categories of spending are shared across levels of education (e.g., those associated with the National Curriculum Development Centre, the National Examination Council of Rwanda, the Education Ministry's staff and running costs, and the inspectorate). For our purposes here, such spending is apportioned according to the subsector's share of the spending that could be allocated across levels.

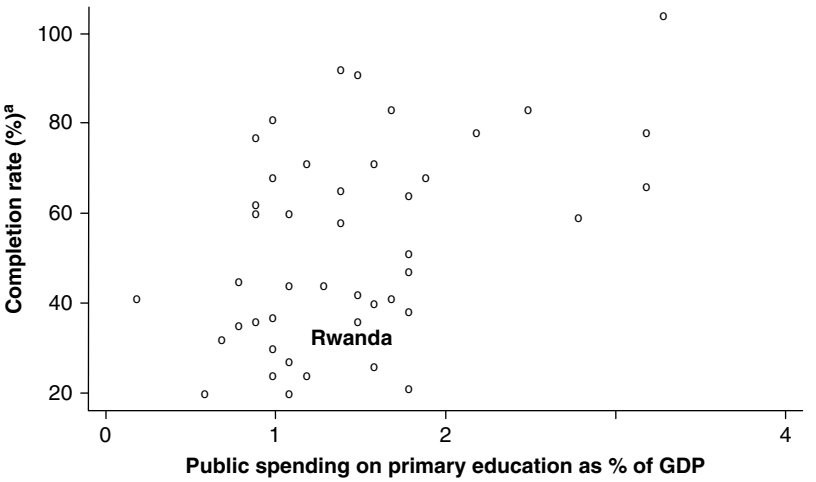
b. Published data for the 1980s show combined spending on primary education (which lasted eight years during this period) and on the three-year vocational institutions for primary school leavers that were discontinued after 1991–92 (see note 2 in chapter 2). To obtain a time series for spending on primary education corresponding to the current six-year cycle, we prorated the published data according to the share of enrollments in the last two years of the eight year cycle and enrollments in the vocational institutions during the 1980s. See appendix table A2-1 for data on enrollments.

Source: See appendix table A3-1.

since 1996 in aggregate current spending on education relative to GDP, current spending on primary education registered a tepid increase, reaching only 1.5 percent of GDP by 2001.

The concentration of spending on higher education after 1996 is consistent with the government's efforts to rebuild the country's depleted stock of highly qualified citizens following the 1994 genocide. Yet if achieving universal primary schooling is an objective, the current bias in the allocation of current spending appears lopsided. Low-income countries that have managed to universalize primary school completion typically allocate a 50 percent share of public spending on education to the primary level (Mingat, Rakotomalala, and Tan 2002). Admittedly, increased spending alone would not be sufficient to produce results. Although figure 3-1 suggests a generally

FIGURE 3-1: RELATION BETWEEN PRIMARY SCHOOL COMPLETION RATES AND PUBLIC SPENDING ON PRIMARY EDUCATION, LOW-INCOME COUNTRIES, CIRCA 2000



a. The completion rate is computed as the number of nonrepeaters in grade 6 relative to the corresponding age cohort for that grade.

Source: Based on data for 47 low-income countries reported in Mingat, Rakotomalala, and Tan (2002).

positive relation across countries between spending on primary education and grade 6 completion rates, the relation is loose, and Rwanda's position in the graph points to substantial scope for improvement in survival even at the current level of spending. Increasing allocations for primary schooling is a legitimate objective, but there is also a need to improve the system's current performance. Subsequent chapters of this volume elaborate on some options in this regard.

In the discussion so far, we have focused on public spending on education managed by the Ministry of Education. The ministry is indeed responsible for the bulk of such expenditure, but in recent years a nonnegligible volume of education-related spending has flowed through other ministries and government agencies, notably for vocational and nonformal training and for financial assistance, mostly to secondary students orphaned by the genocide (table 3-2). Including these spending items raises current spending on education in Rwanda to 3.8 percent of GDP in 2001, with 87.2 percent accounted for by spending channeled through the Ministry of Education.[1] This level of aggregate current spending on education is comparable to the average of about 4.0 percent in low-income countries.

Spending by Households

Rwandan households complement the government's investment in education to a large measure. Data from the 1999–2000 Household Living Conditions Survey (also known as the Enquête intégrale sur les conditions de vie des ménages au Rwanda, EICV), a nationwide survey of some 6,420 households in urban and rural areas, suggest that almost all students, irrespective of level of schooling and no matter whether they attend public or private schools, incur some education-related spending (table 3-3).[2] The surprising pattern is that the share of respondents with

1. Because the additional spending outside the ministry is for postprimary services, the results in figure 3-1 remain unchanged.

2. The survey was conducted between October 1999 and December 2000 in urban areas and between July 2000 and July 2001 in rural areas.

TABLE 3-2: CURRENT PUBLIC SPENDING ON EDUCATION THROUGH THE MINISTRY OF EDUCATION AND OTHER MINISTRIES OR GOVERNMENT AGENCIES, RWANDA, 1999–2001

(Millions of current FRw, unless otherwise indicated)	1999	2000	2001
Ministry of Education[a]	21,738	22,347	25,341
Other ministries[b]			
Education and training services[c]	347	287	324
Financial assistance to students	513	3,205	3,400
Total education-related current spending	22,598	25,839	29,065
As % of GDP	3.5	3.7	3.8
Share spent through the Ministry of Education (%)	96.2	86.5	87.2
Share spent through other ministries and government agencies (%)	3.8	13.5	12.8

a. Excludes spending on the university hospital.

b. Includes the Ministries of Finance; Youth, Sports and Culture; Gender; and Local Administration and Social Affairs (MINALOC), as well as the Genocide Fund, which became operational in 2000 when the first bursaries were awarded.

c. Includes spending on the Institut supérieur des finances publiques (ISFP, now the Institute of Finance and Banking) and on various vocational and nonformal training courses.

Source: See appendix table A3-2.

nonzero spending is smaller in higher education than in primary or secondary school. In absolute terms, however, families spend more at higher levels of education: from US$5 per child per year in public primary schools to US$318 per year in higher education. Summing across all levels and types of education, household spending on education in 2000 amounted to about 1.5 percent of GDP, or about 41 percent as much as public current spending on education in that year. This level of private spending is relatively high and is comparable to that in Madagascar, another country where the private sector accounts for just under half of the enrollments at the secondary level.

As for the composition of spending, school fees are an important item throughout the system. In private primary schools and at postprimary levels, they are half or more of the total cost to families, while in public primary schools they account for 23 percent of the total. For children in public schools, obtaining uniforms turns out to be the single most important cost item (accounting for about 45 percent of the total), followed by books and school supplies (24 percent). The relatively large share of spending on uniforms is not unusual, but it does raise questions about the benefits of requiring families to incur an expense that is arguably only indirectly related to the pedagogical process.

In some low-income countries, including Tanzania and Uganda, fees for primary schooling have been abolished, and a system of capitation grants has been instituted to relieve families of the burden of paying for books and supplies. The expectation that these moves would speed progress toward achieving education for all is borne out by the rapid increase in enrollments in both countries in recent years. Closer examination of the evidence shows, however, that, although there is now nearly universal entry to grade 1, many pupils drop out before finishing the cycle. The implication is that additional measures to compensate for the opportunity cost of schooling may be needed to keep children, particularly those from poor families, in school.[3]

If the Rwandan government followed the example of Tanzania and Uganda by abolishing fees, reimbursing schools for the lost income, and paying for books and pedagogical supplies,

3. See Patrinos and Ariasingam (1997) and Patrinos (2002) for examples of the many mechanisms used by countries to keep children in school.

TABLE 3-3: HOUSEHOLD SPENDING ON EDUCATION, RWANDA, CIRCA 2000

	Primary		Secondary			
	Public[a]	Private	Public[a]	Private	Higher[b]	Total
Share of students reporting nonzero spending on education (%)	97.9	99.5	97.4	97.2	93.8	
Weighted annual spending per student (FRw)[c]	1,807	10,370	38,173	56,644	124,002	
As % of per capita GDP	2.2	12.7	46.6	69.2	151.5	
US$	5	27	98	145	318	
Composition of spending per student (%)						
School fees	22.7	60.2	54.4	68.4	68.4	
PTA contribution and other charges	6.4	0.9	5.6	1.9	0.0	
Books and school supplies	24.3	15.6	11.8	9.0	8.1	
School uniforms	45.0	20.1	11.6	9.0	0.3	
Transport to and from school	0.2	2.3	6.1	4.8	11.6	
Other expenses	1.3	1.0	10.5	6.9	11.5	
Aggregate household spending on education (millions of FRw)	2,647	114	3,042	3,482	1,223	10,508
Subsector share of aggregate (%)	25.2	1.1	29.0	33.1	11.6	100.0
As % of GDP						1.5
As % of public current spending on education						40.7
Memorandum:						
Number of students nationwide	1,464,594	10,978	79,699	61,464	9,866	1,626,601

Blanks denote not computed.

Note: FRw, Rwandan francs, GDP, gross domestic product; PTA, parent-teacher association. Results are based on samples of 6,284 primary school pupils, 945 students in secondary school, and 72 students in universities and other types of institution.

a. Refers to state and *libre subsidié* schools. Teacher salaries in both types of school are financed by the government. State schools are managed directly by the government; *libre subsidié* schools are managed by churches and other nongovernmental organizations. See chapters 5 and 6 for further details.

b. To avoid problems associated with small sample sizes, the public and private sectors are not shown separately.

c. For all students, including those reporting zero spending.

Source: Authors' calculations based on the 1999–2001 Household Living Conditions Survey. Data on enrollments are based on sources cited in appendix tables A2-1 and A5-1. Data on GDP in 2000 are from the World Bank Africa Live Database (May 20, 2002, version). Additional details are provided in appendix table A3-3.

public spending on primary education would need to rise by 0.18 percent of GDP [= (0.227 + 0.243) × 0.252 × 1.5]. This would bring total current public spending for primary schooling to about 1.68 percent of GDP, an increase of about 12 percent over recent years. Such an increase would seem to be the minimum needed to remove some of the immediate impediments toward achieving education for all.

A Closer Look at Public Spending on Education

In this section we discuss in greater detail the functional distribution of public spending on education. We first examine the broad categories of spending reported in the budget. We then build the spending allocations from the bottom up by level of education, as implied by the number and distribution of teaching and nonteaching staff in schools and by the pay structure.

TABLE 3-4: DISTRIBUTION OF CURRENT PUBLIC SPENDING ON EDUCATION, RWANDA, 1999–2001

(%, unless otherwise indicated)	1999	2000	2001
Salaries of teachers and other school personnel[a]	**59.0**	**55.0**	**53.4**
Primary	41.0	37.0	34.5
Secondary	10.1	8.8	9.1
Higher	8.0	9.2	9.9
Student bursaries[b]	**14.3**	**24.3**	**24.0**
Secondary	2.3	11.9	11.6
Local higher education	3.4	5.2	4.9
Higher education abroad	8.6	7.2	7.5
Food for students	**6.0**	**8.2**	**8.7**
Secondary	1.2	3.6	3.6
Higher education	4.8	4.6	5.0
System administration	**7.2**	**4.0**	**7.2**
Other operating expenses[c]	**13.4**	**8.4**	**6.7**
All categories	100.0	100.0	100.0
Memorandum:			
Total current spending[a,b]			
In millions of current FRw	21,862	25,212	27,520
As % of GDP	3.4	3.6	3.6

Note: FRw, Rwandan francs; GDP, gross domestic product.

a. Excludes spending on teacher salary arrears, the university hospital, the Institut supérieur des finances publiques, and various vocational and nonformal training activities offered by other ministries. These exclusions explain the difference between the totals in this table and those shown in table 3-2.

b. Includes bursaries administered through the Ministère de l'administration local et des affaires sociales (MINALOC) and the Genocide Fund.

c. Includes spending on maintenance, transport, utilities, and other running costs.

Source: See appendix table A3-4.

Overall Functional Distribution of Spending

The rise in overall current spending on education in recent years has been accompanied by a noticeable shift in spending in favor of financial and other assistance to students in secondary and higher education, at the expense of allocations for teacher and staff pay, particularly at the primary level, and for operating expenses (table 3-4). The increase in allocations for student bursaries coincides with the activation of financial assistance provided through the Genocide Fund to orphaned students; the bulk of current beneficiaries are attending secondary school. Funding for food for students has also been claiming a rising share of spending, and the government has moved to curb this trend by shifting to lump-sum cash allocations instead of basing the allocations on physical quantities of food per student. The new arrangement will help tighten control over this item, but justifying its continued inclusion in the budget is difficult, given that the beneficiaries are postprimary students, who are already privileged.

Spending Allocations, from the Bottom Up

To construct allocations from the bottom up, we merged information on the distribution of personnel and the pay structure to piece together spending on wages and then completed the picture by adding information on spending on nonsalary items as reported in budget documents. The results show spending allocations by level of education and provide details that would otherwise

TABLE 3-5: NUMBERS OF TEACHERS AND SCHOOL-LEVEL ADMINISTRATIVE STAFF IN GOVERNMENT-FINANCED PRIMARY AND SECONDARY SCHOOLS, RWANDA, 1999

	Teachers			
	With teaching duties	With other duties	Administrative staff[a]	Total
Primary	24,982	40	1,329	26,351
Secondary[b]	3,257	245	964	4,466
Tronc commun cycle	1,907	—	—	—
Upper secondary cycle	1,350	—	—	—

— Not available.

a. Refers to secretaries and school heads with no teaching duties; does not include personnel who provide dormitory and cafeteria services.

b. Teachers who teach classes in both the *tronc commun* and upper secondary cycles are counted in full-time equivalent units according to the distribution of teaching duties between the two cycles.

Source: Based on data from Ministry of Education 1999 census of teachers in state and *libre subsidié* schools.

be obscured. The calculations focus on primary and secondary education, which account for the bulk of the system. For higher education, we did not use the bottom-up approach because the requisite data were unavailable. Instead, we relied on budget documents, which, as it turned out, contained sufficient detail for our purpose.

Consider first the distribution of staff working in public (state and *libre subsidié*) primary and secondary schools (see table 3-5). The data are based on a 1999 census of school personnel conducted by the Ministry of Education, which documented each employee's educational qualifications and work responsibilities. From the data, it is possible to reclassify teachers with no teaching duties and to evaluate the full-time equivalent number of teachers in the *tronc commun* and upper secondary cycles according to teachers' time utilization. The calculation indicates that nearly 60 percent of the teaching time of the 3,257 secondary teachers on the payroll in 1999 was devoted to classes in the *tronc commun* cycle.

We next consider the distribution of these school-level personnel by salary grade (see table 3-6), again on the basis of the 1999 Ministry of Education census of school personnel. Using information from the census on each staff member's salary grade and years of experience, we are able to locate each person in the salary scale and thus compute that person's annual salary, including benefits. On average, primary school teachers receive remuneration of about 4.0 times per capita GDP; the corresponding multiples were 5.7 for *tronc commun* teachers and 6.8 for upper secondary teachers. In both the primary and secondary cycles, administrative staff tend to be better educated and to have more years of experience than teachers as a group, and they are generally paid more.

By combining information from tables 3-5 and 3-6, we are able to estimate the total salary bill broken down by level of education and disaggregated between teaching and administrative staff working in schools. The salary bill of the central administrative staff was not estimated but was taken directly from the amounts reported in the budget documents for 1999.[4] The reported aggregate spending on this item was split across the various levels of education by prorating it according to the distribution of the salary bill for school-level personnel, on the assumption that the distribution reflects the cost of personnel management across levels. We then added the details on nonstaff current spending as reported in the budget documents, being careful to eliminate spending unrelated to education, such as the cost of a university hospital. The results appear in table 3-7. As a check

4. For further details, see the notes to table 3-7.

TABLE 3-6: DISTRIBUTION OF PUBLIC SCHOOL STAFF BY SALARY GRADE AND AVERAGE SALARIES, RWANDA, 1999

		Primary		Secondary		
				Teachers[b]		
Pay category	Educational attainment	Teachers[a]	Administrative staff	*Tronc commun*	Upper secondary	Administrative staff
% of total						
Ungraded	CA, ES (one to three years), CERAI, SF, CERAR[c]	22.5	3.6	0.0	0.0	0.0
6	Incomplete upper secondary	20.5	8.1	1.3	0.8	0.2
5	Lower secondary teacher training diploma	3.7	2.0	0.0	0.0	0.1
4	Upper secondary diploma (old system)[d]	17.9	30.2	1.8	2.6	3.1
3	Upper secondary diploma (new system)[d]	35.0	55.4	74.3	42.8	58.3
2	Two-year postsecondary diploma	0.0	0.2	15.1	30.1	23.5
1	University degree	0.0	0.1	6.8	22.1	10.8
Other		0.4	0.4	0.7	1.6	4.0
Other staff characteristics						
Number of staff		24,982	1,369	1,907	1,350	1,209
Average years of experience		8.1	11.1	5.4	5.6	9.4
Average annual salary, including benefits[e]						
In thousands of current FRw		308.5	388.6	443.2	526.2	594.9
As multiple of per capita GDP		4.0	5.0	5.7	6.8	7.7

Note: FRw, Rwandan francs; GDP, gross domestic product.

a. Includes only teachers with teaching duties.

b. Includes only teachers with teaching duties. Teachers teaching in both cycles are counted in full-time equivalents according to the number of hours they teach in each cycle.

c. CA, certificat d'aptitude, obtained at the end of the old eight-year primary cycle; ES, ecole secondaire; CERAI, centres d'enseignement rural et artisanal intégré; SF, section familiale; CERAR, centres d'enseignement rural et artisanal de Rwanda. The last three offered vocational courses following the old eight-year primary cycle; the SF program was for girls only and the CERAR program, for boys only.

d. Under the old system, an upper secondary diploma was earned after three to five years of secondary schooling; under the new system, it is earned after six to seven years.

e. Includes benefits for transport and lodging (introduced in 1999), as well as estimated family allowances paid to teachers who are household heads and the state's contribution of 5 percent of salaries to social security.

Source: Based on data from Ministry of Education 1999 census of teachers and information supplied by the Ministry of Education on the structure of teacher pay and benefits. See appendix table A5-1 for additional information on the salary structure by qualification.

TABLE 3-7: ESTIMATED CURRENT PUBLIC SPENDING ON EDUCATION BY FUNCTION AND LEVEL, RWANDA, 1999

(Millions of current FRw, unless otherwise indicated)	Primary education	Secondary education		Higher education	All levels
		Tronc commun	Upper secondary		
Salaries and benefits					
Staff at central level[a]	1,056	158	129	405	1,748
School-level administrative staff [b]	532	404	317	3,239	13,755
Teachers with teaching duties[b]	7,707	845	710		
Nonstaff current spending					
System administration[a]	1,140	106	79	177	1,502
School-level operating costs[c]	346	801	475	—	1,621
Food for students[d]	0	169	95	1,045	1,308
Student financial aid					
Local study	0	322	191	733	1,246
Study abroad	0	0	0	1,889	1,889
Other[e]	6	6	6	6	23
Total current spending	10,788	2,810	2,001	7,494	3,093
Memorandum:					
Amount reported in budget documents FRw	—	—	—	—	21,862
(As % of estimated total)					(94.7)

— Not available.

Note: FRW, Rwandan francs.

a. The information in the budget documents can be categorized separately as (a) spending on services that benefit primary and secondary education only, such as the school inspectorate, the National Examination Council of Rwanda, and the National Curriculum Development Centre, and (b) spending on overall administration at the central level. A distinction can be made in each of these categories between spending on salaries and on materials inputs (transport, fuel, supplies, utilities, maintenance, and so on). We apportioned the reported amount in item (a) by level according to the distribution of enrollments, on the assumption that the cost of these services is driven by the size of enrollments. The total spending on item (b) was apportioned according to the distribution of the salary bill for school-level or institution-level staff, on the assumption that the salary bill is correlated with the cost of personnel management.

b. Estimated according to the average annual salaries, including benefits, of administrative staff and teachers in publicly funded primary and secondary schools and the number of such staff, as documented in the Ministry of Education 1999 census of teachers.

c. Includes spending on materials, books, and maintenance. For secondary education, the amount also includes spending on equipment. Although some of this spending may be more properly treated as capital expenditure, no adjustment is made here because no information is available regarding the nature of the equipment.

d. For a few higher education institutions, the amounts spent on food are not itemized in the budget documents and are therefore estimated separately from the data supplied by individual institutions. The estimates are added to the itemized budget amounts to obtain an aggregate for higher education.

e. Refers to spending on the National Commission for UNESCO and on research on science and technology. We apportioned these amounts equally across levels on the assumption that such spending benefits the entire education system.

Source: Authors' estimate based on data on the number and distribution by pay category of teachers and administrative staff counted in the Ministry of Education 1999 census of teachers, supplemented by data on the structure of teacher remuneration and data from the 1999 executed budget. See also table 3-4 and appendix table A5-1.

on the overall calculations, we note that the bottom-up procedure yields aggregate spending of 22,093 million Rwandan francs (FRw), an excess of 5.6 percent over the FRw 21,862 million reported in the budget. The gap is larger than we would have liked in this kind of accounting exercise but may be explained by the government's accumulation of arrears on teacher salaries in the past few years.

To facilitate understanding of the results in the previous table, we can rearrange them under three major heads: management overhead, service delivery at the facility level, and student welfare. This rearrangement brings a new perspective to the management of public spending on education by drawing attention to the extent to which spending is (or is not) oriented toward the core business of service delivery. Management overhead can be thought of as a backline service that supports the core business; it includes spending on managerial and supervisory staff at the central ministry and decentralized levels and on the material inputs needed by such staff to discharge their functions. The core business of service delivery takes place at the level of individual schools and is realized through spending on teachers, school administrators, and support staff, as well as on pedagogical supplies and other operating inputs. Spending on student welfare can be categorized as a backline item, since it is only indirectly linked to teaching and learning at the level of individual classrooms and schools. To continue with the business analogy, student welfare spending can be viewed as a form of customer rebate because it reduces the cost of education services to consumers (students and their families).

The rearranged data (table 3-8 and figure 3-2) provide some insights into priorities in public spending on education. Although there is admittedly no obvious benchmark for judging the distribution of spending, a pattern of allocation that glaringly fails to support the core activity of teaching and learning at the facility level would raise legitimate questions about whether resources are sufficiently focused on service delivery. For the system as a whole, less than two-thirds of total public current spending on education in 1999 went to support service delivery at the facility level, whereas 14 percent was absorbed by management overhead and nearly 20 percent went into student welfare. The allocation for management overhead does not appear to be overly burdensome, but the share for student welfare is unusually large compared with spending patterns elsewhere. The size of this item reflects the country's postgenocide recovery efforts aimed at rebuilding lost human capital through heavy investment in higher education and at helping students orphaned by the massacre.

Closer examination of the spending patterns by level of education raises some concerns. In primary education, management overhead exceeds 20 percent, reflecting relatively elevated spending on material inputs such as transport, utilities, and maintenance. At the school level, 96 percent of the allocation goes for staff salaries, leaving a minuscule 4 percent for books, pedagogical supplies, and other running costs and nothing at all for student welfare. Given the paucity of resources for items other than salaries, it is not surprising that a sizable portion of household spending at this level of education goes for school fees and parent-teacher association dues (both kept for use at the school) and for books and school supplies. A reevaluation of the allocations might be warranted to identify the potential scope for shifting some of the government's spending on overhead toward defraying more of the running costs at the school level. There is currently no provision for subsidizing orphaned children in primary schools—an omission that poses an obvious impediment to the schooling of the most vulnerable children.

In secondary education, spending allocations between the lower and upper secondary levels are comparable—roughly, a tenth on overhead, three-quarters on service delivery, and the rest on student welfare. Within the service delivery category, administration appears to take up a significant share of resources. A closer look at this item may be worth while in order to improve utilization of personnel in schools and avoid, for example, poorly justified assignment of teachers to administrative rather than teaching tasks. Allocations for student welfare consist of spending on school feeding and bursaries for orphaned students. The raison d'être for the general food subsidies appears weak, since not all students at this level are poor; at any rate, they are not poorer

TABLE 3-8: FUNCTIONAL DISTRIBUTION OF CURRENT PUBLIC SPENDING ON EDUCATION, RWANDA, 1999

(%, unless otherwise indicated)	Primary education	Secondary education		Higher education	All levels
		Tronc commun	Upper secondary		
Management overhead	**20.4**	**9.6**	**10.7**	**7.8**	**14.3**
Staff salaries	9.8	5.6	6.5	—	—
Material and other inputs[a]	10.6	4.0	4.2	—	—
Service delivery at facility level	**79.6**	**73.0**	**75.0**	**43.2**	**66.4**
Salaries of teachers with teaching duties	71.4	30.1	35.5	—	—
Salaries of administrative staff[b]	4.9	14.4	15.8	—	—
Material inputs and other operating costs[c]	3.2	28.5	23.7	—	—
Student welfare	**0.0**	**17.5**	**14.3**	**48.9**	**19.4**
Food for students	0.0	6.0	4.7	13.9	5.7
Bursaries for local study	0.0	11.5	9.5	9.8	5.4
Bursaries for study abroad	0.0	0.0	0.0	25.2	8.2
Total	100.0	100.0	100.0	100.0	100.0
Memoranda:					
Total current spending (millions of current FRw)	10,788	2,810	2,001	7,494	23,093
Subsector share of spending (%)	46.7	12.2	8.7	32.5	100.0

— Not available.

Note: FRw, Rwandan francs. The categories of functions represent a regrouping of the expenditure categories in table 3-7.

a. Includes transport, utilities, supplies, maintenance, fuel, and other running costs.

b. Includes the salaries of teachers without teaching duties, school heads, secretaries, and other administrative staff.

c. Includes textbooks, equipment, utilities, transport, maintenance, and other running costs at the facility level, as well as salaries of casual labor.

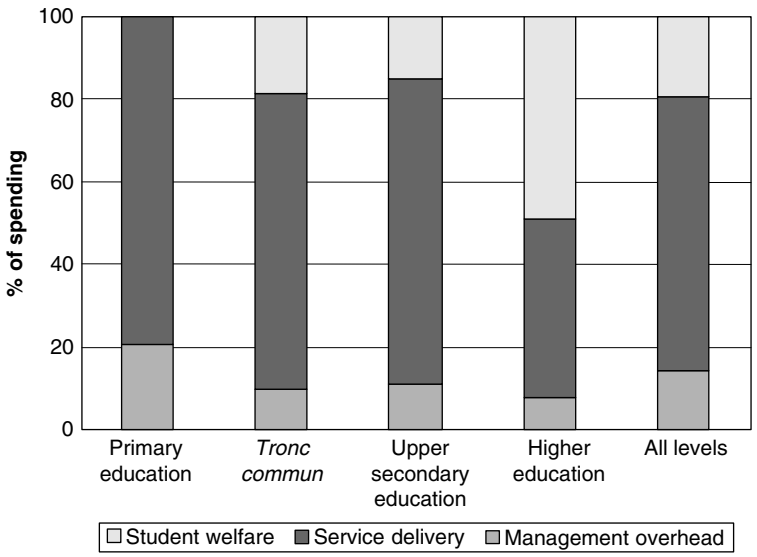
Source: Authors' estimate based on data in table 3-7; see the text discussion for definitions of items.

than children in primary school who currently do not get free food.[5] The justification for bursaries is stronger because they are directed at orphans. As documented in chapter 1, one result of the 1994 genocide was to swell the number of orphans currently in the secondary school age range. As this bulge passes out of the system, allocations for secondary-level bursaries can be expected to decline but not to disappear altogether, as the HIV/AIDS epidemic continues to produce orphans.

With regard to spending allocations in higher education, there is less detail, but even limited information is helpful in identifying questions about spending priorities. The most striking finding is that the core business of service delivery received only 43 percent of the subsector's total

5. As noted earlier, in an effort to control spending on food, the government recently replaced calculation of the subsidies on the basis of the number of students enrolled in a school with a lump-sum cash amount fixed in nominal terms in the base year. As more of the country's schools begin to operate as day rather than boarding schools, the amount spent on food can be expected to decrease.

FIGURE 3-2: FUNCTIONAL DISTRIBUTION OF CURRENT PUBLIC SPENDING ON EDUCATION, RWANDA, 1999



Source: Based on data in table 3-8.

current spending, compared with 49 percent for student welfare in the form of food and bursaries. Because spending on overhead is not especially high (less than 8 percent), a rebalancing of spending in favor of service delivery would essentially necessitate cutting back on student welfare. The only way to avoid the cutback is to raise the share of higher education in overall spending on education, but this option is untenable in view of the subsector's already high share of total spending (37 percent in 2001, up from 33 percent in 1999). The issues for policymakers are to evaluate the merits of shifting spending within the subsector and to form a strategy for minimizing the potential adverse effects associated with cutbacks in student welfare. These negative effects may include, for example, a bias against students from poor families in the socioeconomic composition of the student body and inadequate incentives for students to specialize in fields of study with high social (as opposed to private) returns.

Public Spending per Student

In this section we discuss patterns in per student spending and the underlying sources of differences across levels of education. Data from other countries are presented to lend a comparative perspective.

Unit Spending by Level of Education

The relevant results, shown in table 3-9, pertain to the public sector at all levels. (In higher education, a distinction is made between local study and study abroad.) An immediately obvious pattern is that unit costs are highly skewed in favor of the postprimary levels—another reminder of the relatively meager allocation of public spending for primary education in Rwanda. Each secondary student costs 8.6 times as much to enroll as a primary school child. In higher education, the corresponding ratio is 95 times for local studies and 275 times for study abroad. Within secondary education, unit costs in the *tronc commun* cycle are about four-fifths those in the upper secondary cycle, suggesting that service delivery arrangements (for example, use of specialist teachers, class size, teaching workloads, and instructional time for students) in this subcycle more

TABLE 3-9: PUBLIC SPENDING PER STUDENT BY LEVEL OF EDUCATION, PUBLIC SECTOR, RWANDA, 1999

		Secondary education			Higher education	
	Primary education	*Tronc commun*	Upper secondary	Overall	Local study	Study abroad
Spending per public sector student						
In FRw[a]	7,604	60,273	73,628	65,223	723,899	2,094,422
As multiple of per capita GDP	0.10	0.78	0.95	0.84	9.34	27.03
As multiple of spending on primary education	1.0	7.9	9.7	8.6	95.2	275.4
Memoranda:						
Total public current spending (million FRw)	10,788	2,810	2,001	4,811	5,605	1,889
Overall number of students	1,428,708	79,454	45,670	125,124	9,866	902[b]
% of students in public sector (state or *libre subsidié*) schools	99.3	55.7	57.1	56.2	78.5	100.0

Note: FRw, Rwandan francs; GDP, gross domestic product.

a. Excludes spending on bursaries for students attending private secondary schools. The amount is estimated by prorating spending on bursaries according to the distribution of enrollments between public (state and *libre subsidié*) schools and private schools. Note that although private school students are probably less likely than public school students to receive a bursary, the amount of each award is higher for students attending private schools.

b. Includes only those studying abroad on government scholarships.

Source: Authors' calculations based on public spending data in table 3-7 and enrollment data in appendix table A2-1; for number of students abroad, Ministry of Education data.

closely resemble those in upper secondary education than in primary schooling. The relatively high costs in the *tronc commun* cycle will limit the government's ability to accommodate the rising demand for places in this cycle as increasing numbers of children complete primary school.

Sources of Differences in Unit Spending across Levels

Why are the postprimary levels of education so much costlier than primary education? To answer this question, we decompose overall spending per student into its component parts, beginning with the following expression:

$$US = \frac{\sum_i TS_i}{P} \tag{3-1}$$

where US is overall unit spending, TS_i is total spending on component i, and P is the number of students in the public sector. Unit spending on the salaries of teachers and nonteaching staff (USS) can be expressed as a function of two items: the average salary cost of these staff, and the corresponding pupil-to-staff ratios:

$$USS = \frac{TSS}{P} = \frac{ASS \cdot NS}{P} = ASS \cdot 1/(P/NS) = \frac{ASS}{PSR} \tag{3-2}$$

where TSS is total spending on staff salaries, ASS is average salary per staff member, NS is number of staff, and PSR is the pupil-to-staff ratio. With the use of equation 3-2, differences in unit

TABLE 3-10: LEVEL AND COMPOSITION OF PER PUPIL PUBLIC SPENDING IN PUBLIC PRIMARY AND SECONDARY SCHOOLS, RWANDA, 1999

	Primary education (FRw, unless otherwise specified)	Secondary education as multiple of primary education[a]		
		Both levels	*Tronc commun*	Upper secondary
Overall spending per student	**7,604**	**8.6**	**7.9**	**9.7**
Cost of teachers per student	**5,433**	**4.1**	**3.5**	**5.0**
Average annual teacher salary	308,522	1.5	1.4	1.7
Ratio of students to teachers	(56.8)	2.6	2.4	2.9
Cost of school-level administrative staff per student	**375**	**27.3**		
Average annual salary of administrative staff	388,594	1.5		
Ratio of students to administrative staff	(1,036)	17.8		
School-level material inputs per student	**244**	**74.4**		
Student welfare spending per student	**0**	**n.a.**		
Management overhead per student	**1,552**	**4.4**		

n.a. Not applicable (no spending on student welfare at the primary level).

Note: FRw, Rwandan francs. Public sector includes state and *libre subsidié* schools.

a. Blanks denote that the calculation was not made; differences across the two levels are small and reflect assumptions in apportioning spending across the two cycles of secondary schooling.

Source: Authors' calculations based on data in tables 3-6 and 3-7. See also appendix table A3-5.

spending across levels or types of schooling can be compared in terms of underlying differences in level of salary per staff and the pupil-to-staff ratio, which may be interpreted as a proxy for the intensity of use of staff.

Keeping in mind the above expressions, consider now the results in table 3-10 (which, because of data limitations, pertain only to primary and secondary education). The overall cost per pupil in primary education (FRw 7,604) is divided into FRw 5,433 for teacher salaries, FRw 375 for the cost of school administration, FRw 244 for material inputs at the school level, and FRw 1,552 for management overhead at the systemwide level. Using equation 3-2, we compute the cost of teacher salaries per pupil simply by dividing the average annual salaries of teachers (FRw 308,522) by the pupil-teacher ratio (56.8) and the cost of school-level administration by dividing the average annual salaries of school administrative staff by the ratio of pupils to such staff. Similar calculations yield the corresponding costs per secondary student, overall and separately for the *tronc commun* and upper secondary cycles. To facilitate the discussion below, the results for secondary education are expressed in the table as a multiple of the corresponding indicator in primary education.

Unit spending in secondary education is much higher than in primary education—8.6 times overall, and 7.9 and 9.7 times in the lower and upper secondary cycles, respectively. Part of the reason for the differences lies in teacher salaries, which are the single most important cost item, accounting for more than 70 percent of total spending. The per student cost of teachers in 1999 was 4.1 times as high in secondary schools as in primary schools, reflecting higher teacher salaries and smaller student-teacher ratios in the secondary cycle. A closer look at these variables shows that the latter factor accounted for more of the cost difference. Similarly, higher numbers of staff in relation to students, rather than higher average salaries, were the main reason why the per student cost of school-level administrative staff in the secondary cycle in 1999 was 27 times the

TABLE 3-11: CURRENT PUBLIC SPENDING PER STUDENT, RWANDA, 1999, AND SELECTED COUNTRY GROUPS, 1990S

		As multiple of per capita GDP			As multiple of spending on primary education	
	Number of countries	Primary	Secondary	Local higher education	Secondary	Local higher education
Rwanda, 1999[a]	**1**	**0.10 (0.10)**	**0.50 (0.84)**	**7.3 (9.3)**	**5.1 (8.6)**	**75.2 (95.2)**
Regional average, 1990s[b]						
Francophone Africa	15	0.15	0.49	5.6	3.3	37.3
Anglophone Africa	9	0.10	0.66	6.3	6.6	63.0
Latin America	10	0.07	0.11	0.7	1.6	10.0
Asia	8	0.08	0.19	0.9	2.4	11.3
Middle East and North Africa	6	0.11	0.30	0.9	2.7	8.2

a. Because the cross-country data refer to spending distributed across all enrollments, public and private, we adjusted the data for Rwanda accordingly. The first row refers to average current spending for all students at each level, regardless of whether they are in public or private schools and regardless of type of institution. In the second row (in parentheses), the numbers for primary and secondary education refer to average current spending only for students in public schools. For higher education, the figures in parentheses refer to per student spending in traditional public institutions.

b. Averages based only on data for countries with per capita gross domestic product (GDP) below US$1,000 in 1993.

Source: For Rwanda, table 3-9; for country groups, Mingat and Suchaut (2000).

corresponding cost in the primary cycle. Fortunately, school-level administration was not a major expenditure item in 1999, and its impact on overall costs was limited. Secondary schools received more funding per student for material inputs—about 74 times that at the primary level—but this item, too, accounted for a small share of overall spending. Management overhead took up about 20 percent of overall spending per primary pupil in 1999. Spending per student on this item in secondary education was higher than for primary education, by a multiple of about 4.4.

Cross-Country Comparison of Unit Spending

Table 3-11 presents comparisons with other countries on patterns of unit spending. Public spending averaged across all students in the system, both public and private, as is done in the table, can be interpreted as reflecting the intensity of public spending for each level of education and is suitable mainly for comparing the structure of spending across levels. Public spending per public school student, shown for Rwanda only, is more appropriately seen as a measure of the costliness of service delivery in the public sector.[6]

Average unit spending in primary education in Rwanda is comparable to the averages for low- and middle-income countries in Anglophone Africa and in the Middle East, somewhat higher than the averages for countries in Latin America and Asia, and quite a bit lower than those for Francophone Africa. In secondary education Rwanda's figure is higher than the averages for all regions except Anglophone Africa. It is in higher education, however, that Rwanda's level of

6. Because of differences in data definition, comparisons of countries' spending per student should be handled with the usual caution—particularly in higher education, where enrollments in private institutions may not be fully accounted for. Distance education should be treated differently from country to country.

TABLE 3-12: PUBLIC SECTOR TEACHER SALARIES AND PUPIL-TEACHER RATIOS, RWANDA, 1999, AND SELECTED COUNTRY GROUPS, 1990S

Country or region	Average salary of teachers as multiple of per capita GDP	Pupil-teacher ratio
Rwanda, 1999[a]	**4.0**	**56.8**
Regional average, 1990s[b]		
Francophone Africa	6.3	53.2
Anglophone Africa	3.6	38.7
Latin America	2.3	31.0
Asia	2.5	37.9
Middle East and North Africa	3.3	25.6
All countries in table	**3.9**	**40.0**

a. Data for secondary education are the weighted averages of lower and upper secondary school. All data refer to the public sector.

b. Data refer to countries with per capita gross domestic product (GDP) below US$1,000 in 1993. Pupil-teacher ratios pertain to systemwide averages.

Source: For Rwanda, appendix table A3-5; for data on country groups, Mingat and Suchaut (2000).

spending per student shows up as a true outlier on the high side: it is 75 times the level of spending per primary school child, compared with the corresponding multiples of 63, on average, in Anglophone Africa, 37 in Francophone Africa, and about 11 or less in the other regions. Had higher education study abroad been included in the calculation, the ratio would have been even higher. Overall, the results suggest a structure of spending in Rwanda that is heavily skewed in favor of postprimary levels, especially higher education—a pattern that inevitably translates into significant inequities in the incidence of public spending.

Implicit Tradeoffs in the Input Mix in Primary Education

For any given level of spending per student, education services can be delivered using different input mixes—for example, less costly teachers and more favorable staffing ratios, or vice versa, or more spending on salaries and less spending on nonsalary inputs. In table 3-12 we use cross-country data on teacher salaries and pupil-teacher ratios in primary education (the level for which comparative data are relatively plentiful) to deduce the implicit tradeoffs in primary schooling in Rwanda. The discussion provides a basis for a dialogue on options for improvement.

Recall from equation 3-2 that the per pupil cost of teachers—the single most important component of overall costs—depends on the level of teacher salaries and the pupil-teacher ratio. In general, the pattern in these variables across countries is what one would expect: the less costly are the teachers, the lower pupil-teacher ratios tend to be. Rwanda's teacher salaries exceed the average for Anglophone Africa by 11 percent, but its pupil-teacher ratio is higher by nearly 50 percent. Its figures for these variables are 21 and 122 percent higher, respectively, than the corresponding averages for the Middle East and North Africa.[7] Because overall spending per student in Rwanda is comparable to the averages for the selected regions (around 0.10 times per capita GDP), we can deduce from the much higher pupil-teacher ratios in Rwanda that an implicit tradeoff is being made in favor of nonsalary components. As documented above, the tradeoff

7. In Rwanda the exceptionally high pupil-teacher ratio translates into short school days—about 2.5 to 4 hours long—for children in the first three grades of the cycle because teachers are typically assigned to teach two shifts. (See chapter 5 for further details.)

appears to emphasize system-level management overhead rather than services and material inputs at the school level. This is a regrettable result because research and experience consistently point to the critical role of books and pedagogical supplies in enhancing student learning.[8]

In light of these deductions from the comparative data, one option for improving conditions at the classroom level would be to redirect some of the spending on management overhead toward achievement of smaller pupil-teacher ratios and larger allocations for books and material inputs. If, for example, spending on management overhead were cut by half and the resources thus freed were used to hire more teachers, it would be possible to lower the pupil-teacher ratio to about 50. Although this reduction is certainly an improvement, a ratio of 50 is still high, and books and pedagogical inputs are still undersupplied.

Other ways of improving the learning environment clearly warrant consideration. If overall spending on primary education remained unchanged, the only real option within the subsector would be to tighten controls on teacher salaries, either by changing the criteria for new hires or by slowing the pace of salary increases for those already on board. Such policies obviously need careful evaluation, but it should be noted that in low-income countries which have achieved universal primary school completion, teacher salaries typically average about 3.5 times per capita GDP, and these countries generally maintain a pupil-teacher ratio of around 40 (Mingat, Rakotomalala, and Tan 2002). If in Rwanda average salaries relative to per capita GDP were made comparable to the level in these other countries, all else remaining unchanged, it would be possible to lower Rwanda's pupil-teacher ratio from 57 to 50. If, in addition to the salary change, spending on management overhead were cut in half and the resources thus released were used to hire more teachers, the ratio would drop to 44.

As a further context for discussing the management of teacher costs, consider the data in table 3-13 on the pay of teachers and other workers. With the exception of those with the lowest academic credentials, teachers earn a significant premium over other similarly qualified workers. In the lowest pay category, teachers start their careers with a pay advantage of about 8 percent, but by midcareer the gap has just about evaporated. The bias in favor of the better qualified is consistent with the government's policy of attracting the best people into the teaching profession. If it were not for budget constraints, this policy would improve staff quality, and the system could still maintain reasonable pupil-teacher ratios and provide adequate supplies of pedagogical materials. The reality, however, is that budget constraints are tight. If lowering the pupil-teacher ratio is an objective, the option of keeping a lid on teacher costs cannot be entirely ruled out.

Policy Implications

Rwanda's public spending on education has been rising steadily in the postgenocide years, reaching a historical high of 5.5 percent of GDP in 2001. Because much of this increase has been for capital spending, allocations to support the day-to-day operations of the education system rose to only 3.3 percent of GDP in 2001—about the same level as in the late 1980s. The amount is augmented by education-related spending through channels other than the Ministry of Education, including, in particular, the Ministry of Youth, Sports and Culture, which finances vocational training, and the Genocide Fund, which provides financial assistance to orphaned students. Adding the extra spending brings total current spending for 2001 to about 3.8 percent of GDP. This level is comparable to the 4.0 percent of GDP that low-income countries typically spend on education, but given the extraordinary burden of orphans in the population, one could argue that Rwanda's allocation remains on the low side.

8. The squeeze on public funding for books and pedagogical materials effectively transfers the burden of financing these inputs to pupils and their families, as is confirmed by the pattern of household spending documented earlier in this chapter. Because of the prevalence of poverty in Rwanda, it is likely that families spend less than what is in fact needed for effective learning.

TABLE 3-13: TAKE-HOME PAY OF PUBLIC SECTOR TEACHERS AND OTHER WORKERS IN RELATION TO PER CAPITA GDP, RWANDA, 2001

Teacher pay category[a]	Educational attainment	Starting pay as multiple of per capita GDP[b]			Pay at midcareer as multiple of per capita GDP[c]		
		Teachers (1)	Other workers (2)	(1)/(2)	Teachers (3)	Other workers (4)	(3)/(4)
6	Incomplete upper secondary	2.2	2.4	1.08	2.4	3.6	0.97
4	3 to 5 years postprimary education (D3, D4, or D5)	3.0			4.6		
3	Upper secondary diploma, new system (D6, D7)	4.1	3.5	1.17	6.5	5.2	1.25
2	2-year postsecondary (e.g., *baccalauréat*) diploma	5.6	4.9	1.14	8.4	7.1	1.18
1	University degree	8.3	6.8	1.22	11.1	9.5	1.17

Note: Take-home pay refers to salaries plus allowances for travel and housing. See appendix table A5-1 for additional details.

a. Pay category 5 is for teachers with a teacher-training diploma, a qualification obtained after completing teacher training at the lower secondary level. It is excluded here for lack of a comparable group in the general labor force.

b. The starting pay for teachers is taken from the salary scale shown in appendix table A5-1. For other workers, it is simulated at ages 20, 20, 22, and 24, respectively, for the qualifications shown, based on the Mincerian earnings function reported in appendix table A3-6.

c. Pay at midcareer for teachers is estimated at the midpoint between entry pay and top pay on the pay scale for teachers (appendix table A5-1). For other workers, it is the pay simulated at age 45 based on the Mincerian earnings function reported in appendix table A3-6.

Source: Authors' calculations based on the data in appendix table A5-1 and on simulations based on the Mincerian earnings function reported in appendix table A 3-6.

A case can therefore be made for continued increases in spending on education, particularly current spending. Yet in a context in which the government already spends more than a quarter of its resources on education, further increases are likely to come only slowly—certainly more slowly than the pace of increase in the late 1990s. The ineluctable implication is that future progress in educational development will increasingly require more effective allocation of spending within the sector.

In a country still recovering from the devastation of the 1994 genocide, it may appear heartless to even talk of tradeoffs in spending allocations within a sector such as education. The pattern of spending in recent years, however, shows that implicit tradeoffs have in fact occurred. The government placed substantial priority on rebuilding the country's intelligentsia in the years following the genocide, as reflected in the very rapid changes in the distribution of spending. By 2001, higher education claimed an astonishing 37 percent of total current spending, up from between 12 and 15 percent in the 1980s. Correspondingly, the shares of both primary and secondary education fell significantly below their levels in the 1980s. Public spending on primary education averaged about 1.5 percent of GDP during 1999–2001, compared with an average of about 1.9 percent in the late 1980s.

The bias in funding against primary and secondary schooling effectively shifts part of the burden of education finance to households. Nearly 90 percent of all household spending on education goes for these levels. Parents pay school fees and parent-teacher association dues to help

defray schools' operational costs, and they are responsible for books and school supplies. These arrangements in primary schooling place Rwanda behind countries such as Tanzania and Uganda, where school fees have been abolished and textbooks are provided free of charge as part of an overall strategy for ensuring that all children are able to complete primary schooling and have access to basic learning materials. In secondary education, fees in the public and private sectors in Rwanda are comparably high, blurring the distinction between the two sectors. As expected, the country's current pattern of intrasector allocations shows up in a highly skewed structure of public spending per student by level. A student in higher education is 75 times as heavily subsidized as a child attending primary school—a result that makes Rwanda's structure of education finance one of the least equitable in the developing world.

Although investment in postprimary levels of education will continue to be an important policy aim, ways must also be found to rebalance the allocations to support primary education, particularly if the government is to achieve education for all by 2015 as part of its strategy for educational development and poverty reduction. As more students complete primary schooling, the pressures to expand secondary education—in particular, initially, the *tronc commun* cycle—will also mount, and resources would have to be found for expanding that level, as well. One potential source of savings is in the untargeted subsidies for secondary and higher education, such as spending on food. To give an idea of the scale of the opportunity cost, eliminating this item from higher education alone could mean a boost of nearly 10 percent in the current budget for primary schooling or could eliminate the burden of paying for textbooks and school supplies for 17,000 children.

A closer look at spending on bursaries in higher education might also be warranted to ensure that they are indeed targeted to students from poor families and for fields of study where public subsidization is justified (that is, where society benefits more than the individuals concerned). In secondary education, bursaries currently benefit orphaned children and should obviously continue as long as such students are present in the system.

To stretch the resources available for expanding primary and lower secondary education, ways of managing the cost of service delivery at these levels also need to be examined. The options in primary education include reallocating spending from management overhead to pedagogical materials and ensuring that teacher salary costs are kept at sustainable levels. In lower secondary education, policies to reduce unit costs, particularly through better management of staff utilization, will be critical to efforts to expand enrollments in a fiscally sustainable manner.

Conclusion

Education finance is at a crossroads in Rwanda today. Financing for the sector recovered quickly in the postgenocide years, but the pace of future increases is likely to slow because of the many competing claims on the public purse. In this context, a combination of policies will probably be needed to achieve an efficient and equitable allocation of spending. The policies chosen should be those that will help create, at all levels, but especially at the base of the education pyramid, effective learning environments with adequate overall funding and a good mix of school inputs. Although the appropriate balance among the various policy options is difficult to determine on the basis of financial considerations alone, the information presented in this chapter highlights potentially fruitful directions that can be explored as part of the process of policy development. It is especially important to increase funding for primary education, both by redirecting resources to that level and through better management of costs and allocations within the subsector.

CHAPTER 4

SOCIOECONOMIC DISPARITIES IN EDUCATION

Chapters 2 and 3 examined the performance of Rwanda's educational system in the aggregate, making no distinction between different groups. This chapter focuses on disparities in education in terms of enrollment, student flow, and the share of public spending appropriated by different groups in the country. In particular, it emphasizes differences across provinces, genders, urban and rural localities, and socioeconomic groups. Because so many Rwandan children are orphans, the chapter also compares educational access by orphans and nonorphans.

The good news is that social disparities at the base of the educational pyramid, at least as reflected in enrollment patterns, are narrower in Rwanda than in other low-income countries. The fact that even orphans are reasonably well represented among primary school children suggests that the country's safety net for vulnerable children is at least ensuring that most of these children have access to primary schooling. Yet the risk of nonparticipation remains elevated among the most vulnerable children, in particular those who have lost both parents and those who live away from their parents, probably as workers or as street children with no adult supervision. Broader efforts are also needed to ensure that all children not only start first grade but also reach the end of the cycle.

At postprimary levels, the disparities widen substantially, and rural children and those from poor families lag especially far behind. Differences between girls and boys in educational access and survival emerge only in higher education. Thanks to the government's foresight in setting up the Genocide Fund, orphans are relatively well represented in secondary education, the level that the fund currently targets. Although similar financial assistance to other disadvantaged youths is likely to improve their participation rates, these children's underrepresentation in postprimary education may stem from poor academic progress, as well. To the extent that this is true—and the case is especially convincing for explaining girls' lag behind boys in entering higher education—interventions to improve learning outcomes would seem particularly important.

Aside from redressing socioeconomic disparities in enrollment, there is also scope for improving the incidence of public spending on education. In Rwanda the bias in favor of higher education is

currently so strong that the 10 percent best educated in a cohort appropriates nearly three-quarters of the cumulative public spending on education received by the cohort. As a result, the Rwandan system is one of the least structurally equitable in Sub-Saharan Africa today.

Overview of Participation Rates

Table 4-1 documents the disparities in school participation.[1] At the primary level, the overall gross enrollment ratio (GER) rose from 74 percent in 1992 to 108 percent in 2000. The disparity between the lagging and leading provinces has, however, not become any narrower.[2] In 1992 gross enrollment ratios ranged from a low of 61 percent in Kibungo to 92 percent in Kigali Ville—a gap of 31 percentage points. In 2000 the gap was still 31 percentage points, with the ratios ranging from 97 percent in Butare to 128 percent in Kigali Ville. At the secondary level, the overall gross enrollment ratio fell from 20 percent in 1992 to 11 percent in 2000. The disparity between lagging and leading provinces widened from 29 percentage points (the difference between 9 percent in Byumba and 38 percent in Kigali Ville) in 1992 to 42 percentage points (6 percent in Gisenyi and 48 percent in Kigali Ville) in 2000. At the tertiary level, the overall gross enrollment ratio was only 1.3 percent in 2000. Kibuye and Ruhengeri Provinces had very few students in higher education, whereas the gross enrollment ratio was above the national average in Gitarama (1.7 percent) and Kigali Ville (2.5 percent). The advantage of certain provinces at the secondary and higher education levels may be partly attributable to students' moving to the localities where these levels of education are concentrated. The survey, however, included all members of a household as long as they had been present at some time in the last six months of the survey period, and so the disparities in participation rates cannot be wholly attributed to differences in the supply of services across provinces.

Differences in gross enrollment ratios across provinces reflect to some extent the disparities between urban and rural localities. These disparities may be seen by using as an index the ratio of the rural GER to the urban GER. At the primary level, in 1992 the ratio between GERs was about 0.79; in 2000 it was 0.85. In this sense, some progress has been made in narrowing the disparity between rural and urban localities.[3] At the secondary level, however, the index of rural GER to urban GER fell from 0.49 in 1992 to 0.18 in 2000, implying a significant widening of the gap between rural and urban participation rates.[4] At the tertiary level, where the data pertain only to 2000, the rural gross enrollment ratio was only 6 percent that of the urban localities.

Gender disparities are not particularly large, except at the tertiary level. At the primary level, GERs for girls and boys were practically the same in both 1992 and 2000. At the secondary level, there has in fact been a narrowing of the disparity between boys and girls; although the GER for girls was only 0.89 times that for boys in 1992, the ratio was about the same for both groups in 2000. Given the similarity of participation at the primary and secondary levels, it is somewhat surprising to observe a large gender gap in enrollments in higher education. In 2000 the GER for women in higher education was only 0.44 times that for men. In a later section we explore possible reasons for the sudden emergence of a gap at this level of education and the implications for policy development.

1. To maintain internal consistency within the table, the data are based on a single source for each year. The ratios for circa 2000 differ slightly from those reported in chapter 2, for reasons explained in the relevant table footnotes

2. As described earlier, the gross enrollment ratio is calculated by dividing the total number of students enrolled at a given level of education by the population in the official age range for that level. An alternative indicator of school participation is the net enrollment ratio, which is computed in the same way except that the numerator includes only students in the official age range for the corresponding level of education. We use the gross enrollment ratio here to provide an overview of the system's coverage.

3. In absolute terms, however, the disparity at the primary level has not narrowed by any substantial amount. In 1992 the gross enrollment ratio in urban localities was 19 percentage points higher than in rural localities. In 2000 the gap was just less than 19 percentage points.

4. In absolute terms, the disparity between rural and urban localities at the secondary level increased from 18 percentage points in 1992 to 24 percentage points in 2000.

TABLE 4-1: GROSS ENROLLMENT RATIOS BY PROVINCE, LOCALITY, GENDER, AND INCOME GROUP, RWANDA, 1992–2000

	Primary education		Secondary education		Higher education,
	1992	Circa 2000	1992	Circa 2000	circa 2000
Rwanda	**73.9**	**108.3**	**20.4**	**10.8**	**1.3**
By province					
Butare	69.6	96.9	24.2	9.7	0.8
Byumba	82.9	106.0	8.7	7.6	0.4
Cyangugu	67.6	103.7	22.1	9.6	0.5
Gikongoro	78.2	108.5	25.9	6.5	0.3
Gisenyi	77.2	113.1	15.7	5.9	0.1
Gitarama	67.7	118.9	20.3	9.1	1.7
Kibungo	60.9	110.9	19.6	15.8	0.6
Kibuye	71.2	111.4	10.0	9.6	0.0
Kigali Rural	67.7	106.5	19.6	12.9	0.3
Ruhengeri	85.3	117.6	18.9	6.9	0.0
Umutara	—	124.0	—	21.5	0.7
Kigali Ville	92.1	128.3	37.7	47.8	2.5
By type of locality					
Urban	90.6	124.0	36.0	29.9	8.3
Rural	71.3	105.3	17.6	5.5	0.5
Index (urban = 1.00)[a]	0.79	0.85	0.49	0.18	0.06
By gender					
Boys	74.3	109.5	21.7	10.8	1.8
Girls	73.5	107.1	19.3	10.8	0.8
Index (boys = 1.00)[a]	0.99	0.98	0.89	1.00	0.44
By income group[b]					
Richest 20%	89.3	127.6	39.1	29.4	6.1
Middle 40%	76.6	109.1	18.0	7.9	0.4
Poorest 40%	63.8	99.9	12.1	3.0	0.2
Index (richest 20% = 1.00)[a]	0.71	0.78	0.31	0.10	0.03

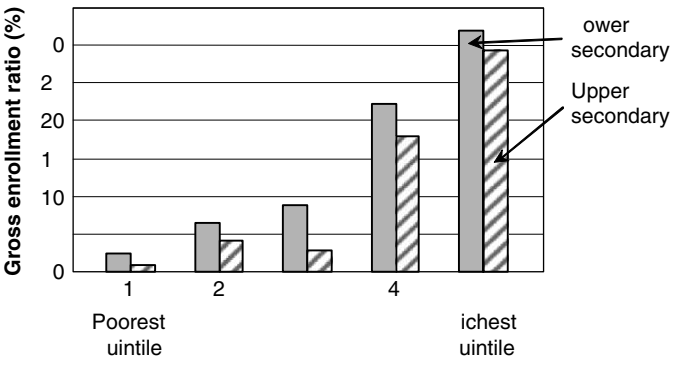
— Not available.

a. The indices in the locality and gender blocks are computed as the ratio between the gross enrollment ratio of the less favored group and that of the most favored group. In the income block, the index is the ratio between the poorest and richest groups.

b. The income groups are defined using principal components analysis of sample households' (1) ownership of or access to such assets or facilities as piped water, flush toilet, electricity, radio, bicycle, motorcycle, car, and refrigerator and (2) number of persons per room. The asset list is comparable between 1992 and 2000.

Source: For 1992–2000, authors' estimates based on the 1992 Rwanda Demographic and Health Survey (DHS); for primary and secondary education in 2000, 2000 Rwanda DHS; for data by province and data for higher education, 2001 Questionnaire unifié sur les indicateurs de développement (QUID) survey.

FIGURE 4-1: GROSS ENROLLMENT RATIOS IN LOWER AND UPPER SECONDARY EDUCATION BY INCOME QUINTILE, RWANDA, 2000



Source: Based on results reported in Kline (2002), using data from the 1999–2001 Household Living Conditions Survey.

A more striking disparity is that between income groups. At the primary level, the disparity—as measured by the index of the GER of the poorest 40 percent to that of the richest 20 percent—has narrowed over time: in 1992 the index was 0.71, but in 2000 it had risen to 0.78.[5] At the secondary level, the GER fell for all income groups, but the decline has been steeper for the lower income groups than for the richest 20 percent. As a result, the GER among the poorest 40 percent relative to that of the richest 20 percent fell from 0.31 in 1992 to only 0.10 in 2000.[6] Figure 4-1 shows that the disparity in GERs at the secondary level is in fact largest between the top two and the bottom three quintiles. The pattern is, moreover, similar for the two subcycles within secondary education.

At the tertiary level, the disparity between income groups is evident. In particular, the gross enrollment ratio of the poorest 40 percent was only 0.03 times that of the richest 20 percent. Coverage among the middle 40 percent was better but still lagged far behind that of the richest 20 percent. The pattern observed in secondary education, where participation is dominated by the top two quintiles, thus appears to have deteriorated, implying that access to higher education is even more narrowly confined to the most privileged segments of Rwandan society.

That the pattern of enrollment in higher education is biased in favor of the better-off is corroborated by the data in table 4-2, which compares the occupational backgrounds of the parents of students enrolled at the Université nationale du Rwanda (UNR) and the Kigali Institute of Education (KIE) with the background of the general adult population ages 35–65.[7] Among students with at least one living parent, the data show overrepresentation of students whose parents work as salaried workers (probably in the modern sector, where most salaried jobs are concentrated).

5. In absolute terms, however, the gap in gross enrollment ratios at the secondary level between the poorest 40 percent and the richest 20 percent remained relatively unchanged at around 26 percentage points in 1992 and 28 percentage points in 2000.

6. In 1992 the absolute gap in gross enrollment ratios between the richest 20 percent and the poorest 40 percent was 27 percentage points. The gross enrollment ratio has fallen by similar percentage points across income groups, and so the absolute gap between the top 20 percent and the poorest 40 percent remained relatively unchanged in 2000.

7. The UNR is the largest public higher education institution, accounting for about 56 percent of students in the public sector in 2000–01. The corresponding share at the KIE was 11 percent. Because of time constraints, similar data could not be collected from the other institutions in the system. The age range of 35–65 was chosen to correspond to the likely age range of the parents of university students.

TABLE 4-2: PERCENTAGE SHARE OF SALARIED WORKERS AMONG PARENTS OF STUDENTS AT TWO PUBLIC HIGHER EDUCATION INSTITUTIONS AND IN THE POPULATION OF RWANDA, 2000

	Fathers of students		Share of men ages 35–65 in the population	Mothers of students		Share of women ages 35–65 in the population
Occupation	UNR	KIE		UNR	KIE	
Salaried workers	32.4	26.5	16.4	11.6	16.0	5.4
Others[a]	67.6	73.5	83.6	88.4	84.0	94.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
Memorandum:						
Sample size	148	310	2,544	172	338	3,295

Note: UNR, Université national du Rwanda; KIE, Kigali Institute of Education. Students whose fathers are dead are excluded from the "Fathers of students" column; students whose mothers are dead are excluded from the "Mothers of students" column. The share of orphans is somewhat lower among university students than among secondary school students. See table 1-2 in chapter 1 for details on the incidence of orphanhood by level of education.

a. Includes farmers, traders, businesspersons, unpaid family workers, and those with unknown occupations.

Source: For the UNR and the KIE, random sampling of student files to which the authors of this study were given access in the context of this study; for the occupational distribution of the general population, 1999–2001 Household Living Conditions Survey.

Although 16 percent of Rwandan men ages 35–65 held a salaried job in the modern sector in 2000, the corresponding shares among the fathers of UNR and KIE students were, respectively, 2.0 and 1.6 times as large. A similar picture emerges for mothers of the students at the two institutions: the share of mothers who worked as salaried employees in the modern sector was 12 percent for UNR and 16 percent for KIE students, compared with the share of 5.4 percent among women ages 35–65 in the population as a whole.

Educational Participation Rates among Orphans

One of the most devastating legacies of Rwanda's 1994 genocide is the extremely high prevalence of orphanhood. Given the size of the orphan population (see chapter 1), it is important to document the extent to which orphanhood has compromised the schooling of children.

Primary Education

As expected, the chances of being in school are higher among children with both parents alive than among those who have lost at least one parent—almost 76 percent, compared with 72 percent (table 4-3). The data suggest that the gap between orphans and nonorphans is driven largely by the shortfall in participation for orphaned girls. The participation rate for orphaned boys was less than 1 percentage point lower than for boys with both parents alive, but the corresponding shortfall was more than 5 percentage points for girls.

Closer examination of the data suggests that children who had lost their mothers, even if they had not lost their fathers, were most at risk of not attending school. Their participation rate was 71 percent for boys and 64 percent for girls. For children who had lost only their fathers, the rates were 77 percent for boys and 72 percent for girls.

Even when both parents were alive, children who lived away from their parents were less likely to attend school than their peers. Their lower participation rate is consistent with the possibility

TABLE 4-3: PERCENTAGE OF CHILDREN AGES 7–12 ENROLLED IN PRIMARY SCHOOL BY ORPHANHOOD STATUS, RWANDA, 1998–99

Status of child	Boys	Girls	Both sexes
Both parents alive	**75.3**	**75.6**	**75.5**
Living with both parents	77	77	77
Living with only one parent or neither	69	73	71
At least one parent dead	**74.6**	**70.4**	**72.4**
Mother dead; father alive	71	64	67
Father dead; mother alive	77	72	74
Both parents dead	70	68	69
Whole sample	**75.0**	**73.5**	**74.3**
Children not living with biological parents	**69.8**	**68.1**	**68.8**
Memorandum:			
Sample size	1,466	1,548	3,014

Source: Authors' estimates based on the 2000 Rwanda Multiple Indicator Cluster Survey (MICS). See appendix table A4-1 for additional information.

that some of them worked at a job and could not find the time to attend school or were simply surviving as street children with little or no adult encouragement to attend school.

The overall picture that emerges is that although most children in Rwanda today attend primary school, there remain pockets of the population who do not. Orphans, especially those who have lost their mothers and those living apart from their biological parents, account for most of the out-of-school population.

Secondary and Higher Education

Table 4-4 provides additional evidence that orphaned children are more vulnerable to nonparticipation than nonorphans. To see this, we compare the share of orphans in the population with the shares of orphans in primary, secondary, and higher education. The data on orphans' shares of enrollments in primary and secondary education are based on a census of the children enrolled in schools associated with the Conseil protestant du Rwanda (CPR), an umbrella organization of schools run by various churches that in 2000–01 served about 20 percent of primary school children and some 16 percent of secondary school students nationwide. For higher education, the data are based on a sample of student records maintained by two of the country's public institutions.

Although the data are patchy, they reveal some interesting patterns. First, they confirm that primary school participation rates tend to be lower among orphans: the share in the population of children ages 7–12 who had lost at least one parent was 38 percent in 2000, but the corresponding share among children enrolled in CPR primary schools was 31 percent.

At the secondary level, the pattern is reversed, with the share of orphans rising to 41 percent instead of falling, as might have been expected. The reason is that many of these children have been specifically targeted for assistance under Rwanda's Genocide Fund.

At the tertiary level, and assuming that orphanhood rates among youths are similar to the rates for children ages 7–12, orphans appear to be underrepresented in the two institutions sampled. Overall, orphans accounted for 32 percent of total enrollment in the UNR and 27 percent in the KIE. These proportions are lower than the share of orphans among students in secondary school.

TABLE 4-4: PREVALENCE OF ORPHANHOOD AMONG PRIMARY, SECONDARY, AND HIGHER EDUCATION STUDENTS, RWANDA, CIRCA 2000

Population group	% with one parent dead			% with both parents dead	%with one or both parents dead	Sample size
	Mother dead	Father dead	Total, one parent dead			
Children ages 7–12, 2000[a]	4.6	25.8	30.4	7.1	37.6	3,426
Schools associated with the Conseil protestant du Rwanda, 2001[b]						
Primary pupils	—	—	22.2	9.1	31.3	497[b]
Secondary students	—	—	25.2	15.5	40.7	68[b]
Higher education students, 2001[c]						
Université Nationale du Rwanda (UNR)	3.9	15.9	19.4	13.0	32.4	207
Kigali Institute of Education (KIE)	4.5	11.6	16.1	10.6	26.6	398

—Not available.
a. Based on the 2000 Rwanda Multiple Indicator Cluster Survey (MICS).
b. The Conseil protestant du Rwanda is an umbrella organization consisting of schools run by various church organizations. In 2001 it took a special census of the 497 primary and 68 secondary schools belonging to it. One purpose was to ascertain the extent of orphanhood among the 292,258 primary and 26,580 secondary students enrolled in these schools. The results were made available in aggregate form to the authors of this study.
c. Based on information supplied to the authors by officials at the two institutions in the context of this study for a random sample of 207 students at the UNR and 398 students at the KIE.
Source: Authors' estimates based on sources given in the notes above.

The lower participation rates among orphans are consistent with the increased opportunity cost of education as students progress up the educational ladder.

Closer examination of the data for higher education reveals an interesting difference between youths who have lost one parent and those who have lost both. Although participation rates among the latter are lower, the drop-off from the corresponding shares in secondary education appears to be less steep among the double orphans. This pattern is consistent with differences in the availability of student aid that gives more support to double orphans. Although the more detailed data necessary for exploring this issue in greater detail are lacking, it seems safe to conclude that although current policies are already helping orphans gain access to higher education, they could probably be fine-tuned to ensure that disadvantaged youths who have lost "only" one parent instead of both are not overlooked.

Disparities in Student Flow Patterns

Apart from the disparities in enrollment and participation rates documented above, it is useful to examine differences in student flow across socioeconomic groups. This information is relevant for policy development because it helps identify the locus of the observed disparities in enrollment. Because of limitations in the data, we examine student flow only in primary schooling.

TABLE 4-5: SELECTED STUDENT FLOW INDICATORS BY GENDER, LOCALITY, AND INCOME GROUP, RWANDA, CIRCA 2000

	% of cohort ever entering grade 1[a]		% of first grade entrants surviving to grade 6[b]		% of last year's sixth-graders still enrolled in current year[c]	
Group	**%**	**Index**	**%**	**Index**	**%**	**Index**
By gender						
Boys	86	1.00	74	1.00	68	1.00
Girls	88	1.02	70	0.95	73	1.07
By locality						
Urban	93	1.00	91	1.00	97	1.00
Rural	87	0.93	70	0.77	64	0.66
By income[c]						
Richest 20%	95	1.00	93	1.00	89	1.00
Middle 40%	89	0.93	68	0.74	65	0.73
Poorest 40%	83	0.87	64	0.69	52	0.58

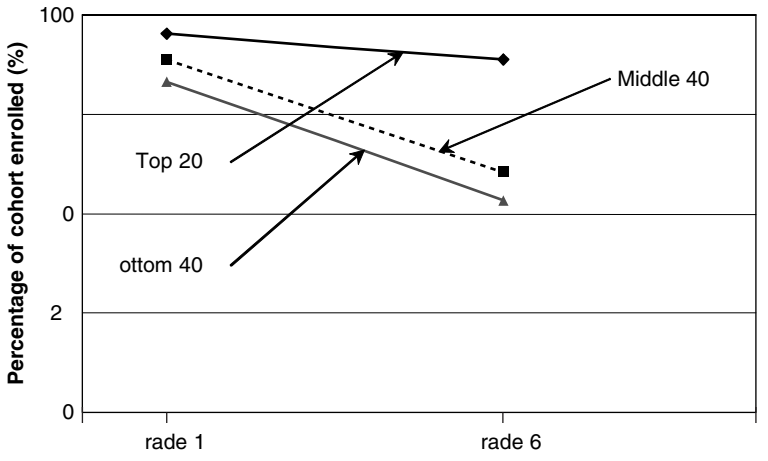
a. Computed as the average of the percentages of children ages 10–13 who have ever enrolled in school.
b. Computed by multiplying the grade-to-grade progression rates after taking into account grade-specific repetition rates.
c. Defined in the same way as in table 4-1. See note b in that table.
Source: Authors' calculations based on the 1999–2001 Household Living Conditions Survey.

Differences by Gender, Locality, and Income

Table 4-5 shows three indicators of student flow: the percentage of an age cohort ever entering grade 1, the percentage of entrants who reach the end of the primary cycle, and the share of the previous year's sixth-graders who were still enrolled in the current school year, either to repeat the grade or to continue to secondary school. Consistent with the data presented earlier, the differences between boys and girls are modest: entry rates are comparable, and girls are at a slight advantage in reaching the end of the cycle and remaining enrolled after grade 6. The differences between urban and rural populations widen progressively during a child's schooling career: the entry rate to grade 1 among rural children is 93 percent as high as that for urban children, but the survival rate to grade 6 is only 77 percent as high, and the continuation rate at the end of grade 6 is only 66 percent as high.

Differences between children in rural and urban localities reflect, to some extent, differences among income groups. Only 83 percent of children in the poorest 40 percent of households enter grade 1, but 95 percent of those in the richest 20 percent do. The gap widens as children move to higher grades. Only 64 percent of children in the poorest 40 percent of households survive to grade 6, compared with 93 percent among those in the richest 20 percent. Only 52 percent of children in the poorest 40 percent of households remain enrolled after attending grade 6 the previous year, but the share is 89 percent among children in the richest 20 percent. Figure 4-2 clearly illustrates that while children from the poorer households lag somewhat behind richer children in starting grade 1, the gap becomes much wider by the end of the primary cycle because of differential rates of dropping out within the cycle. Further selection at the end of the primary cycle reinforces the disparities, producing the gaps in secondary school participation documented earlier in the chapter.

FIGURE 4-2: PRIMARY SCHOOL ENROLLMENT RATES IN A COHORT OF CHILDREN ACROSS INCOME GROUPS, RWANDA, 2000



Note: The term cohort here refers to a composite population whose schooling career reflects the pattern of promotion, grade repetition, and dropout over two school years in a cross-sectional sample of children.
Source: Based on data in table 4-5.

Regression Estimates of the Correlates of Student Flow Patterns

Given the importance of locality, income, and orphanhood status in determining children's schooling careers, it is useful to examine the relative influence of these factors using regression analysis.[8] For this purpose, we define four individual-level indicators of student flow among children ages 7–12: (a) whether a child who was not yet in school the previous year has entered grade 1 in the current school year; and (among those already enrolled last year) whether the child, in the current year, has (b) advanced a grade, (c) remained in the same grade, or (d) dropped out.[9]

The regression estimates are reported in appendix table A4-3, and the results based on them are shown in table 4-6. These results are expressed in terms of the probability of a child's being in one of the four schooling statuses defined above. For example, among children ages 7–12 who were not in school in 1999, the probability of entering grade 1 in 2000 is 0.52 for the sample as a whole. It is 0.13 points lower for children who have lost both parents relative to children with both parents alive, after controlling for gender of the child, urban-rural residence, and income group. The difference for this estimate is statistically significant at the 5 percent confidence level or better. None of the other estimates is statistically different from zero, suggesting that the single most important predictor of nonentry to grade 1 is whether the child has lost both parents. Double orphans are handicapped right at the outset of their schooling career, in that many of them do not even get started.

For those who were already enrolled in the previous year, the probability of advancing a grade is greater by 0.12 points among children whose mothers have died than for children with

8. The advantage of this approach is that it allows us to evaluate the impact of a single factor while controlling for differences in other dimensions.

9. Use of these new indicators of student flow is necessitated by the reliance in this analysis on individual-level data, whereas the flow indicators computed earlier are estimates for population cohorts based on cross-sectional patterns. See also appendix table A4-2 for tabular information on the differences between orphans and nonorphans in the indicators of student flow considered here.

TABLE 4-6: REGRESSION-PREDICTED INDICATORS OF SCHOOL PROGRESSION DURING TWO CONSECUTIVE YEARS IN A COHORT OF CHILDREN WHO WERE AGES 7–12 IN 1998, BY POPULATION GROUP, RWANDA, 1998–2000

			Probability of being in the indicated schooling status in 1999–2000[b]			
				Among those already enrolled in 1998–99		
Reference group	Population group	Sample mean[a]	New entrant to grade 1	Advanced a grade	Repeating same grade	Dropped out
	Whole sample		0.52	0.64	0.33	0.03
Girls	Boys	0.49	0.05	0.00	0.00	0.00
Both parents alive	Both parents dead	0.08	–0.13*	0.05	–0.09*	0.04*
	Mother dead; father alive	0.05	–0.13	0.12*	–0.12*	–0.01
	Father dead; mother alive	0.27	–0.01	0.03	–0.02	–0.01
	Living with only one parent or neither[c]	0.14	–0.07	0.03	–0.03	0.00
Urban resident	Rural resident	0.81	–0.03	–0.08*	0.07*	0.01
Poorest 40% in income	Top 20%	0.21	0.02	0.06*	–0.04	–0.02*
	Middle 40%	0.42	0.03	0.01	0.01	–0.01

* Statistically significant at the 5 percent confidence level or better.

a. Refers to the sample means for those not yet enrolled in 1998–99 among children who were ages 7–12 in 1998. The means are almost identical in the population already enrolled in that year and are therefore not shown separately.

b. The figures for the "Whole sample" row refer to the overall probability of being in the indicated status. The other figures refer to the difference in probability between the indicated population group and the corresponding reference group.

c. Among those with both parents alive.

Source: Based on regression estimates in appendix table A4-3.

both parents still alive. For the other categories of already-enrolled children, the probability of progressing to the next grade also exceeds that in the reference group, but the difference is not statistically significant. For children who do not advance a grade, the alternatives are to repeat the grade or to drop out. Relative to nonorphans, children who have lost both parents are less likely to repeat and more likely to drop out, whereas among those who have lost their mothers but not their fathers, the probability of repeating is lower (a corollary of the fact that they are more likely to advance a grade) and that of dropping out is about the same. For the remaining children, the estimates are not statistically significant relative to nonorphans. Taken as a whole, the results are consistent with the expectation that when given a chance to go to school, children in highly vulnerable circumstances—especially those who have lost their mothers or both parents—are likely to be more motivated to succeed than other children. They overcome the enormous odds against them and manage to draw even with or surpass nonorphans in their progression between grades.

But the prospects are unforgiving for the most vulnerable children—the double orphans. Those in this group who fail to advance are more likely to leave the system than to return for a second try the following year.

Controlling for orphanhood status, the regression results confirm the patterns found in the cross-tabulations presented earlier. Boys and girls are equally likely to advance a grade, repeat, or drop out. By contrast, locality does make a statistically significant difference, holding back rural children by 0.08 points in terms of the probability of advancing a grade and elevating their chances of repetition by 0.07 points. Household income also makes a difference, but only between children from the richest 20 percent of households and the rest of the population.[10] Compared with those in the bottom 40 percent, the chances for children from the most privileged homes of advancing a grade are higher by 0.06 points, and the probability of dropping out is lower by 0.02 points. In relation to the overall probabilities of advancement, repetition, and dropping out shown in the table, these gaps are quite large.

Distribution of Public Spending on Education

Disparities in enrollment and student flow have implications for the distribution of public spending on education because only those who attend school benefit. We examine the issue from two complementary perspectives. The first captures the incidence of spending associated with the system's structural biases; the second measures the incidence of spending associated with cross-sectional differences in school participation across income groups.

Spending Pattern Associated with Structural Biases

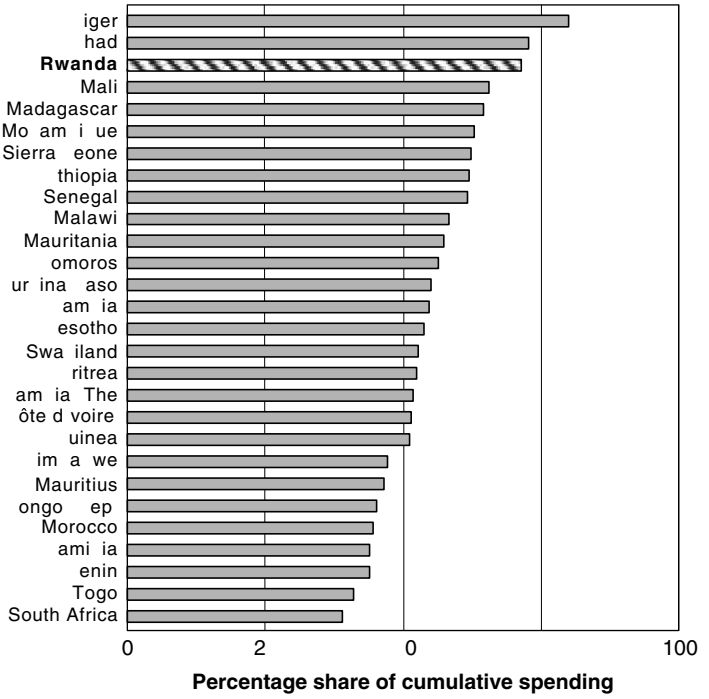
For a given cohort of children, it is possible to determine the number of children who do not go to school at all and the number who will terminate their schooling at each level of education.[11] Children with no schooling receive no benefit from public spending on education, whereas those who attain higher education accumulate both the spending associated with higher education itself and that associated with the levels they have already completed.[12] The distribution of spending on education in a cohort thus depends on the structure of enrollments, as well as the distribution of spending across levels of education. The degree of inequity in the distribution can be portrayed using a Lorenz curve, which shows the cumulative shares of the cohort by educational attainment on one axis and the shares of resources benefiting each group on the other axis. The degree of

10. The income effect is likely to be confounded by our inability in the regression analysis to control for systematic differences in the characteristics of the adoptive families of orphaned children and those of other families.

11. To illustrate, suppose the gross enrollment ratio for a country is 80 percent in primary education, 30 percent in secondary education, and 10 percent in higher education. In a cohort of children passing through the system, the distribution of eventual school attainment would be as follows: 10 percent would have attained higher education; 20 percent (= 30 – 10), secondary education; and 50 percent (= 80 – 30), primary education. The remaining 20 percent (= 100 – 80) would have had no schooling. More refined methods can be used to estimate the desired distribution (for example, using grade-by-grade survival patterns), but sensitivity tests suggest that calculations based on gross enrollment ratios produce reasonably robust estimates for our purpose here. For countries such as Rwanda, where the gross enrollment ratio for primary education exceeds 100 percent, the calculations cap the GER at 100 percent.

12. Suppose, for example, that the distribution of current spending is such that primary education receives 55 percent, secondary education receives 30 percent, and higher education receives the remaining 15 percent. The cumulative spending would be 100 units (= 55 + 30 + 15) for those attaining higher education, 85 units (= 55 + 30) for those attaining secondary education, 55 units for those attaining primary education, and zero for those who did not go to school. The distribution of cumulative spending in a cohort passing through the education system would thus be 23 percent [= 55/(55 + 85 + 100)] for those attaining primary education, 35 percent [= 85/(55 + 85 + 100)] for those attaining secondary education, and 42 percent [= 100/(55 + 85 + 100)] for those attaining higher education.

FIGURE 4-3: SHARE OF CUMULATIVE PUBLIC SPENDING ON EDUCATION BENEFITING THE 10 PERCENT BEST EDUCATED IN A GENERATION, RWANDA AND OTHER SUB-SAHARAN AFRICAN COUNTRIES, CIRCA 1998



Note: Data for Rwanda refer to 2001.

Source: BREDA, World Bank, and UIS (2002), supplemented by estimates for Rwanda prepared by the authors using the same computational methods. See the text for additional information.

inequity can be quantified by calculating the corresponding Gini coefficient.[13] For our purpose, we use an even simpler summary statistic: the share of the resources benefiting the 10 percent best educated in a cohort.[14]

The results for Rwanda appear in figure 4-3, along with estimates for a large number of low-income countries for which appropriate data from around 1998 are available. Although cross-country comparisons should be drawn with caution because of differences in data quality and

13. If we continue to use the same numerical examples as in the preceding two notes, the distribution of the educational attainment of the cohort and the corresponding shares of cumulative public spending on education for the cohort would be as follows: 20 percent with no schooling and with zero share of the cumulative resources; 50 percent attaining primary schooling and receiving 23 percent of the resources; 20 percent attaining secondary education and receiving 35 percent of the resources; and 10 percent attaining higher education and receiving 42 percent of the resources. The Gini coefficient associated with this distribution is 0.57 on a scale that ranges by definition from 0 (each person obtains an exactly proportionate share of resources) to 1.0 (one person gets all the resources). See appendix figure A4-1 for a graphic representation of this hypothetical example.

14. In cases in which the share of the cohort attaining higher education is less than 10 percent, the best educated 10 percent would include some who attained secondary education. The share of resources benefiting this group would simply be the sum of the share of those who attained higher education and the prorated share of those who attained secondary education. In cases in which the share of the cohort attaining higher education exceeded 10 percent, the share of resources benefiting the 10 percent best educated would simply be the prorated share of the resources benefiting the group that attained higher education.

coverage and in the structure of the systems, the results support two conclusions. First, in all countries the best educated always receive more than their population share of public spending on education; this pattern is to be expected, given that governments typically subsidize all levels of education. Second, very large differences exist across countries in the degree of bias in favor of the better educated. The share of cumulative resources benefiting the 10 percent best educated in a cohort ranges from about 40 percent in South Africa to about 80 percent in Niger. Rwanda is located near the top end of the spectrum, just behind Niger and Chad among the 28 countries included in the figure. Its position is consistent with what one would expect in a system in which higher education enrolls less than 2 percent of the population in the relevant age group and claims nearly 40 percent of the government's total current spending on education. To anticipate a point made later in this section, note that Rwanda's position is only slightly worse than that of Madagascar, a country with comparable per capita GDP. The implication is that the enrollment structure and public subsidization in these countries are highly comparable in their biases in favor of the best educated in a cohort.[15]

Spending Pattern Associated with Social Selectivity in Education

A second perspective on the distribution of public spending on education is the extent to which it favors the wealthier groups in society. Benefit-incidence analysis is a common tool for documenting this aspect of inequity in spending patterns. The approach involves using cross-sectional data on school participation patterns by income group and information on public spending per student to calculate the share of resources benefiting households in each income group.[16] As we have seen earlier, wealthier groups in Rwanda become increasingly overrepresented as the level of education rises—a pattern found in practically all countries. Benefit-incidence analysis typically shows that although public spending on primary education may benefit lower-income groups more than wealthier groups, the pattern is often not sustained in secondary education and is usually completely reversed in higher education. The aggregate impact, taking into account all levels of education, usually shows the wealthier groups receiving more than their proportionate share of public spending on education. The real issue is one of degree.

Table 4-7 summarizes the results of benefit-incidence analysis for Rwanda in 2000, along with those for nine other countries in Sub-Saharan Africa for which similar calculations have been made. The analysis shows that the poorest 20 percent of households in Rwanda accounted for 15 percent of public spending on primary and secondary education, while the richest 20 percent of the population received 28 percent. Judging by the relative sizes of these shares, Rwanda stands somewhere in the middle among the Sub-Saharan African countries shown in the table. In other words, the country's public sector spending on education is neither as equitable across income groups as it could be, nor is it as inequitable as in some other countries.

A comparison between the results for Rwanda and those for Madagascar is particularly interesting in light of the findings highlighted earlier regarding the similarity of the structural biases in both systems in favor of the best educated in a cohort. Yet the data in table 4-7 indicate that Rwanda has a more equitable distribution of educational spending across income groups than does Madagascar: in Rwanda the richest quintile appropriates a share nearly twice as large as the share received by the poorest quintile, but in Madagascar the richest receive more than five times as much as the poorest. The more favorable results in Rwanda are consistent with the country's smaller gaps in educational access across income groups. For example, among first-graders from the poorest 40 percent of households, 69 percent reach the end of the primary cycle in Rwanda,

15. In 1998 the gross enrollment ratio in Madagascar was 107 percent in primary education, 16 percent in secondary education, and 2 percent in higher education; the corresponding ratios in Rwanda in 2000 were 107, 12, and 1.4 percent. The distribution of current spending on education in Madagascar in 1998 was as follows: 51 percent for primary education, 33 percent for secondary education, and 16 percent for higher education. The corresponding shares in Rwanda in 2001 were 45, 18, and 37 percent.

16. For further details on the method of calculation, see Demery (2000).

TABLE 4-7: SHARE OF PUBLIC SPENDING ON EDUCATION BENEFITING THE POOREST AND RICHEST POPULATION QUINTILES, RWANDA, 2000, AND SELECTED SUB-SAHARAN AFRICAN COUNTRIES, 1990S

Country	Year of survey	Poorest quintile (%)	Richest quintile (%)	Richest quintile's share as multiple of poorest quintile's share
South Africa	1993	21.1	23.4	1.1
Kenya	1992–93	16.7	20.7	1.2
Ghana	1992	16.4	20.8	1.3
Malawi	1994–95	16.0	25.0	1.6
Rwanda[a]	**2000**	**15.0**	**28.0**	**1.9**
Uganda	1992	13.0	32.0	2.5
Côte d'Ivoire	1995	13.5	34.8	2.6
Tanzania	1993	13.0	38.0	2.9
Guinea[a]	1994	8.5	26.9	3.2
Madagascar[a]	1997	7.0	36.0	5.1

a. Data refer to the distribution of spending on primary and secondary education only.

Source: For Rwanda, Kline (2002), based on the 2000 Household Living Conditions Survey; for Madagascar, Madagascar (2000); for other countries, World Bank EdStats database based on various household surveys on living standards.

compared with only 9 percent in Madagascar.[17] These results imply that in Rwanda it would appear especially important to reduce the education system's structural biases favoring the best educated, even as efforts are made to close the socioeconomic gaps in educational access.

Policy Implications

In developing appropriate policies to address socioeconomic disparities in education, answers are needed to at least three questions: Who are the disadvantaged? Where in the education system might the government intervene to narrow the disparities? And what would be the most effective interventions? The data presented in this chapter provide some insights on these questions, especially with regard to the first two.

Narrowing the Disparities in Primary Education

The gaps across socioeconomic groups in Rwanda are not as wide as those observed in other low-income countries. Girls are as likely as boys to be in school; rural children are 85 percent as likely to attend as their urban counterparts; and children in the poorest 40 percent of households are 78 percent as likely to attend as those in the top 20 percent of households. Except among double orphans, entry rates to grade 1 are generally high, so the pattern of underrepresentation stems mainly from differences in survival rates to the end of the cycle. The populations falling farthest behind in this regard include double orphans, children in rural areas, and children from the poorest 40 percent of households. Double orphans—arguably the country's most vulnerable children—are easily identifiable, and systematic efforts can and must be made to improve their life chances through better access to primary education. Providing financial assistance to such children is one possibility, but the Genocide Fund—the program enacted by law in 1998 to assist

17. For the pattern in Rwanda, see table 4-5; for that in Madagascar, see World Bank (2002a).

children orphaned by the genocide—currently benefits only students in secondary and higher education. The government also provides assistance to support the education of vulnerable children through the Ministère de l'administration local et des affaires sociales (MINALOC), but the amount of funding is relatively modest—about 20 percent of the resources available through the Genocide Fund.

Financial assistance may also be what is needed to boost survival rates among children in the other lagging groups, particularly those from poor families. In rural areas, raising survival rates may require additional interventions on the supply side, such as ensuring that all primary schools offer the full six grades of instruction in the primary cycle, reducing the distances that children have to travel to reach their schools, and, most important, improving teaching and learning to reduce grade repetition and hence dropout.[18] It was not possible to evaluate the relative impact of these promising options in the context of this study, but they clearly need to be explored, through pilot projects and other means, as the next step in policy development.

Narrowing the Disparities in Secondary and Higher Education

As we have seen, socioeconomic disparities begin to widen substantially at the postprimary levels. For girls, the disadvantage in access emerges only in higher education, but for children in rural areas and from poor households, the barriers to access are already obvious in the first cycle of secondary education. The disparities across provinces also begin to appear in secondary education, with lags for Gisenyi and Gikongoro, in particular. Orphans are somewhat less likely than nonorphans to participate in higher education but are at least as likely as nonorphans to enroll in secondary education—the level that currently benefits the most from the Genocide Fund. Targeting financial aid to assist the most vulnerable youths thus appears to be working. Additional interventions would be needed to improve educational access in rural areas, in certain provinces, and among the poorest segments of Rwandan society.

Where in the education system might interventions be made to narrow the observed disparities in postprimary education, and what interventions would be most effective? Although a full answer is beyond the scope of this study, it is instructive to consider the specific situation of females' lagging participation in higher education.

Table 4-8 shows the scores of males and females in the national examinations administered at the end of the primary, *tronc commun* (lower secondary), and upper secondary cycles and the scores of applicants to public institutions of higher education. A startling pattern is that girls consistently perform worse than boys, particularly in the primary and *tronc commun* cycles. Even though girls continue to be as well represented as boys up to the upper secondary cycle, their persistently inferior scores take their toll in the competition for the highly coveted places in public higher education. Girls currently account for only about a quarter of the students in higher educational institutions in the public sector, even though they make up half the students in the final year of upper secondary education. These results imply that policies to improve women's representation in higher education must do more than simply reserve a quota for them. Understanding why girls' academic performance lags behind that of boys, beginning in the primary grades, is a critical first step toward developing sound policies to improve in a meaningful way their access at the top end of the educational ladder.

Although data that might illuminate the reasons for the lagging participation among other population groups are lacking, poor academic performance is a likely root cause of their problems, as well. Accordingly, enhancing learning outcomes among the affected populations—rural children and those from poor families—is a task that cannot be ignored in developing a strategy to diminish socioeconomic disparities in postprimary education.

18. About 14 percent of Rwanda's primary schools currently do not offer all six grades of instruction in the primary cycle (see table 2-10). About half of all rural households are more than 30 minutes away from a primary school (see table 5-4 in chapter 5).

TABLE 4-8: GENDER DIFFERENCES IN PERFORMANCE ON NATIONAL END-OF-CYCLE EXAMINATIONS, RWANDA, CIRCA 2002

	Female	Male
Primary through secondary[a]		
Primary (% exceeding cutoff mark for promotion to next level)	17.8	28.5
Tronc commun (% exceeding cutoff mark for promotion to next level)	29.3	55.6
Upper secondary (% exceeding pass mark for graduation)	62.8	76.0
Higher education		
GPA of applicants to public institutions[b]	3.4	3.6
GPA, by institution named by applicant as first choice for placement		
Université nationale du Rwanda (UNR)	3.5	3.7
Kigali Institute of Science, Technology and Management (KIST)	3.2	3.6
Kigali Institute of Education (KIE)	3.2	3.5
Kigali Health Institute (KHI)	3.6	3.9
Institut supérieur d'agronomie et d'élevage (ISAE)	2.9	3.8

a. Data refer to the results of those who took the examination in 2002.

b. GPA refers to the grade point average achieved by the students on six national examinations taken at the end of the upper secondary cycle. The scores refer to intake to higher education in 2001–02.

Source: For the data on primary and secondary education, National Examination Council of Rwanda; see also appendix table A4-4. Data on higher education were supplied to the authors by officials at individual institutions.

Reducing Overall Inequities in Spending Allocations

The socioeconomic disparities in enrollment across income groups inevitably show up in the results of benefit-incidence analysis. In Rwanda the richest 20 percent of households garners nearly twice as large a share of public spending on education as the poorest 20 percent. Although there is obviously still scope for increasing the benefit to the poor, cross-country comparison suggests that Rwanda does not have the most inequitable distribution of spending across income groups among the countries sampled. Far more inequitable is the country's overall structure of spending: primary education receives only 45 percent of the government's current spending on education, whereas higher education gets nearly 40 percent. Redirecting spending in favor of primary education would go a long way toward reducing the current bias in the system in favor of those who manage to climb to the top of the educational ladder. To the extent that the task involves supply-side changes in spending policy, it should be possible for the government to act quickly and effectively. Appropriate policies on student finance and cost management in higher education are particularly critical in this regard, and these are discussed in greater detail in chapter 7.

Conclusion

Educational access in Rwanda is relatively equitable in primary education, but disparities across population groups widen dramatically at postprimary levels. Orphans are among the most vulnerable population groups, and the country has admirably institutionalized financial assistance to them through the Genocide Fund. More can be done, however, to reach pockets of children still at risk of lagging behind, particularly double orphans, children in rural areas, and children from the poorest families. Aside from these priorities, success in improving overall equity in the system will require correction of the current imbalance in public spending that so obviously favors higher education at the expense of primary education.

CHAPTER 5

SERVICE DELIVERY IN PRIMARY EDUCATION

In Rwanda, as in most other low-income countries, primary education enrolls the largest number of students and absorbs a major share of public spending on education. Because of its central role in basic human capital formation, the performance of the primary sector attracts keen attention from policymakers, as well as the public. This chapter examines the availability of services in primary education, how well existing resources are deployed to provide services, how efficiently the resources are transformed into learning outcomes, the scope for improvement, and the implications for policy development. Although data constraints limit exploration of these topics, the available information presented in this chapter nonetheless helps shed light on the nature of some of the emerging challenges.

Overview of the Supply of Services

We begin by describing a few salient features of the country's network of primary schools. In this chapter, the school is the unit of analysis.[1]

Supply Infrastructure

Rwanda currently has slightly more than 2,000 primary schools, serving some 1.5 million children (see table 5-1). The private sector accounts for only 1.5 percent of the schools and 0.7 percent of the enrollments. The public sector consists of two types of school: state and *libre subsidié*. State schools are funded and managed directly by the government; *libre subsidié* schools are funded by the government but are run by nongovernmental organizations under two main umbrella groups: the Secrétariat nationale de l'enseignement catholique (SNEC) and the Conseil protestant du Rwanda (CPR). More than 71 percent of all primary schools fall into the *libre subsidié* category, and about two-thirds of these are under SNEC management.

1. Unless otherwise indicated, the averages presented in the tables in this chapter refer to unweighted rather than weighted values.

TABLE 5-1: PERCENTAGE DISTRIBUTION OF PRIMARY SCHOOLS AND PUPILS BY SECTOR, RWANDA, 2000

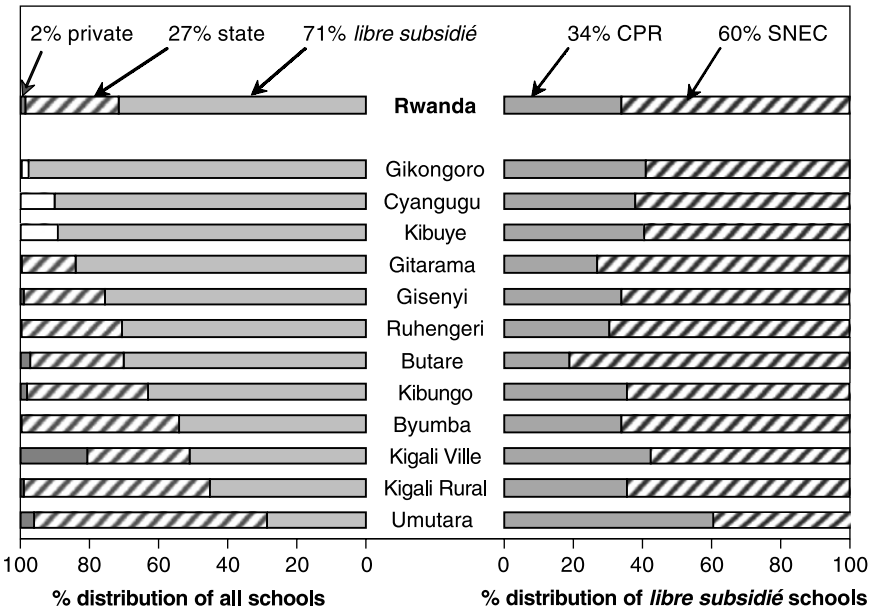
	Public sector[a]			
	State	*Libre subsidié*	Private sector	Overall[b]
Schools	27.1	71.4	1.5	100 (2,093)
Pupils	28.0	69.4	0.7	100 (1,475,572)

a. The public sector consists of schools whose staff salaries and other operational costs are paid by the government. State schools are run directly by the government; *libre subsidié* schools are mostly managed by religious organizations. The percentage distribution is based on 2,043 schools for which information on sector affiliation is available.

b. Numbers in parentheses refer to total numbers of schools and pupils.

Source: Ministry of Education 1999–2000 census of primary schools.

FIGURE 5-1: INSTITUTIONAL COMPOSITION OF PRIMARY SCHOOLS BY PROVINCE, RWANDA, 2002



Source: Ministry of Education 1999–2000 census of primary schools supplemented by data from the Conseil protestant du Rwanda (CPR) and the Sécretariat nationale de l'enseignement catholique (SNEC).

There is wide diversity across provinces in the institutional composition of the supply infrastructure (see figure 5-1). Almost all of the country's private schools are located in Kigali Ville; Cyangugu and Kibuye have no private schools. As a result, private schools account for nearly 20 percent of the schools in Kigali Ville, compared with the national average of less than 1.5 percent. Provinces also vary in the relative shares of state and *libre subsidié* schools. In Gikongoro state

TABLE 5-2: CHARACTERISTICS OF STATE, *LIBRE SUBSIDIÉ*, AND PRIVATE PRIMARY SCHOOLS, RWANDA, 2000

	Public sector			
	State	***Libre subsidié***	**Private**	**All schools**
Average number of pupils per school	720	678	342	684
Schools with classrooms in poor condition (%)	47.9	54.8	19.9	52.3
Schools with teachers teaching two shifts (%)[a]				
Grade 1	94.2	96.0	24.1	94.5
Grade 2	92.8	94.9	24.1	93.4
Grade 3	84.4	88.1	21.4	86.2
Pupil-teacher ratio[b]	59.7	56.9	33.3	57.3
	(56.0)	(55.3)	(32.8)	(55.2)
Schools with nonteaching staff (%)[c]	44.5	41.0	16.1	41.6
Ratio of pupils to nonteaching staffd	725.7	710.5	708.6	714.8

a. Double shifts are not used after grade 3.
b. Figures in parentheses refer to weighted averages.
c. Counting only school heads without teaching duties, and school secretaries.
d. Refers to unweighted ratios in schools with administrative staff.
Source: For data on the first four indicators, authors' calculations based on Ministry of Education 1999–2000 census of primary schools; for data on the last two indicators, authors' estimates based on Ministry of Education 1999 census of teachers.

schools account for less than 2 percent of the schools, but in Umutara their share exceeds 65 percent. Within the *libre subsidié* sector, the share of schools under SNEC management ranges from 81 percent in Butare to 39 percent in Umutara.

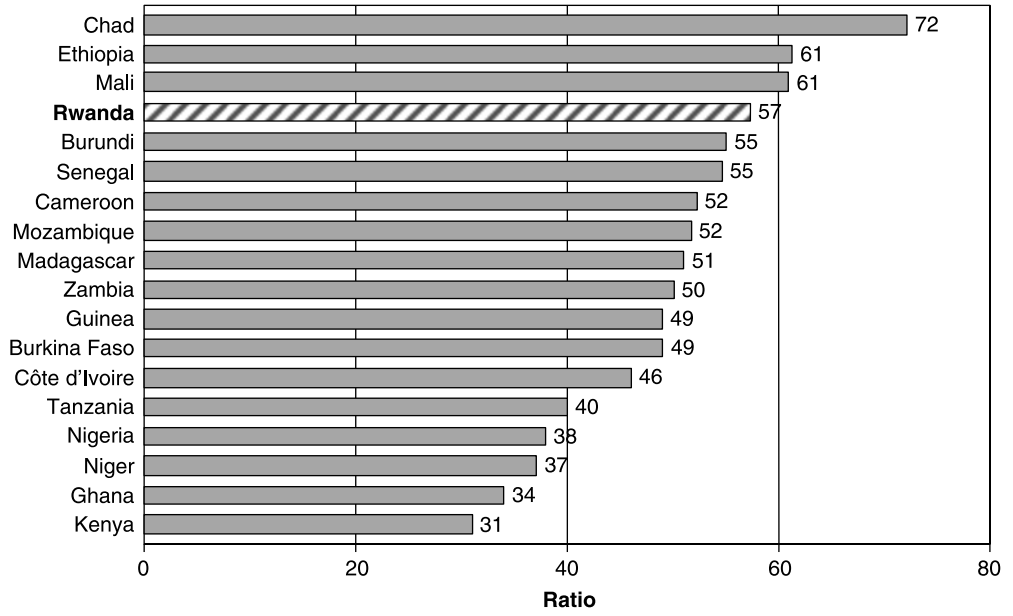
Selected Characteristics of Schools and Teachers

Table 5-2 summarizes some features of the supply of primary schooling in Rwanda today. The country has very few private primary schools, and they are strikingly different from the public schools. Average private school enrollment is only about half that of public schools. The private schools operate in better premises; they generally run single shifts in all grades (unlike public schools, where the first three grades generally operate on double shifts); and they have much smaller ratios of pupils to teachers.

In the public sector, state and *libre subsidié* schools are highly comparable, although state schools tend to be slightly bigger (720 pupils, on average) than *libre subsidié* schools (678 pupils). Almost all first grade classes, whether state or *libre subsidié*, are taught by teachers with double-shift duties, but by third grade the share of double shifts declines to about 84 percent in the state sector and 88 percent in the *libre subsidié* sector. By administrative arrangement, there is no double shifting beyond third grade.[2] Because of the prevalence of double shifting, Rwanda's average pupil-teacher ratio is currently one of the highest among African countries (see figure 5-2). *Libre subsidié* schools are better off than their state counterparts in this regard, but the advantage is hardly dramatic. A smaller share of *libre subsidié* schools than of state schools has nonteaching staff (school heads without teaching duties, and secretarial staff): 41 percent, compared with 44

2. Under double shifting, children attend school either in the morning or in the afternoon, typically for about 2.5 to 4.0 hours, depending on the shift. In some schools, children change shifts on alternate days; in others they do so in alternate weeks.

FIGURE 5-2: PUPIL-TEACHER RATIOS IN PUBLIC PRIMARY SCHOOLS IN RWANDA AND OTHER SUB-SAHARAN AFRICAN COUNTRIES, CIRCA 1999



Source: For Rwanda, table 5-2; for the other countries, World Bank (2002b).

percent of state schools. Among private schools, 16 percent have staff who perform purely administrative tasks. In schools with administrative staff, the staffing ratios appear to be relatively comparable across the three types of school.

Table 5-3 presents information on the profiles of teachers in the various types of school. In private schools about half the teachers are women; this proportion is comparable to that in state schools and is slightly less than the share in *libre subsidié* schools. Teachers in private schools are the most seasoned, with an average of 8.5 years of experience, compared with about 8 years in the other two sectors. They are also the best educated: 77 percent have some sort of upper secondary education, and 47 percent have a D6 or D7 diploma, the best credential at this level of education. (The share of teachers with a D6 or D7 qualification is 33 percent in state schools and 36 percent in *libre subsidié* schools.) A significantly higher share of private school teachers has received preservice teacher training: 67 percent, compared with 50 and 54 percent in state and *libre subsidié* schools, respectively.

Accessibility and Services: Client Feedback

To round out the discussion on the supply of services, we turn to the perspective of the service users. The 2001 Questionnaire unifié sur les indicateurs de développement (QUID) survey of about 5,800 households provides some clues regarding the accessibility of primary schools and pupils' perceptions of the services they receive (see table 5-4).

At the primary level, schools should ideally be within walking distance of pupils' homes, given the usually young ages of the children. According to QUID data, only about half the sampled households live within 30 minutes of a primary school, but in urban areas the share rises to more than 80 percent. Across provinces, accessibility is best in Kigali Ville, Ruhengeri, and Butare, where between 58 and 74 percent of the households live within 30 minutes of a primary

TABLE 5-3: CHARACTERISTICS OF PRIMARY SCHOOL TEACHERS, RWANDA, 1999

	Teacher credential[a]	Public sector: State	Public sector: *Libre subsidié*	Private schools	All schools[b]
Proportion of women (%)		50.3	54.6	50.0	54.0
Average years of experience		8.1	8.0	8.5	8.1
Distribution by educational attainment (%)					
Primary	CA	1.4	1.3	1.4	1.3
Lower secondary		**27.5**	**23.8**	**21.6**	**24.9**
General (1–3 years)	ES 1, 2, 3	9.1	7.3	5.4	7.8
Vocational diploma holder	CERAI, etc.	15.3	12.6	13.5	13.4
Teacher training diploma holder	EAP, EMA, etc.	3.1	3.9	2.7	3.7
Upper secondary		**70.7**	**74.6**	**77.1**	**73.4**
Incomplete	ES 4, 5, 6	21.0	20.5	17.6	20.5
Diploma holder (3–5 years)[c]	D3, D4, D5	16.8	18.3	12.2	17.9
Diploma holder (6–7 years)[c]	D6, D7	32.9	35.8	47.3	35.0
Total		100	100	100	100
Number of teachers		6,390	15,653	74	24,982
Share with preservice teacher training (%)		49.6	54.4	66.5	53.2

Blanks denote not applicable.

a. See appendix table A5-1 for more details on teachers' educational qualifications.

b. Includes teachers for whom data on the type of school where they teach are not available.

c. Diploma holders with 3–5 years of secondary schooling refers to those in qualification category D3–D5; those with 6–7 years refers to category D6–D7. Teachers in the first category are those who received their diplomas before the reforms in 1982 that introduced the six-year secondary cycle still in effect today.

Source: Authors' calculations based on Ministry of Education 1999–2000 census of schools.

school, and is worst in Gitarama, Kibungo, and Cyangugu, where the corresponding share is around 45 percent. These results suggest that the accessibility of primary schools, particularly in the lagging provinces, needs to be improved. We return to this issue in more detail later in this chapter, in the context of the discussion of economies of scale in service provision.

Almost half (49 percent) of the pupils surveyed about their perceptions of their schooling reported no problems. Among those who reported a problem, the overwhelming majority identified lack of books and school supplies as the main source of their frustrations. Surprisingly, the share of satisfied pupils is much greater in rural than in urban areas: 51 percent, compared with 32 percent. Despite the advantages of going to school in Kigali Ville, only 37 percent of the pupils from this area report no problems with their schooling. A possible explanation for these patterns is that respondents have different implicit standards, reflecting differences in their exposure to and knowledge about alternatives to the schooling they actually receive. It might then be expected that urban children and those in Kigali Ville would be more demanding in their expectations and less satisfied with the services they receive.

TABLE 5-4: ACCESSIBILITY OF PRIMARY SCHOOLS AND PROBLEMS WITH SCHOOLING REPORTED BY CURRENTLY ENROLLED PUPILS, RWANDA, 2001

	Households within 30 minutes of a primary school		Pupils reporting no problem		Type of problem encountered by those reporting a problem (%)			
	%	Index (urban and Butare = 100)	%	Index (urban) and Butare =100)	Lack of books and supplies	Poor quality of teaching	Lack of teachers	Buildings in bad condition
Rwanda	53		49		91	3	3	7
Type of locality								
Urban	83	100	32	100	92	3	2	7
Rural	51	62	51	161	83	3	4	6
Province								
Butare	58	100	52	100	96	5	4	6
Byumba	48	82	59	113	97	1	0	0
Cyangugu	46	79	37	71	87	2	2	9
Gikongoro	52	89	54	104	90	5	2	4
Gisenyi	53	92	53	101	89	2	1	11
Gitarama	45	77	41	78	98	1	1	1
Kibungo	45	77	54	103	91	0	0	4
Kibuye	51	88	43	82	89	12	3	18
Kigali Rural	46	78	57	109	97	1	3	2
Kigali Ville	74	127	37	71	93	2	1	4
Ruhengeri	66	114	55	107	95	6	5	10
Umutara	47	81	54	103	77	2	7	10

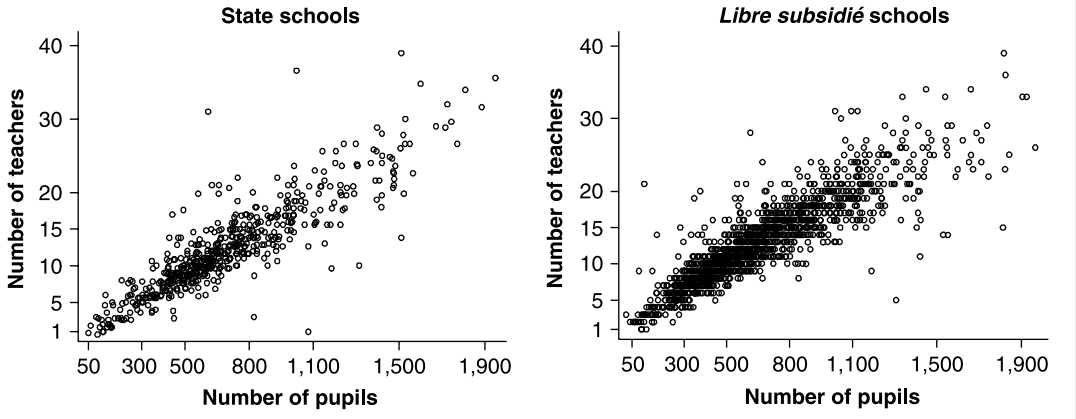
Blanks denote not applicable.
Source: 2001 Questionnaire unifié sur les indicateurs de développement (QUID) household survey.

It is surprising that so few pupils report problems other than lack of books and supplies, given the overall characteristics of the supply infrastructure. Here again, a possible explanation is that although pupils can report objectively from personal experience on the availability of books and supplies, they have few benchmarks for judging the other types of problems about which they were asked. For example, few of those surveyed are likely to know much about teaching quality, and respondents would hardly be in a position to identify that as a problem. For many of the pupils, the school they currently attend is probably the only one they have ever attended, so that they have no basis for comparison.

Teacher Allocation across Schools

In this section we examine in greater detail various aspects of service delivery, beginning with the allocation of teachers across schools. Because teachers embody the bulk of resources that schools, particularly at the lower levels, have to deliver services, teacher allocation across schools is an important management issue.

FIGURE 5-3: RELATION BETWEEN NUMBER OF PUPILS AND NUMBER OF TEACHERS, PUBLIC PRIMARY SCHOOLS, RWANDA, 2000



Note: Each circle represents a school.
Source: Ministry of Education 1999–2000 census of primary schools.

Overview of Allocation Patterns in the Public Sector

Figure 5-3 shows the pattern of teacher allocation based on data for nearly 2,000 of the country's primary schools. (Private schools are not included because of missing data.) Both the state and the *libre subsidié* panels show the characteristic positive relation between school enrollments and the number of teachers allocated to a school. This pattern is to be expected, but closer examination suggests that there is a wide variation across schools in allocation of teachers. For example, a school enrolling 800 pupils, in either sector, may have as few as 10 teachers or as many as 20. The patterns revealed by the figure raise questions about the application of rules affecting teacher allocation and the extent to which disparities across schools stem from provincial differences or from disparities within provinces. To examine these questions, we turn next to regression analysis of the data.[3]

Regression Analysis of Teacher Allocation across Schools

Results on teacher allocation are presented in table 5-5. The coefficient on the number of pupils is estimated at 0.016 for both state and *libre subsidié* schools. This implies that, on average, a school with 100 more pupils than the average size would have 1.6 extra teachers; thus, a new teacher is added for every 62.5 new pupils enrolled.

Consider next the R^2 values shown in the table. The R^2 statistic is a summary indicator that captures the explanatory power of the regression equations. It ranges in value from 0, which implies that the allocation of teachers across schools is independent of the number of pupils each school enrolls, to 1.0, which implies that the variation is completely explained by differences in student enrollments across schools. Again, the results for both samples of schools are comparable, with R^2 values of 0.79 for the state schools, 0.77 for the *libre subsidié* sample, and 0.78 for the combined samples. In international comparisons, the latter value places Rwanda in the middle range of R^2 values for a sample of 12 African countries for which similar regression analysis has been completed (see figure 5-4). Some of these countries, such as Guinea, achieve better results, perhaps providing a target to aim for; other countries, such as Togo, do much worse.

Because both the coefficient estimate on number of pupils enrolled and the R^2 values in table 5-5 are comparable in the regressions for the state and *libre subsidié* samples, we can conclude that teacher allocation rules are actually highly comparable in the two sectors.

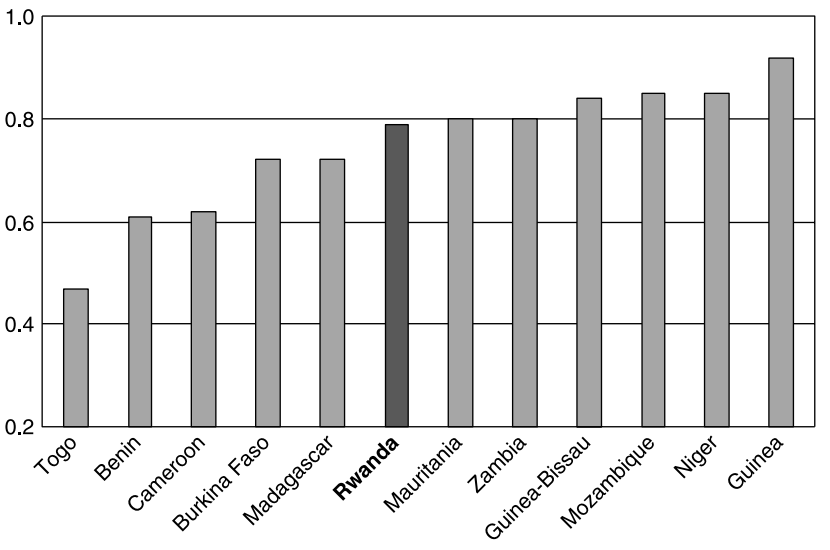
3. A simple way to understand the approach is to think of drawing a best-fit line through the observations plotted in the two panels of figure 5-3.

TABLE 5-5: REGRESSION ESTIMATES OF THE RELATION BETWEEN NUMBERS OF TEACHERS AND PUPILS, PUBLIC PRIMARY SCHOOLS, RWANDA, 2000

	State schools		*Libre subsidié* schools		Both types of public school	
Regressor	**Coefficient**	***t*-statistic**	**Coefficient**	***t*-statistic**	**Coefficient**	***t*-statistic**
Number of pupils	0.016	45.26	0.016	69.55	0.016	83.21
Constant	1.34	4.66	1.58	9.16	1.52	10.27
Number of observations	548		1,440		1,988	
R^2	0.79		0.77		0.78	
Memorandum:						
R^2 in regression models with provincial dummies[a]	0.82		0.81		0.81	

Note: All coefficient estimates for number of pupils are statistically significant at the 1 percent level.
a. See appendix table A5-3 for full regression results.
Source: Authors' estimates based on Ministry of Education 1999–2000 census of primary schools.

FIGURE 5-4: R^2 VALUES OF REGRESSIONS RELATING NUMBER OF TEACHERS TO NUMBER OF PUPILS ACROSS SCHOOLS, RWANDA AND SELECTED SUB-SAHARAN AFRICAN COUNTRIES, CIRCA 2000



Note: The closer the R^2 value is to 1.0, the tighter is the relation between school size and the number of teachers allocated to the school.
Source: Regression analysis of data from each country's annual census of schools.

TABLE 5-6: REGRESSION ESTIMATES OF THE RELATION BETWEEN NUMBERS OF TEACHERS AND PUPILS IN PUBLIC PRIMARY SCHOOLS BY PROVINCE, RWANDA, 2000

	Regression results and related information				Simulations for a school with 700 pupils	
	Coefficient estimate on number of pupils[a]	Constant	Number of schools (*N*)	R^2	Number of teachers	Pupil-teacher ratio
Rwanda	0.016	1.52	1,988	0.78	12.7	55.0
Butare	0.016	1.88	174	0.74	13.2	53.0
Byumba	0.015	2.00	162	0.80	12.3	56.9
Cyangugu	0.018	0.43	156	0.89	13.0	53.7
Gikongoro	0.017	2.21	155	0.64	13.9	50.4
Gisenyi	0.011	3.74	219	0.62	11.7	59.7
Gitarama	0.016	1.27	262	0.86	12.5	55.8
Kibungo	0.015	1.36	144	0.73	11.9	58.7
Kibuye	0.015	0.62	186	0.82	11.3	62.2
Kigali Rural	0.017	0.80	190	0.85	12.4	56.7
Kigali Ville	0.019	4.21	42	0.90	17.2	40.6
Ruhengeri	0.017	1.49	210	0.76	13.3	52.6
Umutara	0.015	2.62	94	0.77	13.1	53.4

Note: Except in Gisenyi, Gitarama, and Kibuye, the R^2 value of the regression for state schools is typically comparable to that for the corresponding sample of *libre subsidié* schools. In those three provinces the R^2 values for state school samples were 0.52, 0.58, and 0.97, respectively, compared with the corresponding values of 0.64, 0.93, and 0.80 for the *libre subsidié* samples.

a. All coefficients in this column are statistically significant at the 1 percent confidence level.

Source: Authors' estimates based on Ministry of Education 1999–2000 census of primary schools.

We then repeated the regressions with provincial dummy variables included in the specification. The R^2 values of the new regressions are reported in the last row of table 5-5; full regression results can be found in appendix table A5-3.

The values are only slightly higher than those associated with the regressions without the provincial dummy variables: in the regressions using the combined samples of state and *libre subsidié* schools, the R^2 statistic rises only slightly, from 0.78 to 0.81. The implication is that differences across provinces in teacher allocation contribute only marginally to the observed disparities in teacher allocation across Rwandan primary schools. A corollary is that the disparities largely result from inconsistent application of teacher allocation policies within each province.

Patterns of Teacher Allocation within Provinces

Table 5-6 presents additional results based on province-specific analysis. Separate regressions were run for each province, using the combined samples of state and *libre subsidié* schools.[4] As a reference, the results for the whole country are shown in the top row of the table.

Consider first the coefficient estimate on the number of pupils. The estimate ranges from a low of 0.011 for Gisenyi to a high of 0.019 for Kigali Ville. These results mean that the overall

4. Combining the two samples helps avoid problems with small sample size in the regression analysis. Because the state and *libre subsidié* schools are highly similar in their patterns of teacher allocation, this approach poses few problems.

pattern in the relation between enrollments and teacher allocation is such that for schools in Gisenyi, a new teacher is added, on average, for every 90.1 new pupils enrolled, whereas in Kigali Ville the corresponding figure is 52.6 pupils. Substantial variation thus exists across provinces in the sensitivity of teacher allocation to changes in the size of enrollments.

We turn next to the values of the R^2 statistic for each regression. This statistic captures the tightness of the relation between enrollments and teacher allocation (that is, how closely the schools in the sample cluster around the regression line relating the two variables). The overall value for the countrywide regression is 0.78, but the province-based regressions yield values ranging from only 0.62 in Gisenyi and 0.64 in Gikongoro to 0.89 in Cyangugu and 0.90 in Kigali Ville. In addition to differences across provinces in the slope of the relation between enrollments and teacher allocation, differences thus also exist in the consistency of teacher allocation. Gisenyi stands out among the provinces because teacher allocation there appears to be driven to a larger extent than elsewhere by factors other than enrollments, and the allocations are, moreover, less sensitive to enrollment growth than in other provinces.

For better understanding of the implications of the regression results, consider the last two columns in the table, which show simulations of teacher allocations based on the regression estimates. The countrywide regression implies that a school enrolling 700 pupils (close to the average size of primary schools in the country) would, on average, receive an allocation of 12.7 teachers, which implies a corresponding ratio of 55.0 pupils per teacher. The same calculation based on the regressions for each province shows teacher allocations ranging from 11.7 in Gisenyi to 17.2 in Kigali Ville and pupil-teacher ratios ranging from around 60 in Kibuye, Gisenyi, and Kibungo to 40.6 in Kigali Ville. Only in Kigali Ville, then, does the level of teacher allocation appear adequate to permit schools to assign teachers to only a single shift of pupils throughout all six grades of the cycle. In the other provinces the compromise solution is to assign two shifts per teacher in the first three grades and single shifts in the upper grades.

To summarize, the complement of teachers in Rwanda's public schools is relatively meager, as suggested by the fact that the country's average pupil-teacher ratio of 57 is among the highest in the developing world. Assigning teachers double-shift duty in the early grades helps reduce the inevitable overcrowding in the classroom implied by the high pupil-teacher ratio, but the arrangement also means that pupils receive relatively few hours of instruction in the school day. In other countries with high pupil-teacher ratios, the compromise is brokered by tolerating overcrowding in the classroom. Neither compromise appears to work, however, as suggested by the generally high rates of grade repetition where pupil-teacher ratios are high.[5]

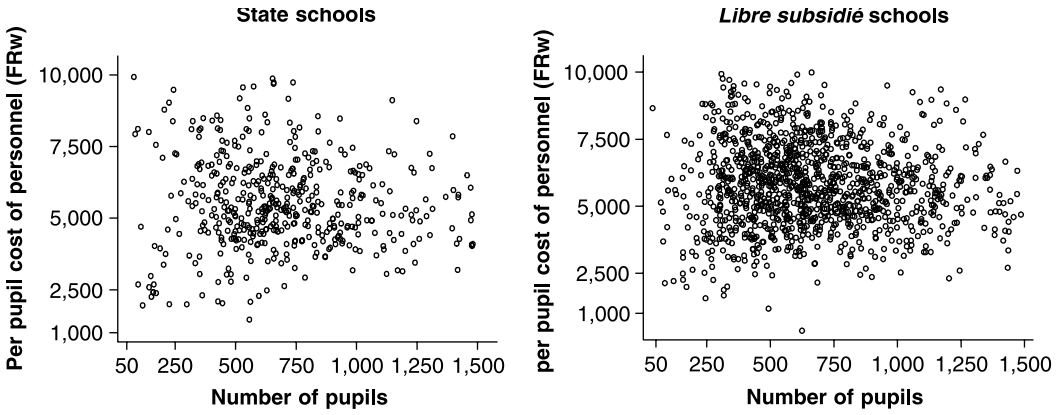
A second result pertains to the pattern of allocation across schools. In Rwanda the allocation appears to be reasonably consistent in relation to school enrollments, but scope for improvement remains, particularly in such provinces as Gisenyi and Gikongoro and, to a lesser extent, in Butare, Kibungo, Ruhengeri, and Umutara. In a growing system such as Rwanda's, teacher recruitment is likely to increase as well, both to serve larger enrollments and as part of an effort to lower pupil-teacher ratios. At this stage, consistency in the allocation of teachers across schools can be improved relatively painlessly by explicitly and unfailingly assigning new teachers to schools with high pupil-teacher ratios. Missing this opportunity would make the task harder in the future, as the pace of teacher recruitment slows. Improvement would then increasingly necessitate the reassignment of incumbent teachers across schools—a difficult task in the best of circumstances.

Economies of Scale in Service Delivery

We now consider a related but different issue: how the cost of service delivery varies across schools of different sizes. The issue is important because of its policy implications for the size and spatial distribution of schools.

5. For example, pupil-teacher ratios in such countries such as Benin, Cameroon, Madagascar, and Mozambique range between 54 and 65 pupils per teacher, and the repetition rate is between 24 and 26 percent.

FIGURE 5-5: RELATION BETWEEN PERSONNEL COST PER PUPIL AND SCHOOL SIZE, PUBLIC SCHOOLS, RWANDA, 1999



Note: FRw, Rwandan francs. Each circle represents a school.

Source: Based on Ministry of Education 1999–2000 census of primary schools merged with data from the 1999 census of teachers and data on the salary scale.

Relation between Size of Enrollments and Unit Costs

Data for the analysis were compiled from two datasets with the requisite information at the school level: the 1999 census of teachers, and the 1999–2000 census of schools. Using three variables common to the two datasets (province, district, and school name), data for 1,774 public schools were successfully merged, yielding a sufficiently large number of observations for the statistical analysis. The teacher census included information on the educational qualifications of teachers and other school personnel, their years of experience, their current duties, and other personal and professional information. By combining this information with the data on salary levels and structure shown in appendix table A5-1, it was possible to estimate the aggregate cost of personnel for each school and then to compute the cost of personnel per pupil in each of the 1,774 schools. Although personnel costs are only part of the total cost of service delivery, they represent the bulk of spending and therefore provide a good proxy for overall spending.

The simple scatter plots of enrollments and unit costs in figure 5-5 reveal more diversity across schools than would be expected only on the basis of the distribution of teachers documented earlier. It implies that differences in the educational qualifications and seniority of teachers and other school personnel tend to widen rather than narrow the gap in funding across schools, through the systematic link between these variables and the salary bill.

Regression Analysis of the Relation between Unit Costs and School Size

The results presented in table 5-7 confirm the pattern in figure 5-5. The relation between cost per pupil and school size is weaker than that between number of teachers and school size. The R^2 value falls to 0.70 for the combined sample of state and *libre subsidié* schools, from 0.78 in the corresponding regression reported earlier that had number of teachers instead of unit costs as the dependent variable.

A more important result shown in the table relates to economies of scale in service delivery. The estimated coefficient on the number of pupils implies that a 1 percentage point increase in personnel costs per pupil allows enrollments to expand by about 1.04–1.05 percent. The implication is that unit costs fall as schools increase the size of their enrollments, all else being the same.

TABLE 5-7: REGRESSION ESTIMATES OF THE RELATION BETWEEN TOTAL PERSONNEL COSTS AND ENROLLMENTS ACROSS SCHOOLS, RWANDA, 2000

	State schools		*Libre subsidié* schools		All public schools	
	Coefficient	*t*-statistic	Coefficient	*t*-statistic	Coefficient	*t*-statistic
Number of pupils	0.96	33.36**	0.96	53.79**	0.96	60.33**
Intercept	8.86	50.58**	8.92	78.15**	8.92	82.81**
R^2	0.71		0.70		0.70	
Number of observations	508		1,266		1,774	
Memoranda:						
Economies of scale[a]	1.04		1.05		1.05	
Average number of pupils per school	720		678		684	

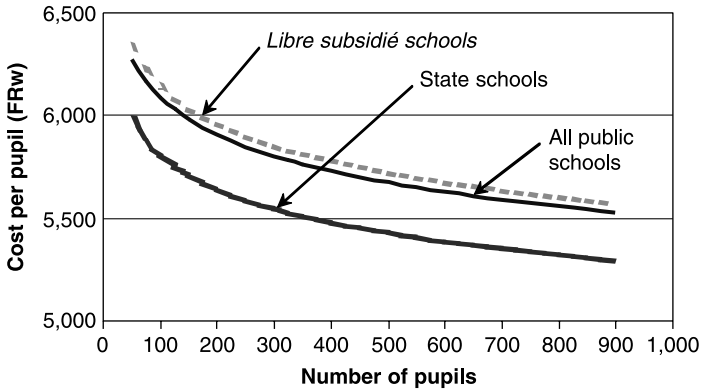
** Statistical significance at the 1 percent confidence level.

Note: In all the regression models, both the dependent and independent variables are expressed on a log scale.

a. Refers to the percentage increase in the number of pupils enrolled, given a 1 percent increase in spending on personnel, calculated as the inverse of the coefficient estimate on the independent variable (number of pupils).

Source: Based on Ministry of Education 1999–2000 census of schools and on data on the salary scale of teaching personnel.

FIGURE 5-6: ECONOMIES OF SCALE IN PUBLIC PRIMARY EDUCATION, RWANDA, 2000



Note: FRw, Rwandan francs.

Source: Simulated from regressions in table 5-7.

Yet the magnitude of these economies is modest, as the simulations in figure 5-6, which are based on the regression results, suggest. Taking the simulations for public schools in general (that is, using the combined state and *libre subsidié* samples), we note that the predicted per pupil cost of school personnel is only 2 percent higher in a school enrolling 400 pupils than in a school with 700 pupils (FRw 5,781, compared with FRw 5,641). As enrollment falls to 100 pupils, the predicted unit cost rises to FRw 6,145—an increase of 6 percent, which is still a modest difference.

TABLE 5-8: PERCENTAGE DISTRIBUTION OF PRIMARY SCHOOLS AND COST PER PUPIL BY SIZE OF ENROLLMENT, RWANDA, 2000

Size of enrollment	Cost per pupil in the public sector (thousand FRw)[a]	Size distribution of schools (%)		
		Public sector		
		State	*Libre subsidié*	Private sector
<150	6.1	3.2	1.8	29.0
150–300	5.9	6.5	7.2	35.5
300–450	5.7	13.4	17.8	6.5
450–600	5.7	19.3	20.9	12.9
600–750	5.6	21.1	18.5	6.5
750–900	5.5	11.4	11.9	0.0
>900	5.5	25.1	21.8	9.7

Note: Columns sum to 100 percent. Percentages are based on data for 2,043 of the 2,093 primary schools for which relevant data are available.

a. Costs are simulated from the regression estimates in table 5-7 for schools whose enrollments correspond to the middle of each size bracket except that, for the first category, cost corresponds to a school enrolling 100 pupils, and, for the last category, cost corresponds to a school enrolling 1,000 pupils.

Source: Authors' estimate based on Ministry of Education 1999–2000 census of primary schools.

Policy Implications for the Size Distribution of Primary Schools

The government as service provider has the option of delivering school services through a network of relatively few schools, each enrolling a large number of pupils, or, alternatively, through a larger number of relatively small schools. In the Rwandan context, it would appear that the latter option would make more sense, given the very limited economies of scale in service delivery documented above. Large schools are not much cheaper to run, but they are necessarily farther from the average pupil's home. The 2001 QUID household survey indicates that children in about half of the survey households take more than 30 minutes to reach the nearest primary school. Delivering services through smaller schools located closer to the pupil's home would help reduce the physical barriers to schools and lessen the opportunity cost of school attendance.

Yet the current network of public schools tends to emphasize size over proximity. Average school enrollment is about 720 pupils in the state sector and 678 pupils in the *libre subsidié* sector, for a combined (weighted) average of 684 pupils per school. By contrast, private schools enroll only 342 pupils each, on average. Table 5-8 provides another perspective on the differences in the size distribution of schools in the public and private sectors. Among the state schools, less than a quarter enroll fewer than 450 pupils each—about the same share as that of schools enrolling more than 900 pupils. In the *libre subsidié* sector the emphasis on size is less pronounced but remains significant. The real contrast is with schools in the private sector, where about two-thirds of the schools enroll fewer than 300 pupils each.

Student Learning

So far, we have addressed aspects of service delivery that affect resource flows to each school. We now move beyond resource allocation to examine the relation between funding and learning outcomes. How strong is the relation between these variables? How greatly do schools differ in their ability to transform funding into student learning? What does the pattern imply for development of policies to improve the effectiveness of service delivery?

TABLE 5-9: PRIMARY SCHOOL LEAVING EXAMINATION RESULTS BY TYPE OF SCHOOL, RWANDA, 1999

Type of school	Mean score (%)	Standard deviation	Number of schools
State	44.6	8.6	398
Libre subsidié	44.5	8.3	1,135
Private	46.5	13.1	14
All schools	44.5	8.4	1,547

Source: National Examination Council of Rwanda.

Evaluating these issues is not easy in the best of circumstances, but in Rwanda the challenges are magnified by data constraints. The country has only recently joined the UNESCO-sponsored Monitoring Learning Achievement Study, and the data and the findings are not yet available. In the absence of other data sources, we use the results on the national examinations administered at the end of the primary cycle as a proxy for student learning. Although this measure is admittedly flawed, it has the advantage that the data pertain to the entire country.

The analysis should ideally be performed using individual-level information, but the practical difficulties of preparing the requisite data proved insurmountable; a usable dataset would require for each pupil other information besides examination results, including, in particular, socioeconomic background. Given the constraints, we perform the analysis using schools as the unit of observation. We merged the examination data for 1999 with those from the 1999 teacher census and the 1999–2000 school census.[6] The resulting dataset pertains to 1,362 of 1,533 schools in the public sector that presented candidates in 1999. For each school, information is available on the average score of the school's grade 6 candidates and on such characteristics of the school as overall spending per pupil on personnel, the educational attainment of teachers, the pupil-teacher ratio, and the condition of buildings. Although the resulting dataset is unique in Rwanda and is very useful for our purpose, its limitations should be kept in mind when interpreting the results.

Overview of Examination Results

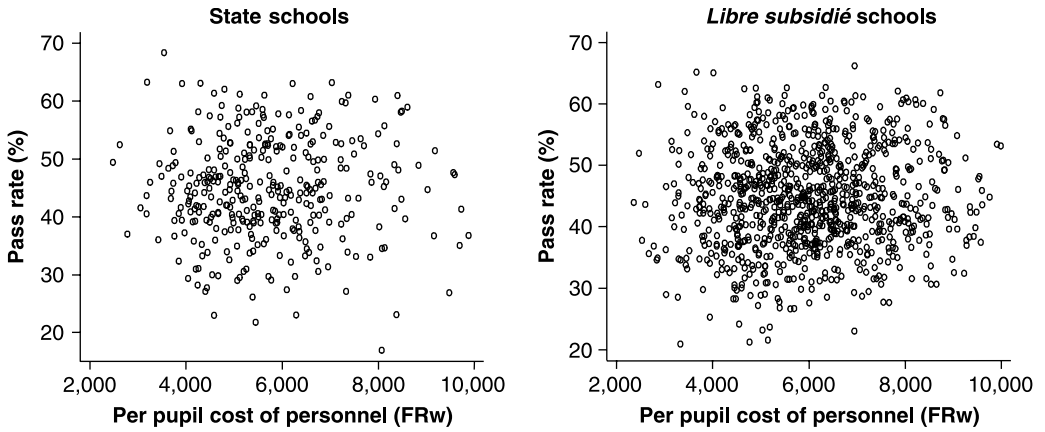
By way of background, table 5-9 shows the mean examination results across the three types of school. The data for state and *libre subsidié* schools are highly comparable, with mean scores of around 45 and standard deviations of 8.6 and 8.3, respectively. The main difference is with the private sector, where both the average score and the standard deviation are significantly higher. Private school pupils tend to achieve high scores, but the gap between the top and bottom performers is much wider.

Figure 5-7 illustrates the relation between pass rates on the grade 6 national examinations and the per pupil cost of teachers and other school personnel. Among both state and *libre subsidié* schools, the relation is weak in two senses: (a) on average, schools with more spending per pupil do not necessarily achieve higher pass rates, and (b) for schools with a given level of spending—say, FRw 6,000 per pupil—the pass rates vary widely, from a low of 20 percent to a high of 60 percent. These findings are not unique to Rwanda; in other countries where similar analyses have been conducted, such as Mauritania and Madagascar, the patterns are similar.

How is the finding that the level of school funding relates only weakly to pass rates on the examination to be interpreted? An attempt to answer this question must begin with the recognition

6. We should ideally have matched the data from the two censuses to the examination results for 2000 to improve the time consistency of the analysis. Because of the practical constraints, we relied instead on the examination results for 1999. Our assumption is that any change in the characteristics of individual schools in the course of a single school year would have been modest.

FIGURE 5-7: RELATION BETWEEN EXAMINATION RESULTS AND PER PUPIL COST OF PERSONNEL, PUBLIC SCHOOLS, RWANDA, 1999



Note: FRw, Rwandan francs. Each circle represents a school.

Source: Based on school-level data examination results merged with estimates of personnel costs from the 1999 census of teachers.

that the translation of resources into learning outcomes is affected (at the least) by (a) how the resources are used to create learning environments at the classroom level and (b) what incentives are in place to motivate the behavior of teachers and pupils.

Use of resources. With regard to how resources are used, the mix of school inputs that characterize classroom conditions is particularly relevant. These inputs include the availability of teachers (as proxied by the pupil-teacher ratio), teachers' qualifications, the supply of textbooks and learning materials, and so on. Clearly, the higher the level of school funding, the more of each of these inputs can be purchased, and the better the learning environment will be. But in fact, all education systems operate in resource-constrained environments. The issue is to find the right balance among the various inputs so that at each level of funding, the resources are used to create as effective a learning environment as possible. Tradeoffs in the choice of inputs are inescapable, and poor input mixes can give rise to differences across schools in the translation of resources into learning outcomes.

Incentives. It is a truism that in the absence of appropriate motivation and support, even the best equipped teachers would fail to produce good learning outcomes among their students. There are various ways of communicating to teachers a set of incentives for good performance, and not all of them need involve financial rewards. In some countries simply clarifying expectations and the scope of a teacher's responsibility has been a first step toward more effective classroom teaching. In others, supportive supervision practices designed to help teachers better manage classroom processes have yielded positive results.

These issues pose difficult challenges for managing the performance of service delivery. Although the data at our disposal do not permit a detailed analysis, some progress in understanding the nature of the challenges can be made using simple regression analysis to examine the correlates of performance on the grade 6 national examinations.

Regression Analysis of the Correlates of Grade 6 Examination Results

The nature of the data (which, again, relate to school-level observations) limits us to an assessment of the relation between examination results and certain physical attributes of the learning environment. These attributes include the pupil-teacher ratio, teachers' educational qualifications and average years of experience, and the quality of the facilities as proxied by their reported condition. Because teacher qualifications and experience can be translated into the salary bill, we can

TABLE 5-10: CORRELATES OF SCHOOL-LEVEL PASS RATES ON THE PRIMARY SCHOOL LEAVING EXAMINATION, RWANDA, 1999

Regression variable	Teacher credential[a]	Sample mean of regression variable[b]	Estimated marginal impact[c]
Dependent variable: examination pass rate (%)		44.5	
Teacher qualification			
Reference group: upper secondary diploma with preservice teacher training	D6, D7 *pédagogique*	32.9	
Primary	CA	1.3	–0.06
Lower secondary			
General	ES 1, 2, 3	8.0	–0.07**
Vocational	CERAI, etc.	13.7	–0.07**
Teacher training	EAP, EMA, etc.	4.1	–0.06
Upper secondary			
Incomplete	ES 4, 5, 6	11.8	–0.11**
Diploma (3–5 years)	D3, D4, D5	18.3	–0.03
Diploma (6–7 years) without preservice teacher training	D6, D7 *non-pédagogique*	9.9	0.00
Spending on personnel per pupil (FRw)		5,047	0.31**

Blanks denote not applicable.

** Statistically significant at the 1 percent level.

Note: FRw, Rwandan francs. See appendix table A5-4 for the full regression results and full list of the variables included in the regression analysis reported here.

a. Because of small cell sizes, no distinction is made between those with and without preservice teacher training.

b. For the teacher qualification variable, the sample means correspond to the percentage distribution of the sample across qualification groups.

c. For the teacher qualification variable, the marginal effect refers to the percentage point change in the examination pass rate in response to a 1 percentage point increase in the share of teachers with the corresponding qualification at the expense of a 1 percentage point decline in the share of teachers with the reference qualification (upper secondary school diploma with teacher training). For the spending variable, the marginal effect refers to the percentage point change in the pass rate in response to an increase of FRw 1,000 in per pupil spending on personnel above the sample mean of FRw 5,047.

Source: Authors' estimates based on school-level data on examination results for 1999, merged with data from Ministry of Education 1999–2000 census of primary schools and 1999 census of teachers.

replace those variables with the estimated per pupil cost of teacher salaries in the specification of the regression equation.

The full regression results appear in appendix table A5-4; the main highlights are summarized in table 5-10. Because teachers are the single most important input in the schooling process, absorbing the largest share of spending on education, the highlights in fact pertain mainly to the relation between teacher qualifications and the examination pass rate.[7] Using as the reference

7. The variable is defined for this exercise in terms of the share of teachers with the credentials shown in table 5-10.

group teachers with an upper secondary diploma and preservice training (32.9 percent of the whole sample), the regression analysis allows us to compare the performance of teachers with other qualification levels against the performance of the reference group, keeping the other (measured) attributes of the schooling environment constant. For example, in the last column of table 5-10, which shows estimated marginal impact, the value of –0.06 appears in the row for primary education. This means that a 1 percentage point increase in the share of teachers with a primary school certificate at the expense of teachers with the reference qualification (upper secondary diploma with preservice teacher training) would reduce the pass rate by 0.06 percentage points.

Several implications emerge from the results. The marginal impact is negative and statistically significant for teachers with general lower secondary education (ES 1, 2, or 3), vocational lower secondary education (for example, CERAI), or an incomplete upper secondary education (ES 4, 5, or 6). In other words, teachers with these qualifications (designated as "unqualified" teachers in the terminology used in Rwanda) are inferior to those with an upper secondary diploma and with preservice teacher training. These negative results are consistent with perceptions among Rwandan policymakers. Yet the magnitude of these teachers' shortfall in performance is modest. For example, the maximum marginal effect for those with ES 4, 5, or 6 credentials is only –0.11. Thus, if the 11.8 percent of sample teachers in this "incomplete upper secondary education" group were replaced entirely with teachers with an upper secondary diploma and preservice training (D6 or D7 *pédagogique*), the pass rate would rise from the current sample average of 44.5 percent to only 45.7 percent. Taking the more drastic measure of replacing all three groups of "unqualified" teachers (the 33.5 percent who have ES 1, 2, or 3, CERAI or equivalent, or ES 4, 5, or 6 credentials) would boost the pass rate to only 47.2 percent.

The modest gain in the pass rate must be balanced against the implied cost of raising teacher qualifications. In the salary structure prevailing in 2001, the annual starting pay of an unqualified teacher ranges from FRw 7,245 a month, plus benefits of FRw 4,000, for those with a general lower secondary education, to FRw 12,462, again with FRw 4,000 in benefits. By contrast, teachers with an upper secondary diploma start at FRw 23,649, plus 6,500 in benefits. The pay gaps are large, and it is reasonable to raise the issue of tradeoffs. In particular, given the current learning environments in most Rwandan schools, would a deployment of resources to hire the top-qualified teachers be the best use of scarce resources? Would the money go farther if it were instead used to increase the supply of textbooks and provide better support for incumbent teachers through in-service teacher training and more effective supervisory services?

A further detail in the regression results pertains to the impact of the level of spending per pupil on the examination pass rate. The marginal impact on this variable is positive, indicating that, in general, the higher is the level of funding for schooling, the better is its performance as measured by the pass rate. But, consistent with the story thus far, the effect is modest; an increase in spending of FRw 1,000 (that is, by about 20 percent above the sample mean) would boost the pass rate by only 0.31 percentage points, from the current average of 44.5 percent to 44.8 percent.

Differences in Performance across Provinces

The same regression analysis also allows us to characterize examination performance across provinces (see table 5-11; see also model 2 in the results reported in appendix table A5-4). Butare has the best results, and we use it as the reference province. The other provinces are listed in order of their distance from the average performance of Butare. Controlling for teacher qualifications, the average pass rate of schools in Cyangugu is about 9.2 percentage points below the average for Butare, whereas the pass rate for schools in Byumba is, on average, 19.1 percentage points below Butare's.

The provincial ranking is relatively stable whether the regression controls for teacher qualification or for the level of per pupil spending. Three groups may be identified among the provinces. (a) Cyangugu, Gisenyi, Kigali Rural, Kibungo, and Ruhengeri are a little behind

TABLE 5-11: REGRESSION ESTIMATES OF PROVINCIAL DIFFERENCES IN EXAMINATION PASS RATES, CONTROLLING FOR DIFFERENCES IN PER PUPIL SPENDING ON PERSONNEL, RWANDA, 1999

	Examination pass rate relative to Butare	
Provincial dummy variables	**Controlling for teacher qualifications**	**Controlling for per pupil spending on personnel**
Reference province: Butare		
Cyangugu	–9.2	–7.6
Gisenyi	–10.8	–8.9
Kigali Rural	–10.8	–9.3
Kibungo	–10.9	–10.7
Ruhengeri	–11.2	–8.8
Umutara	–12.8	–14.5
Kibuye	–15.0	–12.9
Gikongoro	–15.1	–14.3
Gitarama	–15.3	–13.3
Kigali Ville	–17.8	–15.4
Byumba	–19.1	–17.0

Blanks denote not applicable.

Note: See appendix table A5-4 for regression specification and full regression results. All coefficients on the provincial dummy variables are statistically significant at the 1 percent confidence level.

Source: Authors' estimates based on school-level data on examination results for 1999 merged with data from Ministry of Education 1999–2000 census of primary schools and 1999 census of teachers.

Butare; (b) Kigali Ville and Byumba are far behind; and (c) Gitarama, Gikongoro, Kibuye, and Umutara fall into an intermediate ranking between these extremes. These results tell us that differences in the characteristics of schools that are explicitly accounted for in the regression analysis—teacher qualifications, pupil-teacher ratio, condition of the facilities, and per pupil spending on staff—are only part of the reason why schools differ in their ability to produce high-scoring students. The fact that the provincial dummy variables are all statistically significant suggests that other unobserved differences across provinces are also at work. Furthermore, the size of the inter-provincial gaps implies that these unobserved factors are quite important, making it worthwhile to explore differences in school and classroom management practices that could account for the gaps in performance. Butare's position makes it particularly interesting in this regard.

Policy Implications and Conclusion

Primary school services in Rwanda are delivered largely through the network of state and *libre subsidié* schools that make up the public sector. *Libre subsidié* schools are financed largely by the government through payment of teacher salaries but are by and large run and managed by the Secrétariat nationale de l'enseignement catholique (SNEC) or the Conseil protestant du Rwanda (CPR). Beyond documenting these structural dimensions of the system, the analysis in this chapter touched on several issues with important policy implications for the management of service delivery. These include (a) the size and spatial distribution of schools, (b) consistency in teacher allocation across schools, (c) the balance of input mix to support effective learning environments,

and (d) the effectiveness of classroom processes in transforming school funding into learning outcomes. Although data constraints prevent a definitive analysis of these problems, the findings nonetheless provide food for thought in the context of policy development.

Public schools are relatively large in Rwanda, enrolling, on average, about 700 pupils each. Yet the available evidence suggests that there are few economies of scale beyond enrollments of about 400 students. Transforming the current network of schools into a system of smaller but more numerous schools would not increase the cost of service delivery but would help bring schools closer to pupils' homes, thus improving access. Rural children would benefit the most, as only half the households in rural areas currently live within 30 minutes of the nearest school.

With regard to the consistency of teacher allocation across schools, the findings suggest that, overall, the results are reasonably good relative to performance in other countries. Yet room for improvement remains, particularly in such provinces as Gisenyi and Kibungo where the supply of teachers is both relatively meager and poorly deployed. The prospects for improvement are good provided that the government takes advantage of new recruitment to rebalance the allocation of teachers in favor of schools and provinces that are currently underendowed.

The mix of school inputs has both pedagogical and financial dimensions. In an ideal, well-funded learning environment, pupils have sufficient instructional time during the school day, are taught in small classes by teachers with good qualifications, and receive an ample supply of books and other learning resources. In resource-constrained environments, tough choices and tradeoffs have to be made. The challenge facing policymakers is to manage these choices so as to relieve the practical (as opposed to the abstract) constraints on performance.

Some of the results presented in this chapter raise important questions in this regard. The overall supply of teachers in Rwanda is generally low in relation to enrollments, as reflected in the country's relatively high pupil-teacher ratio, which currently averages about 57 pupils per teacher in the public sector. Reducing the ratio would appear appropriate in light of experience in other countries. In a context of hard budget constraints, however, this would require tradeoffs against other inputs that might also be deemed important. In particular, the level of teacher qualifications comes to mind. Hiring well-qualified teachers—for example those with upper secondary education diplomas—has its benefits for the learning process, and the current profile of primary school teachers shows the country making significant headway in this direction. Yet the tenuous link between teacher qualifications and performance—measured imperfectly here using examination results—raises legitimate questions about the wisdom of putting the bulk of resources into teacher qualification at the expense of lowering the pupil-teacher ratio and thereby increasing the length of the school day for pupils in the first three grades of school.

In addition, the analysis highlights the need to look beyond physical inputs. Resources matter, but because schooling is a social process in which participants' behavior affects the effectiveness with which resources are transformed into outcomes, it is critical to ensure that the "software" of managing service delivery is put in place and is used. Teachers are the main agents on the front lines. It is essential that they are equipped for the job through proper training and that they receive the support and incentives they need to perform their jobs well.

CHAPTER 6

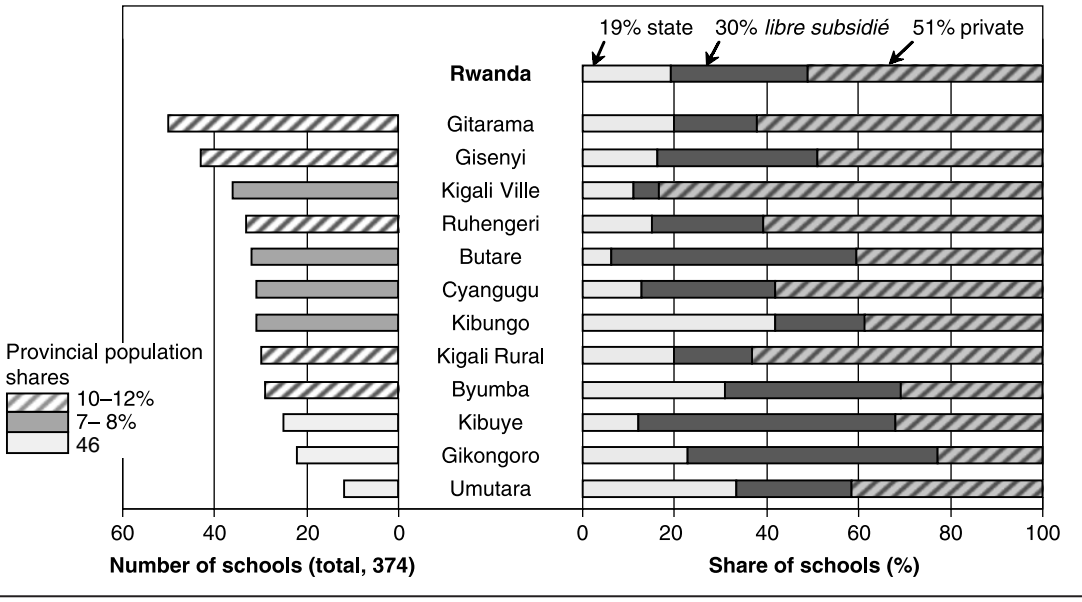
SERVICE DELIVERY IN SECONDARY EDUCATION

Secondary education in Rwanda is a relatively small subsector at present, enrolling about 141,000 students in 2001, compared with nearly 1.5 million pupils at the primary level. Yet, as chapter 2 suggests, the pressure to expand secondary school places is likely to mount in coming years as more and more children complete their primary schooling.[1] Managing the subsector's expansion in a fiscally sustainable manner is therefore a critically important policy issue. As a contribution to the discussion, this chapter documents the subsector's key features by consolidating information on the institutional composition of secondary schools and the overall characteristics of their services. It also examines the deployment of teachers and resources across schools, economies of scale in service provision, and the correlates of performance in the national examination at the end of the *tronc commun* cycle. As in chapter 5, data limitations have constrained the analysis in important ways and have reduced the precision of the findings. Although the results should obviously be understood in their proper perspective, we believe they remain sufficiently robust to help guide policy development for the subsector.[2]

1. To illustrate, if survival rates at the primary cycle were to stabilize at even 50 percent—much lower than the current level of about 73 percent, which may not persist because of high repetition rates—the probability of a primary school leaver making the transition to the secondary cycle would be less than 40 percent, in contrast to the present rate of 60 percent, even if the secondary school system (public and private) enrolled twice as many students as it does now.

2. Data problems in secondary education were particularly serious. Information from the Ministry of Education annual school census for the latest available school year was incompletely computerized, and additional effort was needed to fill in the gaps. This task proved a challenge because schools were sometimes known by more than one name and different names were used in different datasets. Thanks to help from various sources, and time-consuming data-cleaning efforts, most of these problems were eventually resolved to our satisfaction.

FIGURE 6-1: NUMBER AND INSTITUTIONAL COMPOSITION OF SECONDARY SCHOOLS BY PROVINCE, RWANDA, 2000–01



Source: For number of schools and their distribution, Ministry of Education 2000–01 census of secondary schools; for population shares, Rwanda (2002b).

Overview of the Supply of Services

In this section we provide a brief sketch of some key features of the supply of secondary schooling in Rwanda by documenting the institutional composition of the system, selected characteristics of the schools themselves, and the curricula offered by the schools. The picture that emerges is one of a highly fragmented system that probably needs to be streamlined for sustainable expansion.

Institutional Infrastructure

As at the primary level, the government finances and runs the state secondary schools. It pays the salaries of teachers in the *libre subsidié* schools but leaves day-to-day management of these schools in the hands of churches and other nongovernmental organizations. The government neither finances nor runs the private schools.

Of the nearly 400 secondary schools in Rwanda, 19 percent are state schools, 30 percent are *libre subsidié* schools, and the remaining 51 percent are private schools (see figure 6-1). These percentages contrast sharply with the figures for the primary level, where the private sector share is tiny. The percentages vary widely across provinces: the private sector share, for example, ranges from more than 80 percent in Kigali Ville to just over 20 percent in Gikongoro; the state schools' share ranges from a low of about 6 percent in Butare to more than 40 percent in Kibungo.

It is interesting to compare the supply of schools and their composition across provinces with the corresponding shares of the country's population. For example, about 10–12 percent of the population lives in Gitarama and Gisenyi, but Gitarama has more schools (about 50, compared with Gisenyi's 43), and a larger share of the total is private. The pattern is suggestive of possibly more favorable social conditions for secondary schooling in Gitarama, including stronger household ability and willingness to pay for schooling and probably more effective local initiative in starting schools. Ruhengeri, Kigali Rural, and Byumba also account for about 10–12 percent of

TABLE 6-1: NUMBER AND PERCENTAGE DISTRIBUTION OF TYPES OF SECONDARY SCHOOL, RWANDA, 2001–02

Network	Number of schools by type				% privately financed
	State	*Libre subsidié*	Private	All types[a]	
State	72	0	0	72 (19.0)	0.0
SNEC[b]	0	61	28	89 (23.5)	31.5
CPR[b]	0	31	37	68 (18.0)	54.4
Other	0	20	129	149 (39.4)	86.6
All networks[a]	72 (19.0)	112 (29.6)	194 (51.3)	378 (100.0)	51.3

a. Figures in parentheses show total as percentage of all schools.
b. Refers to the main church-related networks, the Secrétariat nationale de l'enseignement catholique (SNEC) and the Conseil protestant du Rwanda (CPR).
Source: Compiled from lists of schools supplied by the Ministry of Education, the SNEC, and the CPR.

the population, but they have only about 30 schools each, and whereas the private share of schools in Ruhengeri and Kigali Rural is about the same as in Gitarama, it is much smaller in Byumba.

The three provinces with the smallest shares of population are Kibuye, Gikongoro, and Umutara. The first two have about twice as many schools as Umutara—in part, apparently, because of greater government involvement. The lower degree of government involvement in Umutara may be associated with the province's unique features. Most of the area is part of a national park, and many of the inhabitants are returnees from Uganda and have gone through an English medium school. Because the teachers needed to staff such schools are still rare in the Rwandan system, stronger government involvement in the province has simply been impossible to arrange in the short run.

The data in table 6-1 show the distribution of secondary schools according to the management network to which they belong and their funding status. In Rwanda the main management networks are (a) the state, (b) the Catholic Church, through its Secrétariat nationale de l'enseignement catholique (SNEC), (c) a loose association of schools run by Protestant churches voluntarily subscribing to the Conseil protestant du Rwanda (CPR), and (d) independent or smaller associations of private or community schools. Schools belonging to the state, the SNEC, and the CPR each account for about a fifth to a quarter of the schools; the unstructured private sector claims the remaining two-fifths.

State schools are by definition funded by the government; but unlike the situation at the primary level, sizable shares of SNEC schools (32 percent) and CPR schools (54 percent) are run entirely with private funding. Faced with limited public funding and a growing demand for secondary schooling, these networks have met the demand in the only practicable way: by tapping into private sources of funding. In the independent schools sector, the surprising finding is that about 20 such schools have gained entry into the *libre subsidié* category, which entitles them to receive government funding for teacher salaries. Although it is unclear how non–public sector schools qualify for such funding, being in the *libre subsidié* group is so advantageous that schools can be expected to seek this prize assiduously.

As indicated in chapter 5, significant pressures are building up on Rwanda's secondary school system, given the growing numbers of primary school leavers likely to seek entry to secondary school. Because of continuing budget constraints, the government is unlikely to be able to meet the increased demand by itself, and private funding will continue to be critical. Yet the current

TABLE 6-2: SELECTED CHARACTERISTICS OF STATE, *LIBRE SUBSIDIÉ*, AND PRIVATE SECONDARY SCHOOLS, RWANDA, 1999–2001

	Public sector			
	State	*Libre subsidié*	Private schools	All schools
Number of schools, 2000–01	72	110	191	374[a]
Share of students, 2000–01 (% of total number, 141,163)	19.6	34.6	43.8	100.0
Average enrollment per school, 2000–01	384	467	323	378
Share receiving food from Ministry of Education, 1999–2000 (%)				
No allocation	0.0	0.0	100.0	51.3
Allocation based on number of boarders only	58.3	46.8	0.0	25.0
Allocation based on numbers of boarders and day students	41.7	53.2	0.0	23.7
Total	100.0	100.0	0.0	100.0

a. Total includes one school for which information regarding the category is missing.

Source: For data on number of schools, average enrollments per school, and distribution of enrollments, electronic data files from Ministry of Education 2000–01 census of secondary schools; for data on the share of students in the *tronc commun* cycle, Ministry of Education statistical abstract, 2000–01; for data on schools receiving food, administrative records of the Department of Secondary Education, Ministry of Education.

financing arrangements in the sector are such that the burden of mobilizing private funding falls unevenly across schools, with private schools bearing a disproportionate share of the load. In considering the future prospects for secondary education, the issue of school funding probably warrants additional attention. In particular, policymakers may need to rationalize funding arrangements to distribute the available public subsidies more equitably among schools so that public funds are used to leverage private contributions in all schools, thus putting the expansion of the subsector on a more fiscally sustainable footing.

Some Characteristics of the Supply of Services

According to table 6-2, the distribution of enrollments across state, *libre subsidié*, and private schools generally matches the distribution of the schools across these categories, as shown in figure 6-1. *Libre subsidié* schools tend to be larger than the average size of secondary schools nationwide, and private schools tend to be smaller, but the differences are not large, and the data reinforce the impression of a system composed mostly of relatively small schools.

Rwanda's publicly financed secondary schools traditionally offer boarding services. Recently, because of the growing pressure to expand places, they have also been catering to day students. Unfortunately, no data are available on the number of boarders and day students, and we rely on the Ministry of Education's records of allocation of food.[3] All secondary schools currently offer boarding services, and it appears that nearly 60 percent of the state schools cater exclusively to

3. Until 2001, the Ministry of Education allocated food to schools according to numbers of boarding and day students. This practice was replaced in 2002 by a new system whereby schools receive a financial allocation to cover the cost of feeding the students.

TABLE 6-3: PERCENTAGE DISTRIBUTION OF SCHOOLS BY LEVEL AND NUMBER OF INSTRUCTIONAL STREAMS OFFERED, RWANDA, 2000–01

	Public sector			
Level	**State**	***Libre subsidié***	**Private**	**All schools**
Tronc commun only	51.4	24.5	34.6	34.9
Tronc commun combined with upper secondary cycle[a]				
1 instructional stream	29.2	40.0	38.7	37.3
2 instructional streams	8.3	24.5	22.5	20.4
3 instructional streams	0.0	3.6	2.6	2.4
Upper secondary cycle only[a]				
1 instructional stream	8.3	7.3	1.6	4.6
2 instructional streams	2.8	0.0	0.0	0.5
Total	100.0	100.0	100.0	100.0
Memorandum:				
Number of schools	72	110	191	373

Note: Students in upper secondary school are enrolled in one of four streams: general, vocational, technical, or *normal* (teacher training).

a. See appendix table A6-1 for details on the specific combinations of instructional programs offered.

Source: Based on data from Ministry of Education 2000–01 census of secondary schools.

boarders, compared with almost 50 percent among *libre subsidié* schools. Although boarding schools may be justified in an elite school system, they are a fiscally unviable model for expanding the system, given the large diversion of state funds to feed students. Finding ways to phase out boarding schools would appear to be a priority item on the agenda for policy development.

Instructional Programs

Secondary schools in Rwanda offer the gamut of instruction, from lower secondary schooling to specialized vocational and technical courses at the upper secondary level (table 6-3). Slightly more than a third of the schools provide instruction only in the *tronc commun* (lower secondary) cycle; nearly 60 percent offer both the *tronc commun* and upper secondary cycles; and 5 percent serve upper secondary students exclusively. The distribution of instructional programs shows distinct differences across types of school: more than half of the state schools specialize in the *tronc commun* cycle, compared with only a quarter of the *libre subsidié* schools and about a third of the private schools. Among schools serving both lower and upper secondary students, the spread of course offerings is distinctly wider in the *libre subsidié* and private sectors; many of the schools provide instruction in two or even three streams at the upper secondary level. The diversity may be a sign of the schools' responsiveness to market demand (given that both public and private schools collect nontrivial levels of fees). Yet because the schools are typically small, with fewer than 500 students each, on average, the implied fragmentation of course offerings may mean that schools are failing to take advantage of scale economies in service delivery. We return to this issue later in the chapter, when evidence is presented on the existence and nature of scale economies in secondary education.

TABLE 6-4: PERCENTAGE DISTRIBUTION OF SECONDARY STUDENTS BY CYCLE AND STREAM AND BY SCHOOL TYPE, RWANDA, 2000–01

Cycle and stream	State	*Libre subsidié*	Private	All schools
Tronc commun cycle	67.1	59.7	64.2	63.1
Upper secondary cycle	32.9	40.3	35.8	36.9
Distribution in upper secondary cycle				
General	36.1	46.6	16.7	32.0
Normal[a]	9.4	25.0	34.8	26.4
Vocational	40.2	26.3	40.8	34.9
Technical	14.3	2.1	7.7	6.6
Memorandum:				
Total number of students	27,667	51,277	61,782	140,726

a. Primary school teacher training stream.

Source: Authors' calculations based on Ministry of Education electronic files from the 2000–01 census of secondary schools.

Data on the distribution of enrollments appear in table 6-4. Consistent with the information presented above, about two-thirds of all secondary students are in the *tronc commun* cycle, with the slightly above-average share in the state schools counterbalancing the below-average share in the *libre subsidié* sector. The upper secondary level is divided into general, *normal* (teacher training), vocational, and technical streams. Overall, less than 7 percent of the students pursue the technical stream, about a third of the total is in the general stream, another third is in the vocational stream, and a quarter is in the *normal* stream. There are substantial differences around these system averages in the distribution across types of school. In state schools there is a stronger focus on the vocational and technical streams than in the other two types of school; together, these streams cater to some 55 percent of state school students. In the *libre subsidié* category the emphasis is on the general stream, and in the private sector it is on the *normal* and vocational streams, which together serve more than three-quarters of private school students.

Table 6-5 shows the number of schools offering the indicated fields of instruction in each stream, as well as the number of students enrolled in each field. The shaded cells highlight fields in which average enrollment per school in the public sector is fewer than 100 students.[4] Six state and 18 *libre subsidié* schools offered the *math-physique* curriculum in 2000–01. Each state school enrolled, on average, 118 students in this field; the average for *libre subsidié* schools was only 86 students. One state and five *libre subsidié* schools offered the *action sociale* and *secrétariat* streams. Enrollments per school in each of these fields were much lower in the state than in the *libre subsidié* schools. Looking at the table as a whole, the general pattern in both the state and *libre subsidié* schools is that the technical streams tend to have small enrollments per field.

The question at this point is whether the mix of services provided by the public sector (state and *libre subsidié*) schools is consistent with economic considerations. In particular, the small enrollments per field and institution merit further scrutiny because of their cost implications.

4. Because private schools in Rwanda rely heavily, if not completely, on fees to fund their operations, we assume that they are recovering their costs even at the low enrollments in some of fields shown in table 6-5. Public schools are shielded from similar market forces and are therefore likely to be less cost-conscious. Because the same labels may mask differences in course content, private schools may well be offering different curricula—adapted to keep costs down when enrollments are low—than those offered in the public sector.

TABLE 6-5: NUMBER OF SCHOOLS OFFERING UPPER SECONDARY PROGRAMS AND AVERAGE ENROLLMENTS PER SCHOOL BY FIELD, RWANDA, 2000–01

	Number of schools offering field			Average number of students		
	State	*Libre subsidié*	Private	State	*Libre subsidié*	Private
All schools offering a program at the upper secondary level	37	27	66			
General						
Lettres	2	19	10	128	111	41
Science humaines	13	27	20	90	108	78
Math-physique	6	18	7	118	86	67
Bio-chimie	9	28	17	129	110	75
***Normal* (primary school teacher training)**	4	22	62	215	235	124
Vocational						
Agricole	5	5	5	159	113	66
Foresterie	1	0	0	182		
Vétérinaire	5	1	1	137	129	42
Hygiène	0	1	0		79	
Laborantins	2	0	1	122		67
Sciences infirmières	4	7	11	263	115	209
Action sociale	1	5	2	54	137	85
Hôtellerie et tourisme	0	0	2			202
Droit	0	2	9		129	100
Secrétariat	1	5	7	33	109	78
Commerce et comptabilité	5	18	38	123	132	110
Informatique	0	0	2			40
Technical						
Electricité	3	2	5	116	33	44
Electro-mécanique	1	0	1	93		20
Electronique	1	0	1	35		274
Mécanique-générale	2	0	1	79		20
Mécanique automobile	3	0	6	59		89
Construction	3	1	3	85	26	36
Travaux publics et construction	1	1	0	76	159	
Plomberie-soudure	0	1	0		20	
Menuiserie	1	0	1	57		11
Métal-bois	0	1	1		166	132
Métal-électricité	0	0	2			99
Engins lourds	1	0	0	65		

Note: Blank cells denote not applicable. Shaded cells highlight fields in which average enrollments are relatively small.
Source: Based on data from Ministry of Education 2000–01 census of secondary schools.

In fields where only one school is currently offering a stream, the courses may be new, and the small enrollments may thus consist of single cohorts of students. If so, the menu of course offerings appears to be expanding even though the demand is sometimes already being met by existing schools or may be only nascent (e.g., *electronique* compared with *electro-mécanique*).

A more fundamental issue concerns the role of the state in the delivery of vocational and technical education and training. Because these streams are intended to prepare students for the world of work, the production of graduates should ideally be as responsive as possible to labor market signals. Experience from most developing countries suggests, however, that public sector institutions tend to perform poorly in this regard. The weak link reflects in part the inherently feeble incentives for adapting service delivery where a school does not depend for its survival on its ability to attract clients on the basis of its record for successful job placement for its graduates. In Madagascar, for example, most graduates of technical secondary schools end up pursuing courses at the university, often in fields unrelated to their upper secondary school courses, thus wasting the state's investment in their (expensive) training.

In light of all this, Rwanda's policymakers might want to give careful consideration to the strategy for expanding vocational and technical education. In doing so, the issue of government financing has to be looked at separately from that of direct government involvement in service delivery. An important argument for government financing is that it serves to advance equity goals, given that students attending vocational and technical streams tend to come from more disadvantaged backgrounds. How strong this argument is in Rwanda's current context is difficult to tell because we have no data on the profiles of students in vocational and technical education. The argument for direct government involvement in service delivery is much weaker, particularly given the well-documented evidence from many low-income countries pointing to the public sector's typical slowness in restructuring course offerings to match fluid developments in the labor market, or even its inability to do so (see, for example, Johanson and Adams forthcoming). Rwanda might find it worthwhile to examine the measures such countries as Côte d'Ivoire, Morocco, and Zambia have taken to achieve their goals in the education sector by combining government finance with nongovernmental delivery of services.

Teacher Qualifications, Utilization, and Deployment

Teaching staff is the single most costly input in the internal operations of schools. In this section we examine the distribution of teachers by qualification, their teaching workload across school types and subcycles, and the pattern and consistency of their deployment among schools. Although most of the available data pertain to the public sector, information on private schools is included where possible.

Teacher Characteristics and Classroom Learning Conditions

Women make up less than one-fifth of the teachers in state and private secondary schools and less than one-quarter of those in *libre subsidié* schools (table 6-6). At least in the public sector, most of the teachers for whom data are available are relatively young, averaging about 5.5 years of teaching experience in state schools and 6.6 years in *libre subsidié* schools. Throughout the system, almost all teachers have at least an upper secondary diploma, but there are striking differences in the distribution among school types of those who have only upper secondary diplomas; they account for about 64 percent of teachers in state schools, 60 percent of those in *libre subsidié* schools, and only 48 percent of those in private schools. This distribution is consistent with the bias in state schools toward the *tronc commun* cycle, where teachers can be expected to have lower qualifications than those in the upper secondary cycle. The majority of public sector teachers report having had preservice teacher training; it is not known what share of private school teachers has this qualification.

As noted above, a large number of Rwanda's secondary schools offer, under one roof, instruction at both lower and upper secondary levels. In such schools, some teachers teach classes at both levels. According to the data in table 6-7, in the state schools just under a quarter of the teachers fall into this category, whereas the corresponding share is nearly 40 percent in the *libre subsidié* sector. Teachers who teach both cycles appear to have a slightly heavier teaching load—about 19 hours per week, compared with the overall average of 18 hours. In contrast to the

TABLE 6-6: CHARACTERISTICS OF TEACHERS BY TYPE OF SECONDARY SCHOOL, RWANDA, 1999–2000

	Teacher credential[a]	Type of school		
		State	*Libre subsidié*	Private
% women		16.6	24.1	—
Average years of experience		5.5	6.6	—
Teachers' educational attainment (%)				
Upper secondary				
Incomplete	ES 4, 5, 6	0.8	1.1	—
Diploma (3–5 years)	D3, D4, D5	0.8	0.8	1.8
Diploma (6–7 years)	D6, D7	64.0	58.8	48.4
Postsecondary				
2-year diploma	*Baccalauréat* or 2-year diploma	18.7	22.5	33.7
University degree	*License*, BA, BSc, master's, PhD	12.3	14.9	13.6
Other	Includes unknown	3.4	1.8	2.5
% with preservice teacher training		66.9	62.4	—

— Not available.

a. See appendix table A5-1 for a detailed description of the various credentials.

Source: For state and *libre subsidié* schools, Ministry of Education 1999 census of teachers merged with the 1999–2001 census of schools; for private schools, Ministry of Education statistical abstract, 1999–2000.

relatively small differences in teaching loads, student-teacher ratios vary significantly across levels of instruction and type of school, implying probably large differences in average class size.

We can deduce the magnitude of the differences using the following tautological relation:

$$SH \cdot \frac{S}{CS} = TH \cdot T$$

where SH is the weekly instructional hours received by students, S is number of students, CS is class size, TH is the weekly teaching workload, and T is number of teachers. The left-hand side of the equation represents aggregate instructional hours received by the student body; the right-hand side gives the aggregate hours of teaching offered by the teachers. By rearranging, we have the following relation:

$$CS = \frac{SH}{TH} \cdot \frac{S}{T} = \frac{SH}{TH} \cdot STR$$

where STR is the student-teacher ratio, derived simply as S/T.

Applying the foregoing equation to the data in the "*tronc commun* only" column in table 6-7, and assuming that students' instructional hours are the same across school types, we can deduce that class sizes in state schools are, on average, about 41 percent larger than in *libre subsidié* schools [= (26.6/19.3) × (17.8/17.4)]. Thus, if class sizes average about 40 students per section in the *libre subsidié* schools, they would be as high as 56 students per section in the state schools.

TABLE 6-7: DISTRIBUTION OF TEACHERS BY LEVEL OF CLASSES TAUGHT, AND TEACHING LOADS AND STUDENT-TEACHER RATIOS, PUBLIC SECONDARY SCHOOLS, RWANDA, 1999–2000

	Level of classes[a]			
	Tronc commun only	Both *tronc commun* and upper secondary	Upper secondary only	All levels
Distribution of teachers by level of classes taught (%)				
State schools	50.5	23.6	25.9	100 (1,017)[b]
Libre subsidié schools	33.7	38.0	28.3	100 (2,234)[b]
Teachers' average teaching workload per week (hours)				
State schools	17.4	19.2	18.7	18.1
Libre subsidié schools	17.8	19.0	17.3	18.1
Student-teacher ratio[c]				
State schools	26.6	21.3	15.5	23.3
Libre subsidié schools	19.3	22.0	16.6	21.2

a. All calculations in the table count teachers in full-time equivalent units according to their time allocation in each cycle.

b. Figures in parentheses indicate the total number of teachers with valid data among the 3,257 enumerated in the 1999 census.

c. Refers to school-level averages. For comparison, the student-teacher ratio in private schools averages 24.2.

Source: For distribution of teachers by level of classes taught and teaching workload, Ministry of Education 1999 census of teachers, merged with data from the 1999–2000 census of secondary schools; for data on student-teacher ratios, electronic data files from Ministry of Education 1999–2000 annual census of secondary schools.

Using the same approach, we can make a similar comparison of class sizes in the lower and upper secondary cycles. In state schools, class sizes in the *tronc commun* cycle are, on average, about 84 percent larger than in the upper secondary cycle [= (26.6/15.5) × (18.7/17.4)], whereas in *libre subsidié* schools the corresponding gap is much smaller, 13 percent [= [19.3/16.6) × (17.3/17.8).

Table 6-8 shows the educational qualifications of teachers in state and *libre subsidié* schools according to the level of classes they teach. Among teachers with only *tronc commun* classes, almost all have at least an upper secondary school diploma. The share that is university educated is slightly smaller in state schools—just under 10 percent, compared with more than 12 percent in *libre subsidié* schools. An upper secondary school diploma may be less than ideal for teaching *tronc commun* classes, but it is nevertheless minimally adequate because the teachers have at least three more years of schooling than their charges. By contrast, the situation in the upper secondary cycle is alarming: about half the teachers in state schools and more than half of those in the *libre subsidié* schools have only an upper secondary school diploma themselves.

These findings suggest that a clear priority in policy development is to find ways to improve the educational qualifications of upper secondary school teachers. As it may take years to train a sufficient number of teachers to at least two years past the secondary school diploma level, it is important to look at both short-term and long-term measures. One short-term option is to replace incumbent upper secondary school teachers who are underqualified (that is, lack at least a two-year postsecondary diploma) with teachers currently teaching *tronc commun* classes who are

TABLE 6-8: DISTRIBUTION OF STATE AND *LIBRE SUBSIDIÉ* SECONDARY SCHOOL TEACHERS BY EDUCATIONAL ATTAINMENT AND LEVEL OF CLASSES TAUGHT, RWANDA, 1999–2000

Type of school and teacher qualification	Level of classes		
	Tronc commun only	Both *tronc commun* upper secc	Upper secondary only
Teachers in state schools			
Number	514	240	263
Share of total (%)			
Upper secondary diploma	69.0	64.2	49.3
2-year postsecondary diploma	16.9	16.0	25.1
University degree	9.5	12.3	17.9
Other	4.7	2.8	7.6
Teachers in *libre subsidié* schools			
Number	752	850	632
Share of total (%)			
Upper secondary diploma	64.8	57.0	54.4
2-year postsecondary diploma	19.8	23.6	24.2
University degree	11.7	16.7	16.2
Other	3.7	2.7	5.2

Source: Ministry of Education 1999 census of teachers, merged with data from the 1999 census of secondary schools, in which 3,257 teachers with teaching duties were enumerated.

at least minimally qualified. Among the teachers who teach classes in either the lower or upper secondary cycle, in 1999–2000 a total of 473 upper secondary teachers lacked the minimum qualifications for teaching in the upper secondary cycle, and 371 *tronc commun* teachers had those minimum qualifications. Ignoring for the moment the possibility that a complete swap between these two groups of teachers might not work because of mismatches of fields of specialization, location of work, and other practical constraints, nearly 80 percent of the underqualified teachers currently teaching in the upper secondary cycle could potentially be replaced. The share could conceivably go higher if the swap were extended to teachers who teach both cycles.

A legitimate question is how much, on balance, the system would actually gain from the swap, since it would help solve a serious problem in the upper secondary cycle at the possible expense of depressing teaching quality in the lower secondary cycle. We return to this issue later, in a discussion of the relation between teachers' educational attainments and student learning. For the moment, suffice it to say that although the groundwork for long-term solutions needs to be laid through careful expansion of postsecondary education to supply upper secondary teachers with the desired qualifications, the immediate option of rationalizing the deployment of incumbent teachers also merits consideration.

Teacher Deployment across Schools

Figure 6-2 hints at substantial variation in the number of teachers across schools of similar size—an unsurprising pattern, given that schools offer different levels and types of instruction. To see how much of the variation persists after controlling for these differences, we turn to regression analysis, the results of which are reported in table 6-9. As before, the available data pertain only to schools in the public sector.

TABLE 6-9: REGRESSION ESTIMATES OF THE RELATION BETWEEN NUMBERS OF TEACHERS AND STUDENTS, PUBLIC SECONDARY SCHOOLS, RWANDA, 1999–2000

	Tronc commun cycle			Upper secondary cycle					
				Model 1			Model 2		
	State	*Libre subsidié*	All public schools	State	*Libre subsidié*	All public schools	State	*Libre subsidié*	All public State
Number of students	0.040 (8.59)**	0.036 (8.33)**	0.038 (12.20)**	0.048 (9.71)**	0.047 (13.77)**	0.048 (16.31)**	0.035 (7.77)**	0.040 (10.32)**	0.039 (13.46)**
Number of streams[a]							2.651 (2.82)**	1.423 (2.46)*	1.794 (3.55)**
Constant	0.831 (0.74)	2.992 (2.88)**	1.983 (2.61)**	1.548 (1.41)	1.839 (2.25)*	1.676 (2.46)*	–1.561 (1.08)	–0.025 (0.02)	–0.556 (0.61)
Number of observations	53	97	150	30	83	113	30	83	113
R^2	0.75	0.50	0.61	0.75	0.52	0.61	0.84	0.55	0.66

Blanks denote not applicable.

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

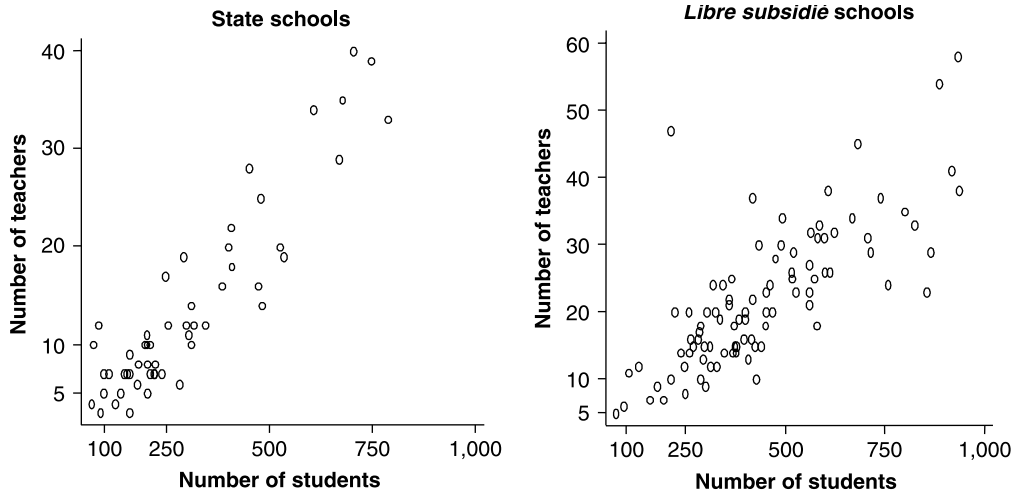
Note: Figures in parentheses are robust *t*-statistics.

Because some teachers teach in more than one cycle, the number of teachers is counted in full-time equivalent units according to the distribution of each teacher's workload across the two cycles. See appendix table A6-3 for additional results for the combined sample of schools offering either the secondary cycle or both cycles.

a. The variable applies only to the upper secondary cycle, where students follow the curriculum in one of four streams: general, *normal*, vocational, or technical.

Source: Based on data from Ministry of Education 1999–2000 census of secondary schools merged with data from the 1999 census of teachers.

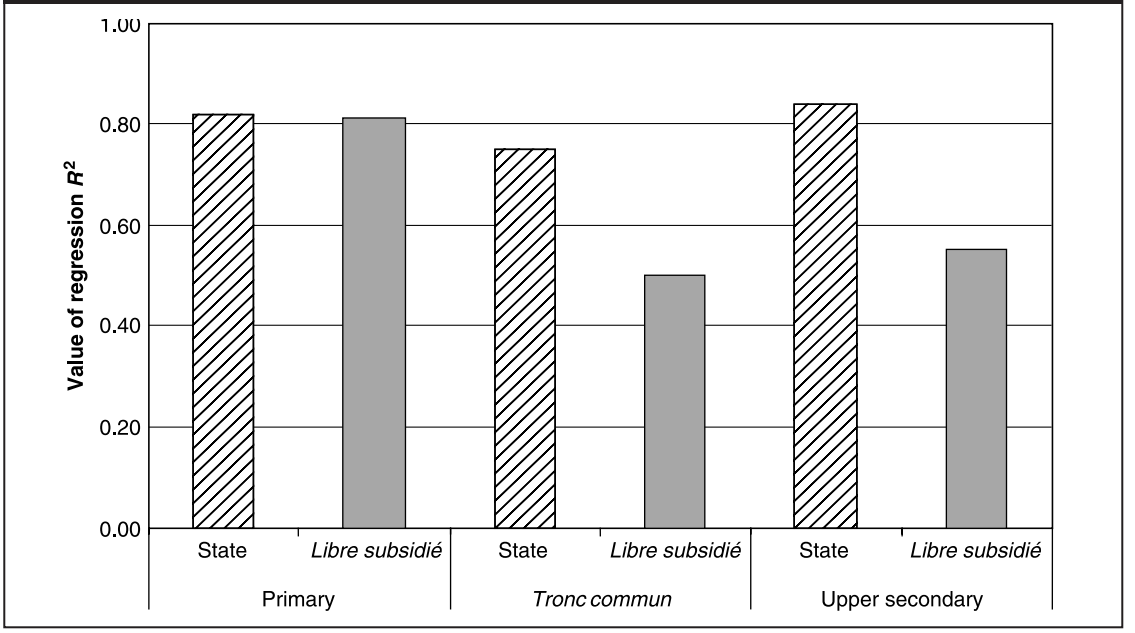
FIGURE 6-2: RELATION BETWEEN NUMBERS OF STUDENTS AND TEACHERS, STATE AND *LIBRE SUBSIDIÉ* SCHOOLS, RWANDA, 2000



Note: Each circle represents a school.

Source: Based on Ministry of Education 2000–01 census of secondary schools.

FIGURE 6-3: R^2 VALUES OF REGRESSIONS RELATING NUMBERS OF TEACHERS AND STUDENTS ACROSS SCHOOLS BY LEVEL OF EDUCATION AND SCHOOL TYPE, RWANDA, CIRCA 2000



Source: For primary education, table 5-5 in chapter 5; for *tronc commun* and upper secondary education, table 6-9.

The regression analysis is carried out separately for the *tronc commun* and upper secondary cycles. For the purpose of this exercise, teachers who teach classes in both the lower and upper secondary cycles are counted in full-time equivalent units according to the distribution of their teaching workload between the two cycles. For upper secondary education, we ran two sets of regressions, one without controlling for the number of streams of instruction offered and a second set with that variable included.

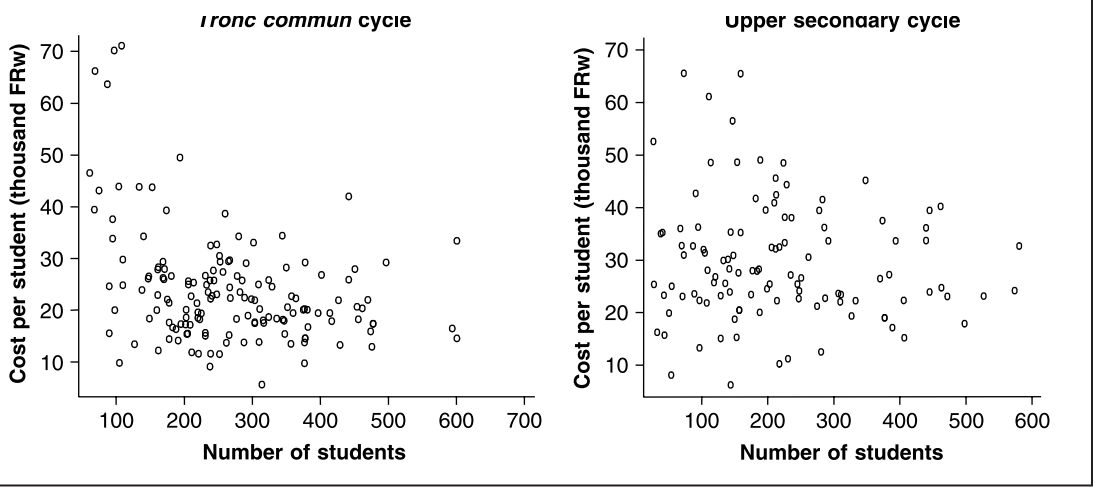
The coefficients on the number of students are statistically significant and positive on all the regressions, indicating that teacher allocation is generally linked to enrollments, and their values span a narrow range, from 0.035 in the regression for the upper secondary cycle in state schools to 0.40 in the regression for the *tronc commun* cycle in state schools.[5] These values imply that teachers are supplied at the average rate of one teacher per increase in enrollment of 25–29 students. (At the primary level, the rate is 1 teacher per additional 63 pupils.)

Consider next the R^2 values of the regressions. Those for the state school regressions are consistently larger than the corresponding values for the *libre subsidié* schools. This result signifies that although both types of school follow comparable teacher allocation rules, the application of such rules at the level of individual schools is much less consistent in the *libre subsidié* sector.

Figure 6-3 presents the results graphically and includes those for primary education from chapter 5 to provide an overall perspective. Interestingly, the inconsistency in teacher allocation across *libre subsidié* schools is less of a problem at the primary than at the secondary level. Even so, the fact that R^2 values are nowhere more than around 0.85 indicates that there remains room for improvement throughout the system.

5. The model 2 results are used because they control for field of study.

FIGURE 6-4: RELATION BETWEEN NUMBER OF STUDENTS AND COST PER STUDENT, *TRONC COMMUN* AND UPPER SECONDARY CYCLES, RWANDA, 1999



Note: FRw, Rwandan francs. Each circle represents a school.

Source: Based on Ministry of Education 1999–2000 survey of secondary schools merged with the 1999 census of teachers.

Economies of Scale in Service Delivery

Beyond ensuring consistency in teacher allocation, another challenge in the management of the secondary education sector is to take advantage of economies in service delivery where these exist. Such economies occur when a school's total cost rises less rapidly than the increase in student enrollments. Certain fixed costs such as remuneration of specialized teachers and of administrative and support staff at the school level are spread over the rising enrollments.[6] As a result, the cost per student of service delivery can be expected to fall as enrollments increase.

Overall Pattern

Figure 6-4 shows a simple scatter plot of the relation between unit costs and size of enrollments across schools. The scatter is visually even more dispersed than that in figure 6-2 relating number of teachers and enrollments. As at the primary level, the pattern implies that in addition to teacher numbers, differences in the availability of administrative personnel and in the educational profiles of the teachers and the administrative staff tend to exacerbate rather than to narrow differences in the allocation of resources across schools.

Regression Estimates of the Relation between Unit Costs and Enrollments

The results shown in table 6-10 suggest that given the way the system currently operates, significant scale economies in service delivery exist in the *tronc commun* cycle: at the sample mean; total personnel costs rise by 6.2 percentage points for a 10 percentage point rise in enrollments; and conversely, a 10 percentage point increase in spending on personnel would allow enrollments to

6. For our purpose here, we include the cost of teachers, as well as administrative personnel. Again using data from the 1999 census of teachers, we apportion the cost of teachers to the *tronc commun* or upper secondary level according to the distribution of each teacher's teaching workload across the two levels, and we apportion the cost of administrative staff according to the share of enrollments in each cycle.

TABLE 6-10: RELATION BETWEEN TOTAL COST OF PERSONNEL AND ENROLLMENTS IN PUBLIC SECONDARY SCHOOLS, RWANDA, 1999–2000

	Tronc commun cycle			Upper secondary cycle		
	State schools	*Libre subsidié*	All public schools	State schools	*Libre subsidié*	All public schools
Number of pupils (log)	0.60	0.60	0.62	0.96	0.93	0.95
	(6.06)**	(7.43)**	(9.64)**	(8.74)**	(10.71)**	(14.33)**
Dummy variable for single-cycle school	–0.45	0.07	–0.20	0.117	0.257	0.123
	(4.03)**	–0.74	(2.90)**	–0.62	–0.78	–0.71
Constant	12.34	12.26	12.13	10.31	10.66	10.50
	(21.74)**	(27.29)**	(33.30)**	(17.27)**	(23.14)**	(29.54)**
Number of schools	54	98	152	31	84	115
R^2	0.65	0.37	0.48	0.81	0.69	0.73
Memoranda:						
Economies of scale[a]	1.67	1.67	1.61	1.04	1.08	1.05
Average enrollment per school	290	301	296	260	249	253

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

Note: See appendix table A6-3 for regression results on the relation between numbers of teachers and secondary students in both cycles across schools.

In all the regressions, the dependent variable and the number of students are expressed on a log scale. Numbers in parentheses are robust *t*-statistics.

Where teachers teach more than one cycle, the cost attributed to each cycle is prorated in proportion to the time allocation of the concerned teachers across the two cycles. Because some teachers teach in more than one cycle, the cost of teachers is computed by apportioning it according to the distribution of each teacher's workload across the two cycles.

a. Refers to the percentage increase in the number of students enrolled for a 1 percent increase in spending on personnel, calculated as the inverse of the coefficient estimate on the independent variable (number of students).

Source: Based on Ministry of Education 1999–2000 census of secondary schools merged with the 1999 census of teachers, as well as data on the salary scale of school personnel.

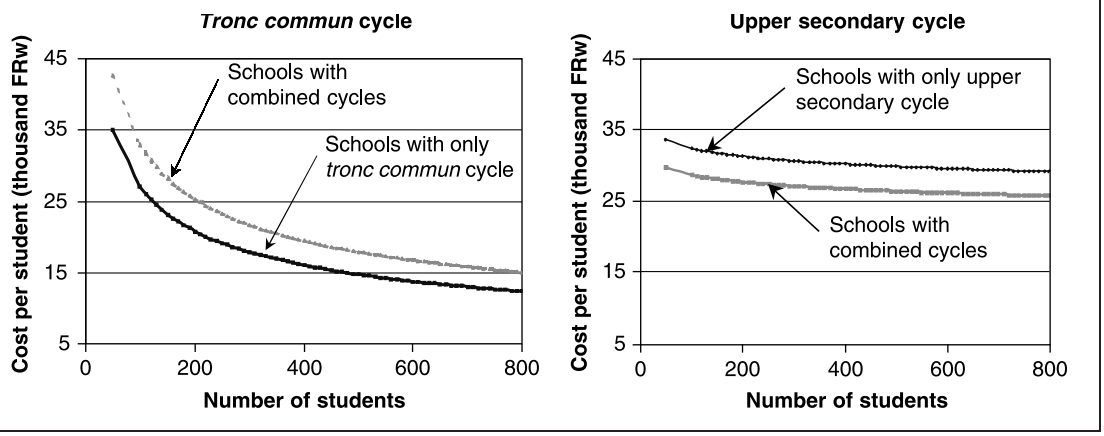
grow by 16.1 percent.[7] The magnitude of the economies is comparable across state and *libre subsidié* schools. In schools that combine instruction in the lower and upper secondary cycles under one roof, the personnel costs tend to be higher, particularly in the *tronc commun* cycle in state schools, as suggested by the statistically significant and negative coefficient on the dummy variable denoting a single-cycle school.[8]

The regression results in table 6-10 suggest that economies of scale are also present in the upper secondary cycle. Their magnitude, however, is modest: an increase of 10 percent in

7. The analysis should ideally examine the possible existence of economies of scope in addition to that of economies of scale. We did not implement the latter analysis because the samples involved are small and such an analysis would be inappropriate, given the rough quality of the available data.

8. One explanation is that administrative staffing coefficients are higher for the upper secondary than for the lower secondary cycle. Because these costs are, by construction, spread between the two cycles according to the distribution of enrollments between the cycles, total personnel costs in the *tronc commun* cycle would tend to be higher in schools with combined cycles.

FIGURE 6-5: SIMULATIONS OF ECONOMIES OF SCALE IN SECONDARY EDUCATION, *TRONC COMMUN* AND UPPER SECONDARY CYCLES, RWANDA, 1999–2000



Note: FRw, Rwandan francs.
Source: Simulated from the regressions in table 6-10.

spending on school personnel would allow enrollments to rise by only about 10.5 percent, on average. As at the lower secondary level, the pattern of scale economies is comparable across types of school. One possible explanation for the near absence of scale economies can be found in the wide menu of course offerings in the upper secondary cycle that was documented earlier in this chapter. Typically, schools expand their enrollments by diversifying their curriculum offerings rather than by increasing the scale of existing offerings, and so they do not benefit from economies of scale in service delivery.

In addition, the average enrollment in both the *tronc commun* and upper secondary cycles is relatively small—no more than about 300 students, on average, per cycle at each school. These small sizes stand in sharp contrast to the current average of about 700 students per primary school.

The regression results are represented visually in figure 6-5. For reasons noted above, economies of scale are present in the *tronc commun* cycle but are largely absent in the upper secondary cycle. For the *tronc commun* cycle, these economies are particularly apparent as the size of enrollments increases to about 400 students.

Taking Advantage of Scale Economies in Service Delivery

In chapter 5 the absence of scale economies in primary education led us to suggest that smaller schools may be no more costly to operate than larger schools and would have the advantage of bringing schools nearer to pupils' homes, thus facilitating educational access. In the *tronc commun* cycle, the opposite problem exists: most of the schools offering this cycle enroll too few students and are therefore uneconomic to operate. Because students at the *tronc commun*e level are older and better able to travel longer distances to school, the argument of accessibility is weaker for this level.

Table 6-11 shows estimated unit costs at different enrollment sizes and the current size distribution of secondary schools in Rwanda. Scale economies are more obviously present in the *tronc commun* than the upper secondary cycle. Unit costs at enrollments of more than 400 *tronc commun* students are less than two-thirds those for enrollments of between 100 and 200 students and about four-fifths those for between 200 and 300 students. Yet more than a fifth of the students are currently enrolled in schools serving between 100 and 200 *tronc commun* students, and more than a third are in schools with enrollments of between 200 and 300. If all the small

TABLE 6-11: SIZE DISTRIBUTION OF ENROLLMENTS IN PUBLIC SECONDARY SCHOOLS AND SIMULATED COST PER STUDENT, RWANDA, 1999–2000

	Tronc commun cycle		Upper secondary cycle	
Size of enrollment	Average cost per student (thousand FRw)[a]	Size distribution of enrollments (%)	Average cost per student (thousand FRw)[a]	Size distribution of enrollments (%)
<100			29.7	18.6
100–200[b]	28.2	21.1	28.0	25.4
200–300	23.2	35.5	27.3	22.0
300–400	20.5	23.5	26.9	19.5
400+	18.6	19.9	26.4	14.4
Number of schools offering the cycle[c]		166		118

Blanks denote not applicable.

Note: FRw, Rwandan francs.

a. Unit cost in the 400+ categories is simulated, for the *tronc commun* level, for an enrollment of 450. Unit costs in the <100 and 400+ categories are simulated, for the upper secondary level, for enrollments of 50 and 500 students, respectively. These are, roughly, the average sizes of enrollments per institution in the size category. For the other size categories, the costs are simulated for schools in the middle of the size bracket.

b. For the *tronc commun* cycle, the range is <200.

c. Includes schools offering only one cycle or both the *tronc commun* and upper secondary cycles.

Source: Authors' simulations based on the regressions in table 6-10.

schools enrolled at least 400 *tronc commun* students each, the average unit cost of delivering services would fall by about 20 percent—arguably a nontrivial decline, considering the overall scarcity of resources and the fact that the costs of personnel who deliver lower secondary services are currently 3.5 times the corresponding costs at the primary level.

The foregoing results have obvious implications for management of the size distribution of secondary schools as more and more children complete their primary schooling and the secondary sector expands. In a growing system such as Rwanda's, taking advantage of scale economies means avoiding a proliferation of schools catering to small cohorts of students. This result can be achieved in many ways, depending on conditions on the ground. In some localities it might be appropriate to combine enrollments in nearby schools that currently offer lower and upper secondary instruction to small enrollments in both cycles. In other settings it might be simply a matter of raising enrollments to accommodate the growing clientele for lower secondary schooling. In communities where no school currently delivers lower secondary schooling, it might be appropriate to start entirely new schools if the demand is sufficient to allow the school to fill rapidly at least 400 places in the *tronc commun* cycle.

Unlike lower secondary education (which most educators increasingly view as an extension of primary schooling), the expansion of places in the upper secondary cycle needs to proceed more slowly, if only because labor market considerations become increasingly relevant. This issue is explored in more detail in chapter 7, but for the present discussion, the important implication is that enrollments at the upper secondary level are likely to remain relatively small for the foreseeable future. Although, given the results presented above, small enrollments do not appear uneconomic, the fragmentation of course offerings is a problem and may be an important reason for the absence of scale economies. Policies for managing the expansion of this level of schooling, particularly in the public sector, might thus seek specifically to avoid a proliferation of course offerings while at the same time taking advantage of opportunities for consolidation where appropriate.

Examination Results and Their Correlates

A final aspect of service delivery relevant to policy development is the relation between the resources that schools receive and the output in terms of student learning. As at the primary level, the analysis is severely handicapped by lack of appropriate student assessment data. Here again we use the results on the national examination administered at the end of the *tronc commun* cycle as a proxy measure for student learning in lower secondary schooling, and we perform the analysis using schools, rather than individual students, as the unit of observation. This approach suffers from well-known flaws, but it is the best that can be implemented under the circumstances. Although a national examination is also administered at the end of the upper secondary cycle, we do not attempt to analyze the results, in part because of the small number of schools involved and the large number of fields of specialization at that level.

Results on the National Tronc Commun Examination

The results of the *tronc commun* examination are expressed in terms of the pass rate and the average score, which can range from zero to a maximum value of X. Because places in the upper secondary cycle are limited, the pass rate is adjusted from year to year to let through the appropriate number of students. This practice makes it difficult to track trends in the performance of schools on the examination but does not affect the comparison across schools at a single point in time.

The results for the 278 schools that fielded *tronc commun* candidates for the 1999 national examinations appear in table 6-12. A clear dichotomy is seen in the performance of students attending public and private schools. In the public sector, students in *libre subsidié* schools achieved a mean pass rate of 72 percent, compared with 75 percent in state schools; these high percentages contrast with an average of only 47 percent in private schools. Although the average for *libre subsidié* schools is lower than that for the state schools, no school in the *libre subsidié* group had a pass rate below 12.5 percent, whereas the weakest state school had a pass rate of only 1.6 percent—worse than the pass rate of 2.1 percent in the weakest private school. In each school category, at least one school achieved a pass rate of 100 percent.

The ranking by school type changes somewhat when performance is measured using average scores instead of pass rates: both state and *libre subsidié* schools outperform private schools, but

TABLE 6-12: RESULTS ON THE NATIONAL EXAMINATION AT THE END OF THE *TRONC COMMUN* CYCLE, RWANDA, 1999–2000

Type of school	Number of schools[a]	Pass rate (%)[b]			Average score[c]		
		Mean	Min.	Max.	Mean	Min.	Max.
State	44	75.2	1.6	100.0	3.1	1.8	4.6
Libre subsidié	99	72.0	12.5	100.0	3.4	1.7	5.2
Private	135	47.2	2.1	100.0	2.3	0.9	6.1
All schools	278	60.4	1.6	100.0	2.8	0.9	6.1

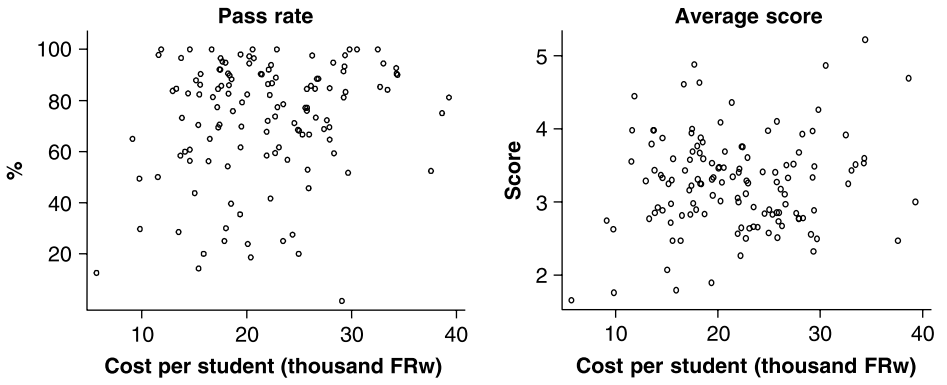
a. The sample includes all secondary schools that fielded candidates for the 1999 national examination at the end of the *tronc commun* cycle. The pass rate is based on the number of schools; the average score is based on one fewer school each in the categories for *libre subsidié* and private schools.

b. Refers to the percentage meeting the requirement for entry to the upper secondary cycle.

c. The scoring system uses a scale that translates letter grades into numerical scores, with A scored at 11 points, E scored at 0, and letter grades in between scored progressively lower by 1 point.

Source: Computed from unpublished school-level data supplied by the National Examination Council of Rwanda.

FIGURE 6-6: RELATION BETWEEN PERSONNEL COSTS PER STUDENT AND RESULTS OF NATIONAL EXAMINATION AT END OF THE *TRONC COMMUN* CYCLE, PUBLIC SECONDARY SCHOOLS, RWANDA, 1999–2000



Note: FRw, Rwandan francs. Each circle represents a school.

Source: Based on data supplied by the National Examination Council of Rwanda, merged with Ministry of Education 1999 census of teachers.

state schools now rank behind *libre subsidié* schools. The widest range of scores—from a low of 0.9 to a high of 6.1—is for the private schools, implying that the sector had the worst as well as the best schools in the system. In the public sector the worst school was equally likely to be a state or a *libre subsidié* school, but the top performer was in the *libre subsidié* group.

Regression Analysis of the Correlates of Examination Performance

Data for the analysis of performance on examinations were prepared by merging school-level data files supplied by the National Examination Council of Rwanda. Files containing information on each school were based on the census of secondary schools in 1999–2000, and those containing information from the 1999 census of teachers were aggregated to the school level. This procedure produced a dataset of 137 public sector (state and *libre subsidié*) schools. Private schools were eliminated because information was lacking on unit costs; some public sector schools were also dropped because of missing data.

Figure 6-6 provides an overview of the relation between performance on the examination and the cost of personnel per student. As in primary education, the patterns shows substantial disparity in two respects: (a) consistent with what has been documented earlier, spending per student varied widely, from FRw 10,000 to as much as FRw 40,000, and (b) for schools with similar levels of funding for personnel, performance on the national examinations was highly dispersed. For schools with per student spending on personnel of about FRw 20,000, the pass rates ranged from about 20 to 100 percent.

The full results of the regression findings appear in appendix table A6-4; highlights are presented in table 6-13. A key finding is that the coefficient on spending per student is not statistically significant, confirming what was hinted at in figure 6-6. One interpretation is that school performance on the national examinations depended more on how resources were used than on the amount of resources schools received. To look into the issue more closely, we also regressed examination results against some aspects of the learning environment. Because of data limitations, we were able to consider only two such aspects: the student-teacher ratio and teachers' educational attainment. Table 6-13 contains findings on the relation of these variables to student performance on the national examinations.

TABLE 6-13: CORRELATES OF SCHOOL-LEVEL PERFORMANCE ON THE NATIONAL EXAMINATION AT THE END OF THE *TRONC COMMUN* CYCLE, RWANDA, 1999–2000

Regression variable	Sample of mean of regression variable[a]	Dependent variable and regression estimates: Pass rate (%) (sample mean = 73.0) — Coefficient	Pass rate (%) (sample mean = 73.0) — Marginal impact[b]	Score (sample mean = 3.3), coefficient
Student-teacher ratio				
Reference group: <18	23.6			
18–27	48.5	−0.47	−6.9	−0.28*
>27	27.9	−0.93*	−13.7	−0.22
Teacher qualifications				
Reference group: university degree (*license*, BA, BSc, master's, PhD)	8.4			
Postsecondary (*baccalauréat* or 2-year university diploma)	14.9	−0.04	−0.55	−0.004
Upper secondary (D6, D7)	75.0	−0.03	−0.39	−0.009
Other	1.7	0.07	1.06	0.015
% teachers with preservice teacher training	67.9	0.01	0.13	−0.004
R^2			0.20	0.31
Number of observations			136	137

Blanks denote not applicable.

* Underlying coefficient estimate for the variable is statistically significant at the 5 percent confidence level.

Note: See appendix table A6-4 for the full regression results and the full list of variables.

a. Corresponds to percentages in the indicated category.

b. The regression model follows a log-logit specification: $\ln[y/(1-y)] = bX$. The marginal effect on the student-teacher ratio refers to the percentage point change in the pass rate in response to switching the indicated ratio for the ratio in the reference group. The marginal effect on the teacher qualifications variable refers to the percentage point change in the pass rate in response to a 1 percentage point increase in the share of teachers with the corresponding qualification at the expense of a 1 percentage point decline in the share of teachers with the reference qualification (a university degree).

Source: Authors' estimates based on school-level data on examination results for 1999 merged with data from Ministry of Education 1999–2000 census of primary schools and 1999 census of teachers.

The negative coefficient estimates for the relation between pass rates and the student-teacher ratio imply that, relative to students attending schools averaging fewer than 18 students per teacher, those in schools with higher ratios tended to fare worse on the examination. The detrimental impact was statistically significant if the student-teacher ratio exceeded 27. For students in such schools, the pass rate was, on average, 13.7 percentage points lower than the sample pass rate of 73 percent. The negative relation persisted when the pass rate was replaced by examination score as the dependent variable, but the regression coefficient was statistically significant only for the dummy variable corresponding to a student-teacher ratio in the 18–27 range. These results suggest that high student-teacher ratios probably compromised student learning as measured by examination results, but the sample size and the quality of the data were such that it was not possible to determine with any precision the exact thresholds above which the negative effects begin to take hold.

We consider next the findings on the relation between teacher qualifications and examination results. Students taught by teachers without a university degree did worse, as the negative coefficient estimates suggest, but none of the coefficients is statistically significant. The result remained the same regardless of which dependent variable was used. These results do not mean that teacher attainment is never an important factor in determining students' academic performance. Rather, they imply that in the current context of Rwanda's secondary schools, other factors, including, perhaps, overcrowding in some schools and lack of adequate learning materials and other facilitating conditions, are probably an even more binding constraint on performance.

Policy Implications

Taken together, the findings in this chapter highlight the following issues for policy discussions:

- Developing separate expansion strategies for the *tronc commun* and upper secondary cycles
- Managing the cost of expansion
- Ensuring adequate conditions for effective learning in both cycles of the subsector.

Developing Separate Expansion Strategies for the Two Secondary Cycles

In Rwanda the *tronc commun* cycle offers a standard curriculum to all students, while the upper secondary cycle consists of four streams within each of which additional fields of specialization are offered. The system's current design is thus consistent with the view that the lower secondary cycle is part of basic education—in other words, an extension of primary schooling to complete a child's preparation for adulthood. By contrast, the mission of upper secondary education is to prepare students for eventual jobs at the relatively skill intensive end of the labor market, with some students reaching these jobs only after going on to higher education.

Acceptance of this distinction between the two cycles implies that the expansion of each would need to be managed very differently. Enrollment growth in the lower cycle would have to keep pace with the rising number of primary school leavers seeking to complete additional years of schooling, whereas growth in the upper cycle would need to be calibrated to the demand for educated labor with significant educational attainment. As in most modernizing agricultural economies, the demand for such labor in Rwanda is likely to expand only moderately fast at best, so it is important to ensure that the numbers admitted to the upper secondary cycle are kept consistent with market conditions. The volume of graduates produced will be a less relevant criterion of success than production of graduates who leave upper secondary school with the right skills to succeed in the next phase of their lives. Those going on to higher education need a solid foundation for further studies. Those who will take jobs need skills that will meet employers' demand for skilled labor and enable the graduates to perform their work well.

Managing the Cost of Expansion

Two important characteristics of the secondary school system make both cycles costly to operate at present. First, almost all secondary schools in the public sector (state and *libre subsidié* schools) provide boarding facilities. Although some schools have begun to enroll day students, the fiscal burden of expansion is likely to be untenable unless most, if not all, of the future increase in enrollments, particularly at the *tronc commun* level, is accommodated in day schools.

Second, many schools currently enroll too few students to benefit from scale economies in service delivery. At the *tronc commun* level, more than half of the public sector schools enroll fewer than 300 students each, whereas economies of scale materialize mostly at enrollments beyond at least 400 students. Rationalizing the size distribution of schools in an expanding system is relatively straightforward because it rarely necessitates collapsing existing schools into single institutions. What is required is a plan for expansion that (a) raises enrollments in the *tronc commun* cycle in existing schools where enrollments are currently too small and (b) ensures that new schools are opened only in areas with sufficiently large catchments of potential *tronc commun* students. Adding on *tronc commun* classes to existing primary schools is a possibility, but that

arrangement calls for careful evaluation, since most primary schools are already very large and the benefits of bringing the two cycles under one roof are unclear. Indeed, if the experience from the current practice in secondary education of combining the *tronc commun* and upper secondary cycles in one school is any guide, the result may well be to encourage an uneconomic size distribution of enrollments at both levels.

At the upper secondary level, too, school enrollments tend to be small, and the fact that schools seek to supply a wide menu of course offerings only exacerbates the problem. Possible approaches to managing costs in such a system include: (a) reducing duplication in course offerings across schools, (b) consolidating related fields of specialization where feasible, and (c) accommodating future growth in enrollments in existing schools rather than building new ones. A related cost-saving measure is to consider shortening the duration of some courses. Currently, all courses last three years, but in some fields, especially in the vocational stream, on-the-job learning may well be more effective than classroom instruction in helping students succeed in their future jobs.

Ensuring Adequate Classroom Conditions for Effective Learning

Our findings point to at least three constraints that may be compromising the classroom learning environment.

Class sizes, particularly in state schools, may be too large. A recent policy of increasing the weekly teaching workload to a minimum of 25 hours (from about 17–19 hours in 1999) may have helped ease the problem. But given the small enrollments across schools and the fragmentation in course offerings, it is unclear how well the policy is being implemented and how effective it has in fact been in ensuring better allocation of teachers' time.

A related constraint has to do with the consistency of *teacher allocation* across schools. Although the number of teachers allocated is positively related to the size of enrollments, the link is not especially close, implying that teachers are more available in some schools than in others. The unequal availability of teachers is a worse problem among *libre subsidié* schools than among state schools, which suggests that tighter management of teacher allocation across those schools may warrant special attention.

The issue of *teacher qualifications* cannot be ignored. In the *tronc commun* cycle, most teachers satisfy the minimum qualification—at least an upper secondary school diploma—and some have even earned a university degree. By contrast, about 50 percent of the teachers in the upper secondary cycle, in both state and *libre subsidié* schools, are probably underqualified, having only an upper secondary diploma themselves. Any strategy for improving learning conditions must seek to raise the educational profile of teachers in the upper secondary cycle. The obvious long-term solution is to set clear standards for teacher recruitment, but to solve the problem more quickly, policymakers might consider rationalizing the current allocation of the most qualified teachers (those with postsecondary qualifications) between the *tronc commun* and upper secondary cycles.

Conclusion

Secondary education in Rwanda is in many ways at a crossroads today. The rising tide of primary school leavers is already creating pressures to increase places in secondary schools. As a result, enrollments in both the public and private sectors have grown at an extraordinary pace, averaging some 20 percent a year since 1996. Secondary education is slowly being transformed from a system serving a small, elite clientele into one that will increasingly be expected to cater to the masses. The challenge is to ensure that appropriate policies are put in place so that the system can expand along an efficient and equitable path.

In order to assess where and how the government might usefully intervene, this chapter has documented some key characteristics of the secondary education sector and the current arrangements for service delivery. The findings highlight three areas for attention by policymakers:

development of separate strategies for the future growth of the lower and upper cycles; management of the cost of expansion by taking advantage of scale economies in service delivery and minimizing fragmentation of course offerings; and management of teacher deployment and teaching assignments to promote environments conducive to learning. To be sure, the range of problems in the education sector that policymakers face is broader than this. But these three issues cannot be ignored. They will need to be tackled because of their impact on costs and therefore on the success of the government's efforts to extend educational opportunities in secondary education in a fiscally sustainable manner while ensuring that services are delivered equitably and with maximum value for money.

CHAPTER 7

HIGHER EDUCATION

Higher education in Rwanda expanded rapidly in the postgenocide years. Since 1997, three new public institutions have been created, the number of government-sponsored students has risen nearly 250 percent, and the public budget for the subsector has grown by a massive 340 percent, to a current level of almost FRw 12 billion (nearly US$27 million). The subsector currently serves a small population but absorbs almost 40 percent of the country's current spending on education. Given the obvious imbalance, it is no surprise that the future development of higher education has been the subject of recent policy documents tabled for discussion by the Cabinet.[1]

In this chapter our purpose is to consolidate the available quantitative information on higher education so as to illustrate in a concrete manner the nature of some of the key challenges and to enrich the factual basis for policy discussion. Because the system for data collection is still being rebuilt following the genocide, much of the information presented below was gathered directly from the institutions themselves for this study. Although care was taken to ensure consistency and reliability in the data at the time they were gathered, some information may need to be updated in light of ongoing improvements in data collection. Overall, however, the potential flaws in the data are not so serious or so pervasive as to alter the thrust of the policy issues to which they call attention.

1. Specifically, Rwanda's donor partners have sponsored the preparation of three policy documents: "Draft Policy Framework 2000," which examines the changing nature of higher education in general and the major challenges facing the country; "Proposed Higher Education and Continuing Education Bil/The Higher and Continuing Education Act 2002," which sets forth new arrangements covering all aspects of planning, management, governance, and funding of higher education; and "Organization of Research, Science, Technology, Higher, and Continuing Education," which outlines an organizational structure to ensure that the Ministry of Education can effectively fulfill its proposed roles and functions in higher education.

The treatment here does not pretend to be exhaustive. It focuses on the following areas: the structure of the system and the institutional composition of enrollments; the distribution of enrollments by level and field of study; government sponsorship for study abroad; staffing patterns at the institutional level; the cost of service delivery and of student finance; and the pattern of student flow and output of graduates.

The analysis highlights several areas that warrant attention if the sector's high costs are to be brought under control:

1. The current system of *blanket subsidies* under which practically all students who gain entry into public institutions automatically receive a bursary and access to subsidized welfare services. The more than fourfold increase in enrollments in the public sector in the past decade has made this system increasingly unsustainable.
2. *Government sponsorship of study abroad*, which accounted for a quarter of current spending on higher education. The cost of such studies is high, and local options are increasingly available, particularly for the undergraduate courses that most recipients of scholarships for study abroad are in fact pursuing.
3. *Cost management in public institutions.* The generous staffing ratios in the public institutions, in comparison with private schools, are one reason why the cost of service delivery is so high in the public sector and why so little funding appears to be left for nonpersonnel inputs to support effective teaching.
4. *Management of student flow.* Issues that should be addressed include not only patterns of dropout and repetition but also the overall size of the intake of students and the distribution of students by field of study.

Structure of the System

Higher education in Rwanda today is made up of a diverse mixture of public and private institutions. In this section we examine the growth of the sector since colonial times and document its current institutional composition and the distribution of enrollments by field of study.

Historical Context

Table 7-1 shows the number of public and private institutions and the size of their enrollments, beginning in the 1960s. The first institution of higher education, the diploma-granting Grand séminaire de Nyakibanda (GSN), was established in 1936 by the Roman Catholic Church specifically to train men for the priesthood.[2] For most of the next three decades, the seminary was the only institution of higher education in Rwanda, and students who were not training for the priesthood pursued their higher education in the present-day Democratic Republic of Congo or in Belgium. The situation changed in 1963 with the founding of the Université nationale du Rwanda (UNR; in English, National University of Rwanda, NUR) under a joint agreement between the Rwandan government and the Dominican Fathers from Québec Province, Canada.[3] In 1966 the Institut pédagogique national (IPN; in English, National Institute of Education) was established with support from the United Nations Development Programme (UNDP) and the United Nations Educational, Scientific, and Cultural Organization (UNESCO); its mission was to train secondary school teachers and conduct research in education. The private Faculté de théologie de Butare (FTB) was established in 1969.

The 1970s saw no change in the number of public institutions, but in the private sector the Institut Africain et Mauricien de statistiques et d'économie appliquée (IAMSEA) was established

2. See Mazimpaka and Daniel (2000) and Linguyeneza (2001). The latter gives an account of the pioneering work of the Roman Catholic Church at all levels of education.

3. Although the UNR is a public institution, until 1974 it was run by the Dominican Fathers (Linguyeneza 2001). At that time the university consisted of the Faculty of Medicine, the Faculty of Economics and Social Sciences, and the Teacher Training College (Ecole normale supérieure). See NUR (2002a) for additional historical information.

TABLE 7-1: NUMBER OF INSTITUTIONS OF HIGHER EDUCATION, OVERALL ENROLLMENTS, AND SHARE OF STUDENTS IN PRIVATE SECTOR, RWANDA, 1960S–PRESENT

	Number of institutions[a]		Enrollments[b]	
Period	**Public**	**Private**	**Total (thousands)**	**% private**
1960s				
Pre-1963	0	1	—	—
Post-1963[c]	2	2	—	—
1970s	2	3	1	—
1980s[d]	3	6	1–3	8–28
1990s				
Pregenocide[e]	3	7	3–5	35
Postgenocide	6	6	5–11	6–28
2000–present	6	6–8	12–17	30–38

— Not available.

a. Refers to the number of institutions at the end of each period. Four institutions for which information on date of founding is unavailable are excluded: in the public sector, the Ecole supérieure militaire and Centre de formation des adjoints techniques de la statistique, and in the private sector, the Grande séminaire de Kabagyi and Centre d'enseignment supérieur de Kigali. Enrollments in these institutions are, however, likely to be very small.

b. Ranges indicate the counts at the start and end of the period.

c. The Université nationale du Rwanda was established in 1963–64. The Institut pédagogique national was founded in 1966–67 and merged with the UNR in 1981–82.

d. In addition to the UNR, institutions operating in this period were the Institut supérieur de finances publiques (ISFP), founded in 1986–87, and the Institut supérieur d'agronomie et d'élevage (ISAE), founded in 1988–89.

e. The genocide took place in April 1994.

Source: Authors' compilation based on data in appendix table A7-1.

in 1976.[4] In the following decade the IPN was incorporated into the UNR, in 1981, and two new public institutions were established: the Institut supérieur de finances publiques (ISFP), in 1986–87, and the Institut supérieur d'agronomie et d'élevage (ISAE), in 1988–89. In the private sector, the number of institutions doubled, from three to six, with the addition of the Université adventiste d'Afrique centrale (UAAC) in 1984, the Ecole supérieure de gestion et d'information (ESGI) in 1985, and the Institut supérieur catholique de pédagogie appliquée de Nkumba (ISCPA) in 1986.

The biggest change in the structure of higher education took place in the 1990s, a decade marked by explosive growth in the public sector and large-scale replacement of existing private institutions by new ones. The number of public institutions grew from three to six with the founding of the Kigali Health Institute (KHI) in 1996, the Kigali Institute of Science, Technology and Management (KIST) in 1997, and the Kigali Institute of Education (KIE) in 1999.[5] In the

4. New faculties were established at the UNR during this decade: the Faculties of Law and of Applied Science in 1973, and the Faculty of Agronomy in 1979.

5. Apart from the increase in the number of public institutions, significant changes also occurred at the UNR. The School of Modern Languages (Ecole pratique des langues modernes, EPLM), which was closed in 1973, was reopened in 1994; the School of Information Sciences and Technology (Ecole des sciences et techniques de l'information, ESTI) was established in 1996 (Kereni 2002; NUR 2002b); and the Faculties of Science and of Applied Science merged in 1998 to form the Faculty of Science and Technology (Bonfils 2002).

private sector the Institut supérieur de pédagogie de Gitwe (ISPG) was established in 1993, only to close the following year. After the 1994 genocide, three more private institutions—the IAMSEA, the ESGI, and the ISPCA—went out of existence. The FTB and the UAAC reopened in 1996 and the ISPG in 1997. Two new private sector institutions were established, the Université libre de Kigali (ULK) in 1996, and the Université laïque de Kigali (UNILAK) in 1997. Overall, the number of private institutions dropped from seven before the genocide to six afterward.

The number of students and their distribution between public and private schools tracked the changes in the number of institutions. In the 1960s the system as a whole enrolled perhaps 100 students; the UNR, for example, began with only about 50 students. In the 1970s total enrollment stood at about 1,000, but by the end of the 1980s, it had risen to 3,000. Growth during the 1980s was fueled mainly by the establishment of private institutions, and the share of students in the private sector grew during the decade from just 8 percent to 28 percent. Further expansion of the system in the early 1990s saw public and private enrollment rising to about 5,000. The private sector's share rose to about 35 percent just before the 1994 genocide.

In the postgenocide 1990s, total enrollments more than doubled, reaching 11,000 by the end of the decade. The private sector share of enrollments fell in the years immediately following the genocide, when several institutions closed, but began recovering as new institutions were established. In the early 2000s enrollments continued to grow throughout the system, reaching nearly 17,000 by 2001–02. The private sector grew even faster; its share of enrollments in that year was a historical high of 38 percent.

Institutional Composition of Enrollments

Table 7-2 shows that in 2000–01, the most recent year for which complete data are available, enrollment in higher education was concentrated in a small number of institutions. In the public sector the UNR accounted for 56 percent of total enrollments, followed by the KIST, with 18 percent, and the KIE, with 11 percent. The remaining 15 percent of public sector students was distributed among three other institutions. The degree of concentration was even greater in the private sector: the ULK enrolled 81 percent of the students, while the UAAC accounted for 11 percent, the UNILAK for 7 percent, and the ISPG for only 1 percent.

To the extent that trends in the UNR apply to the system as a whole, women's access to higher education appears to have improved with time (table 7-2). In the mid-1980s women accounted for less than 18 percent of total enrollment in the UNR. By around 2000, their share had risen to more than 23 percent, and their share in the 10 main public and private institutions taken together was about 33 percent.[6] The average, however, masks significant differences in the two sectors: although women accounted for nearly half of enrollments in the private institutions, their share was only 26 percent in the public sector. In the private institutions the shares are rather consistent, in the 49 to 56 percent range, but they vary significantly in the public sector, from a low of 18 percent at the ISAE to 49 percent at the KHI. These differences may be attributable to the stiff competition for places in the heavily subsidized public sector, to the tendency of girls to perform less well than boys on the national examination taken at the end of the secondary cycle, and to the curricula of the institutions; the KHI offers the traditionally female-dominated course in nursing.[7]

The results of the national examination serve as a basis for selection into the public institutions. The private institutions are less selective (presumably, given a minimum level of competence)

6. The rise in women's share in total enrollment mainly stems from growth of enrollments in private institutions. Their share of enrollment in the public institutions appears to have leveled off since the mid-1990s (table A7-2).

7. See table 4-8 in chapter 4 for data on the differences in examination results between boys and girls on the national examination.

TABLE 7-2: INSTITUTIONAL DISTRIBUTION OF STUDENTS IN HIGHER EDUCATION, SHARE OF FEMALE STUDENTS, AND SCORES OF ENTRANTS ON NATIONAL EXAMINATION AT END OF SECONDARY CYCLE, RWANDA, 2000–01

Sector and name of institution	% of students in subsector[a]	% female		Average score on national examination of students identifying institution as first choice[b]
		Mid-1980s	Circa 2000	
Public[c]				
Université nationale du Rwanda (UNR)	55.5	17.7	23.4[d]	3.6
Kigali Institute of Science, Technology and Management (KIST)	18.2	—	28.8[d]	3.5
Kigali Institute of Education (KIE)	11.0	—	29.3[d]	3.4
Kigali Health Institute (KHI)	7.9	—	48.7[d]	3.7
Institut supérieur d'agronomie et d'élevage (ISAE)	6.0	—	18.4[d]	3.5
Institut supérieur des finances publiques (ISFP)[e]	1.4	—	34.8[d]	—
All public institutions	100.0 (8,729)	—	26.4[d]	—
Private[f]				
Université libre de Kigali (ULK)	80.7	—	48.8	—
Université adventiste d'Afrique centrale (UAAC)	11.0	—	52.2	—
Université laïque de Kigali (UNILAK)	6.9	—	56.2	—
Institut supérieur de pédagogie de Gitwe (ISPG)[g]	1.3	—	49.4	—
All private institutions	100.0 (4,029)	—	49.2[d]	—
All public and private institutions	(12,757)	—	33.4[d]	—

— Not available.

a. Figures in parentheses refer to the total number of students.

b. Students' score on a 10-point scale on the national examination administered at the end of the upper secondary cycle.

c. Enrollments exclude part-time students, for whom little systematic data exist.

d. Weighted percentage.

e. Now the Institute of Finance and Banking (IFB); in French, Ecole des hautes études des finances et d'économie appliqué.

f. The following private institutions, all with probably very limited enrollments not exceeding 100 to 200 students each, are excluded here for lack of enrollment data: Grand séminaire de Nyakibanda, Faculté de théologie de Butare, Grand séminaire de Kabgayi, and Centre d'enseignement supérieur de Kigali.

g. Reestablished in December 2002.

Source: For distribution of enrollments, appendix table A7-2; for data on examination scores, personal communication from the National Examination Council of Rwanda

and cater to those who are able and willing to pay the fees. The available data on the quality of student intake pertain only to the public institutions. The variation is modest, but it suggests that the brightest students tend to rank the UNR and the KHI as their top choices.

Distribution of Enrollments by Field of Study

The distribution of students by field of study in 2000–01 is shown in table 7-3. Overall, the pattern is heavily biased toward the humanities and social sciences, which enroll nearly three-quarters of the students in the system.[8] Within these fields, there is a clustering of enrollments in economics and management (whose share is 44 percent) and in literature and the humanities (27 percent). By contrast, only 28 percent of the students were enrolled in the applied and natural sciences, and just over half of these were pursuing courses in science and technology. The distribution of enrollments shows the expected differences between public and private institutions, with the latter focusing almost entirely on the humanities and social sciences. In absolute enrollments, the private institutions have more than three times the number of law students as do the public institutions, whereas enrollment sizes are roughly comparable in literature and the humanities and in economics and management.

Trends in Enrollments by Field at the UNR

The available data permit a closer look at how the distribution of enrollments at the UNR has evolved from the time when the university was practically the only significant institution to a context marked by a revitalized private sector and an expanded public sector. In general, the evidence points to substantial changes suggestive of an institution in the process of adapting to its new surroundings: experimentation with the creation of new faculties, reconstitution of existing faculties and schools, reorganization of course offerings, and so on (see appendix table A7-4). These changes are perhaps best seen as part of the university's ongoing efforts to achieve a good balance in supplying graduates to meet the county's felt need for highly qualified labor (NUR 2002a; Rwamasirabo 2002).

Table 7-4 documents the evolution since the 1980s. One change is the large share of students enrolled in prespecialized courses in the postgenocide era. Fully a quarter of all students are now enrolled in such courses, reflecting the new policy of requiring students to achieve bilingualism as part of their university studies. Setting aside these students, the pattern of enrollments shows dramatic shifts between the broad fields of the humanities and social sciences and the applied and natural sciences. In the 1980s the distribution appeared reasonably balanced, with 58 percent of the students enrolled in the humanities and social sciences and 42 percent in the applied and natural sciences. In the postgenocide 1990s, enrollment shifted heavily in favor of the humanities and social sciences, raising the share of that field to 74 percent, a gain of 16 percentage points over the level in the 1980s. The concentration in humanities and social sciences has declined only marginally in the early 2000s, to 72 percent. Given the country's interest in linking into the global economy through increased capabilities in the hard sciences, it might be appropriate to evaluate the current patterns of enrollments across disciplines. In particular, in view of the growth of the private sector, the question is whether the UNR is indeed offering courses that would not otherwise be available.

Major shifts have also occurred within each of the two broad fields discussed above. The reorientation toward courses with an explicit labor market focus, to the detriment of more traditionally academic ones, is especially clear from the data for the humanities and social sciences. In the 1980s

8. The humanities and social sciences include fields of study classified under codes 01–38 and 76–86 in the International Standard Classification of Education (ISCED); applied and natural sciences refer to ISCED 42–72 (see UNESCO 1997). For a breakdown of enrollment by field in each of the six public and four main private institutions, see table A7-3.

TABLE 7-3: NUMBER AND DISTRIBUTION OF STUDENTS IN PUBLIC AND PRIVATE HIGHER EDUCATION INSTITUTIONS, RWANDA, 2000–01

	Public institutions[a]		Private institutions[b]		Both types		
Field of study	Number of students	% distribution	Number of students	% distribution	Number of students	% distribution	% private
Literature and humanities	963	13.6	1,160	28.8	2,123	19.2	54.6
Law	338	4.8	1,033	25.7	1,371	12.4	75.3
Economics and management	1,876	26.6	1,661	41.3	3,537	31.9	47.0
Teacher education	940	13.3	54	1.3	994	9.0	5.4
Science and technology	1,475	20.9	68	1.7	1,543	13.9	4.4
Health sciences	870	12.3	48	1.2	918	8.3	5.2
Agriculture	599	8.5	0	0.0	599	5.4	0.0
Total in specialized courses	7,061	100.0	4,024	100.0	11,085	100.0	36.3
Prespecialized courses	1,633		0		1,633		0.0
Overall total	8,694		4,024		12,718		

Blanks denote not applicable.

a. Includes enrollments in the following institutions: Université nationale du Rwanda (UNR), Kigali Institute of Science, Technology and Management (KIST), Kigali Institute of Education (KIE), Kigali Health Institute (KHI), Institut supérieur d'agronomie et d'élevage (ISAE), and Institut supérieur des finances publiques (ISFP), now the Institute of Finance and Banking (IFB).

b. Includes enrollments in the following institutions: Université libre de Kigali (ULK), Université laïque de Kigali (UNILAK), Université adventiste d'Afrique centrale (UAAC), Institut supérieur de pédagogie de Gitwe (ISPG), and Faculté de théologie de Butare (FTB).

Source: See appendix table A7-3

TABLE 7-4: TRENDS IN ENROLLMENTS AND DISTRIBUTION BY FIELD, UNIVERSITÉ NATIONALE DU RWANDA, SELECTED PERIODS

	Average annual enrollments[a]			% distribution of enrollments[b]		
Field of study	1980s	Postgenocide 1990s	Early 2000s	1980s	Postgenocide 1990s	Early 2000s
Humanities and social sciences	**843**	**2,467**	**2,927**	**58.3**	**73.9**	**71.7**
Law	126	573	366	14.9	23.2	12.5
Arts and human sciences	257	342	465	30.4	13.9	15.9
Education	153	310	727	18.2	12.6	24.8
Economics, social science, and management	308	1,180	1,329	36.5	47.8	45.4
Journalism and communications	0	62	40	0.0	2.5	1.3
Applied and natural sciences	**602**	**870**	**1,153**	**41.7**	**26.1**	**28.3**
Medicine and health sciences	143	440	430	23.8	50.6	37.3
Science and technology	333	305	623	55.4	35.1	54.0
Agronomy	126	125	100	20.9	14.3	8.7
Total in specialized fields	**1,445**	**3,337**	**4,079**	**100.0**	**100.0**	**100.0**
Prespecialized courses[c]	0	730	1,302	0.0	18.0	24.2
Overall total	**1,445**	**4,067**	**5,381**			

Blanks denote not applicable.

a. The three periods refer, respectively, to 1982–86, 1994–99, and 2000–02.

b. Expressed as a percentage of total enrollments. The percentages of the two broad fields—humanities and social sciences, and applied and natural sciences—sum to 100 percent; the percentages for each individual field sum to 100 percent within each of these broad fields.

c. Refers to students in common core courses, language trainng, and other preparatory courses.

Source: See appendix table A7-4

students studying arts and human sciences accounted for 30 percent of total enrollments in the humanities and social sciences, but their share fell to less than 16 percent in the early 2000s. By contrast, the proportion enrolled in economics and management rose from 37 to 45 percent. The share of enrollments in education fell in the postgenocide 1990s, perhaps reflecting a period of consolidation and reorientation in course content, but by the early 2000s the field had more than recovered, claiming nearly a quarter of total enrollments in the humanities and social sciences group. The years following the genocide saw an explosion of enrollments in law, to nearly a quarter of all students in the humanities and social sciences group, but the increase was short lived. By the early 2000s, law students made up just over 12 percent of the total in the category, less than in the early 1980s. This seems to be one field in which the university has been reducing the absolute number of enrollments as similar offerings have become available in the private sector.

Within the applied and natural sciences, there is also evidence of major changes in the pattern of enrollment. Fewer students are studying agronomy; they made up less than 9 percent of all students in the hard sciences in the early 2000s, down from 21 percent in the early 1980s. The share of medicine and health sciences shot up in the postgenocide 1990s, accounting for half of science enrollments during the period, but by the early 2000s it had fallen to just over 37 percent of the total as the number of students stabilized at less than 450. Enrollments in science and technology picked up following a period of relative stagnation during the postgenocide 1990s. The lull is similar to that in education enrollments, suggesting a preexpansion period marked by consolidation and reorganization of course offerings in light of the evolution of the sector.

TABLE 7-5: HIGHER EDUCATION STUDENTS ON OVERSEAS GOVERNMENT SCHOLARSHIPS, RWANDA, 1967–2002

Period or year	Number of students abroad[a]	% female	Students abroad as % of total foreign and domestic enrollments[b]
1967–69	220	—	39.8
1970–79	504	—	43.6
1980–86	690	8.9	33.1
1999–2000	902	31.0	11.3
2000–01	877	28.3	9.5
2001–02	646	26.9	6.0

— Not available.

a. Refers to the average annual number studying abroad for the periods shown. Data for 1999–2002 exclude students on government scholarships studying at the Rwandan branch of the Université adventiste d'Afrique centrale (UAAC). The number of such students was 79 in 1999–2000, 38 in 2000–01, and 20 in 2001–02.

b. Percentage of all students studying abroad and in public institutions in Rwanda.

Source: See appendix table A7-5.

Study Abroad on Government Scholarships

Rwanda has a long tradition of sending students to other countries on government scholarships. In the past, some types of training were simply not available locally. The situation has changed with the explosive growth of higher education in recent years, yet students continue to be sent abroad. As chapter 3 documented, each student on an overseas government scholarship costs the state nearly three times as much as one studying at a domestic public institution. In recent years the government has had to allocate about a quarter of its total current public spending to higher education to finance overseas study.

Number of Students Involved

Table 7-5 summarizes the trends in government-financed study abroad since the late 1960s.[9] The number of overseas scholars rose steadily from 220 in the late 1960s to 902 by 1999–2000 before falling to 646 in 2001–02.[10] The increase in the early years, coupled with slow growth in domestic enrollments, meant that an average of 33 to 44 percent of all higher education students were studying abroad in the two decades leading up to 1986. The share dropped steadily after 1999, reaching a floor of only 6.0 percent by 2001–02.

Data on women's participation in overseas studies, which are available beginning in the 1980s, show significant improvement with time. In the 1980s women accounted for less than 10 percent of students studying on overseas government scholarships, but during the period 1999–2002, their share averaged just under 30 percent. This proportion is similar to the share of women in domestic public institutions.

9. The information on Rwandan students studying abroad does not include students financed privately, but their numbers are likely to be very small.

10. The Université adventiste d'Afrique centrale (UAAC), an international institution, has a branch in Rwanda. The 20 students studying on government scholarships at the Rwandan branch of the UAAC are excluded from the count in table 7-5.

Distribution of Overseas Scholars by Field and Level of Study

Table 7-6 shows the distribution of overseas scholars in 1984–85 and in 2000–01. Excluding those for whom the field of study is unknown or undefined, 76 percent of the students on an overseas scholarship were pursuing courses in the applied and natural sciences in the earlier year. By 2000–01, the share had declined to 57 percent, a drop of nearly 20 percentage points. The retreat from the applied and natural sciences mirrors a similar shift in the domestic system. Still, the share of overseas scholars in these disciplines is high in comparison with the corresponding shares of 42 percent in the public sector and 10 percent for all domestic students.

In both the humanities and social sciences and the hard sciences, the trend has been toward increasing concentration in the pattern of enrollments. Nearly three-quarters of the overseas scholars in the humanities and social sciences were pursuing courses in economics, management, and business in 2000–01, compared with about 46 percent in the mid-1980s. In the applied and natural sciences the scholars have clustered around science and technology, boosting the share of this domain from 61 percent in the mid-1980s to nearly 78 percent in 2000–01. These shifts are again consistent with the trend in the domestic system, where increasing shares of students are enrolled in courses with an explicit orientation toward future jobs.

Table 7-6 also offers information (for 2000–01 only) on the level of the courses pursued by overseas scholars. A very high share (87 percent) was enrolled at the undergraduate level or lower. Given the high cost of education abroad, it is important to determine the extent to which these students are pursuing training that is indeed unavailable in Rwanda. Since 43 percent of them were in the humanities and social sciences, and 88 percent of these were studying at the undergraduate level or lower, there is a high likelihood that a large proportion of these students could have been channeled to domestic institutions at a much lower cost to the government.

Distribution of Enrollments by Host Country

Table 7-7 shows the number of Rwandan students on overseas government scholarships by host country. In 1984–85, 45 percent of these students were hosted by developed countries (members of the Organisation for Economic Co-operation and Development, OECD); 43 percent were in non-OECD countries outside Sub-Saharan Africa; and only 12 percent were studying in Sub-Saharan African countries. By the late 1990s and early 2000s, the pattern had changed dramatically: the OECD share of students had fallen to about 14 percent, whereas the share of non-OECD countries outside Sub-Saharan Africa had risen to 49 percent and that of Sub-Saharan Africa countries, to 37 percent. These changes have been accompanied by an increase in the number of host countries in Sub-Saharan Africa, in contrast to decreases in the other two country groups.

Beyond the broad trends, the changes taking place at the country level are also noteworthy. In 1984–85 India received no Rwandan government-sponsored students, but by 1999–2002, it had the single largest contingent of such students, between 35 and 45 percent of the total. South Africa and Uganda also became important host countries during the same period: neither had any government-sponsored Rwandan scholars in 1984–85, but by 1999–2002 South Africa was host to 7–15 percent of these students and Uganda, to 9–16 percent. All of the main OECD host countries except Canada have seen a decline in their shares of government-sponsored Rwandan students. Among the non-OECD countries, the change in Russia's position is especially dramatic: its share fell from 29 percent in 1984–85 to a mere 2 percent in 2001–02.

Differences in the cost of education abroad and in the cost-sharing arrangements with the host countries appear to be among the key factors driving these changes. Around 2002, students studying in Algeria, China, India, Poland, and Russia were on special bilateral programs under which the host country paid the fees and offered a small grant, while the Rwandan government topped up the grant and paid for the airfare. (See appendix table A7-7 for details.) As for the other potential hosts, it is much cheaper for the government to send students to neighboring African countries than to OECD countries. For example, annual academic fees alone currently range from US$11,000 to US$14,000 in OECD countries but are less than US$1,200 in South Africa. In addition, welfare grants for students studying in OECD countries range from

TABLE 7-6: NUMBER AND DISTRIBUTION OF RWANDAN STUDENTS ON OVERSEAS GOVERNMENT SCHOLARSHIPS BY FIELD AND LEVEL OF STUDY, 2000–01

	1984–85		2000–01				
			Number of students by level of study				
Field of study	Number of students, all levels	Distribution by field (%)[a]	2-year diploma[b]	3–4 year undergraduate program[c]	Masters and PhD	All levels	Distribution by field (%)[a]
Humanities and social sciences							
Law	17	11.4	0	28	3	31	9.0
Economics, management, and business	69	46.3	10	220	21	251	73.2
Literature, arts, and social studies	63	42.3	1	43	17	61	17.8
Subtotal	**149**	**23.8**	**11**	**291**	**41**	**343**	**43.3**
Applied and natural sciences							
Medicine and pharmacy	81	17.0	6	36	19	61	13.6
Science and technology	288	60.5	8	311	31	350	77.8
Agronomy, agroindustry, etc.	107	22.5	0	35	4	39	8.7
Subtotal	**476**	**76.2**	**14**	**382**	**54**	**450**	**56.7**
Others/unknown	83	11.7	1	97	24	122	13.3
All fields	**708**	**100.0[d]**	**26**	**770**	**119**	**915[e]**	**100.0[d]**
Distribution by level of study (%)			2.8	84.2	13.0	100.0	

Blanks denote not applicable.

a. The percentages of the two broad fields—humanities and social sciences, and applied and natural sciences—sum to 100 percent; the percentages for each individual field sum to 100 percent within each of these broad fields.

b. Leading to a *bachelier* certificate in Francophone systems.

c. Leading to a *licence* certificate in Francophone systems or a bachelor's degree in Anglophone systems.

d. Sum of subtotals for humanities and social sciences and for applied and social sciences; excludes "Others/unknown."

e. Includes 38 students on government scholarships studying at the local branch of the Université adventiste d'Afrique centrale (UAAC).

Source: For data for 2000–01, personal communication from the Direction de l'enseignement supérieur, Ministry of Education; for data for 1984–85, Rwanda (1986b).

TABLE 7-7: NUMBER OF RWANDAN STUDENTS ON OVERSEAS GOVERNMENT SCHOLARSHIPS AND THEIR HOST COUNTRIES, 1984–85 AND 1999–2002

Region or country	1984–85			1999–2002				
				Number of Students				
	Number students of	Number of countries host	Regional share of students (%)	1999–2000	2000–01	2001–02[a]	Number of host countries	Regional share of students (%)[b]
Sub-Saharan Africa	**89**	**11**	**12.6**	**369**	**334**	**244**	**15–17**	**37.0**
Congo, Dem. Rep.	23	1		0	0	0	0	
Senegal	25	1		8	10	21	1	
South Africa	0	0		65	87	94	1	
Uganda	0	0		141	138	61	1	
Other	41	9		155	99	68	12–14	
OECD countries	**318**	**11**	**44.9**	**151**	**114**	**96**	**8–9**	**14.1**
Belgium	77	1		20	22	15	1	
Canada	38	1		28	28	33	1	
France	48	1		25	15	11	1	
Germany	70	1		6	6	7	1	
United Kingdom	1	1		40	22	17	1	
United States	33	1		18	12	9	1	
Other	51	5		14	9	4	2–3	
Rest of world	**301**	**13**	**42.5**	**461**	**467**	**326**	**6–10**	**48.9**
Algeria	42	1		24	31	40	1	
China	25	1		25	32	35	1	
India	0	0		403	373	231	1	
U.S.S.R./Russia	207	1		0	22	15	1	
Other	27	10		9	9	5	2–6	
Total	**708**	**35**	**100.0**	**981**	**915**	**666**	**31–32**	**100.0**

Note: Because of the often small numbers involved, shares of individual countries are not calculated.

a. Includes students on overseas government scholarships studying at the Rwandan branch of the Université adventiste d'Afrique centrale (UAAC).

b. Computed from average enrollments from 1999–2000 to 2001–02.

Source: See appendix table A7-6.

US$8,400 to US$14,400, depending on the level of study, whereas for students sent to South Africa the corresponding range is US$3,400 to US$4,200. These cost differences and the availability in recent years of high-quality programs in non-OECD countries, including other Sub-Saharan African countries, explain in large part the significant changes in the destinations of students going abroad on government scholarships.

Staffing Patterns in Public and Private Institutions of Higher Education

We turn now to other aspects of the domestic higher education system, including the nationality and the academic qualifications of the faculty and the pattern of staffing ratios across institutions. Although faculty remuneration is relevant to policy development in the sector, it is not addressed here because the available information is highly fragmented and could not easily be consolidated within the time frame of this study.[11]

Faculty Characteristics

Table 7-8 shows the numbers of full-time and part-time faculty, the share of expatriates among the full-time staff, and the academic composition of the faculty for four public institutions and for the two private institutions with the highest enrollments. At the UNR, the number of staff grew by 78 percent between the mid-1980s and 2000–01, fueled by a more than threefold increase in enrollments. The number of expatriate staff members appears to have grown almost as rapidly, as suggested by the relative stability of their share of the full-time faculty (23 percent in the mid-1980s and 21 percent in 2000–01). The data for the other public institutions pertain only to 2000–01. They show substantial variation in the dependency on foreign staff, ranging from highs of 40 percent at the KIE and around 30 percent at the KIST and the ISAE to 14 percent at the KHI. In the private sector the share of expatriate faculty was 15 percent at the ULK; the UAAC uses no foreign teachers at all. The generally lower shares in the private sector are to be expected, since foreign teachers are costly and are probably not affordable in large numbers, considering the fee income that private institutions are able to generate.

The data also reveal wide variations among institutions in the use of part-time and visiting faculty. The UNR had 6 visiting or part-time staff for every 10 full-time staff in 2000–01, a ratio comparable to that in the mid-1980s. At the ISAE the ratio in 2000–01 was slightly lower than at the UNR, but at the KIST the ratio was drastically lower: only 1 visitor per 10 full-time staff. In contrast to the situation at the public institutions, private sector schools rely much more heavily on part-time staff; part-timers outnumber full-time faculty by 30 percent at the ULK and by 80 percent at the UAAC. As with the use of expatriate staff, cost considerations probably lie behind the pattern. Because many part-timers are actually full-time staff members at the public institutions, their use does not necessarily compromise the quality of teaching, although continuity in teaching arrangements may not be fully ensured, given the nature of temporary contracts.

Turning to qualifications, because of the difficulty of establishing precise categories of qualification, we have simply grouped the full-time staff into two main categories: those with doctorates and those with less than a master's or a *maîtrise* degree.[12] At the UNR the share of highly qualified staff has diminished since the mid-1980s, but the decline is surprisingly small, given the heavy losses in human capital during the genocide. In absolute terms only a quarter of faculty members

11. The government recently established standard rates by qualification for all foreign faculty, but the structure and composition of pay for nationals remain institution specific. The lack of comparability in faculty remuneration across public institutions is perceived as a problem by some and is the subject of ongoing policy development.

12. Part of the difficulty is that the same qualification label may refer to different levels of training, depending on when and where the training took place. To illustrate, the *licence* degree in the French system is currently awarded following a three-year course that is taken after passing the *baccalauréat* examination administered at the end of the secondary cycle. In earlier years, however, a four-year course was the norm. In the Belgian system the *licence* degree may require four or five years of study. The available data do not allow us to distinguish among the various situations.

TABLE 7-8: NUMBER AND COMPOSITION OF HIGHER EDUCATION FACULTY BY INSTITUTION, RWANDA, SELECTED YEARS

Sector and name of institution[a]	Full-time faculty		Number of part-time and visiting faculty per full-time faculty	Qualifications of full-time faculty[b]	
	Number	% expatriate		% with doctorate	% with less than a master's or *maîtrise* degree[c]
Public					
Université nationale du Rwanda (UNR)					
Mid-1980s	218	23.2	0.7	40.2[d]	—
2000–01	389[e]	20.8[f]	0.6	34.6[d] (24.0)[g]	43.8
Kigali Institute of Science, Technology and Management (KIST)	162	30.2	0.1	21.0	—
Kigali Institute of Education (KIE)	85	40.0	—	45.3	15.1
Kigali Health Institute (KHI)	63	14.3	—	—	55.3
Institut supérieur d'agronomie et d'élevage (ISAE)	31	32.3	0.5	6.5	54.8
Private					
Université libre de Kigali (ULK)	55	14.5	1.3	—	40.0
Université adventiste d'Afrique centrale (UAAC)	12	0	1.8	16.7	25.0

—Not available.

a. For all institutions except the UNR, the data are for 2000–01.

b. Distribution for the UNR in 2000–01 is for national staff only.

c. Includes those with a *licence*, bachelor of arts, or bachelor of science degree.

d. Includes medical doctors.

e. Includes 22 United Nations volunteer lecturers and 35 teachers in the Ecole pratique des langues modernes (EPLM), a language training program for first-year students aimed at enabling them to become bilingual in English and French.

f. Assumes that the 35 EPLM teachers are nationals.

g. Excludes medical doctors, to render the percentage comparable to figures for the other institutions.

Source: Small survey of teachers and their qualifications conducted by the Direction de l'enseignement supérieur, Ministry of Education; for data on the UNR in the mid-1980s, Rwanda (1986b).

(excluding medical doctors) currently hold doctorates, whereas nearly 44 percent have only a *licence* or a bachelor's degree (i.e., less than a *maîtrise* or a master's degree). The situation at the KIST at the top end of the qualification range is comparable to that of the UNR, but it is much worse at the ISAE. Among the public institutions, only the KIE has an impressively high stock of doctorate holders among its staff.[13] In the private sector, faculty qualifications are generally not much better than at the UNR. For example, 40 percent of the ULK's full-time faculty lacks a

13. In the absence of more detailed data, it is unclear whether the high share of doctorates is equally prevalent among the KIE's national and expatriate staff.

TABLE 7-9: NUMBER OF NATIONALS ON THE UNIVERSITÉ NATIONALE DU RWANDA (UNR) FACULTY STUDYING OVERSEAS ON GOVERNMENT SCHOLARSHIPS AS OF FEBRUARY 2002

Item	Share (or number)
Number of UNR faculty members on overseas scholarships	(92)
% working toward a master's degree	55.3
% working toward a doctorate	28.7
As % of full-time nationals on the faculty	33.7
Total scholarship holders abroad in 2001–02[a]	(666)
% scholarship holders who are UNR faculty members	13.8
% UNR faculty among those pursuing postgraduate degrees[b]	64.7

a. Includes students on overseas government scholarships studying at the Rwandan branch of the Université adventiste d'Afrique centrale (UAAC).

b. One hundred and nineteen overseas government scholars were studying for postgraduate degrees. See table 7-6.

Source: For data on UNR staff, personal communications from UNR officials; for number of overseas scholarship holders, appendix table A7-5.

postgraduate degree, and at the UAAC the share is 25 percent. The overall picture, considering both public and private institutions, is one in which many faculty members in higher education are barely ahead of the students they teach.

Given the high proportion of inadequately qualified staff, faculty upgrading is an obvious priority in staff development. At the UNR, one-third of the national full-time faculty in 2002 was pursuing additional training via overseas government scholarships (table 7-9).[14] Of these, 55 percent was reading for a master's degree and 29 percent for a doctorate. These faculty members accounted for 14 percent of all students studying on overseas government scholarships but made up more than two-thirds of those pursuing studies at the postgraduate level.

Staffing Ratios in Public and Private Institutions

We next examine the patterns of staff utilization across institutions, using student-to-staff ratios as an indicator. The relevant data for the main public institutions and the two private institutions with the largest numbers of students appear in table 7-10. Consider first the ratio of students to full-time faculty (column A, under "Staffing ratios"). The ratios are clearly much more favorable at the public institutions than at the private ones, but that pattern is to be expected, given the differences between the two sectors in the reliance on visiting or part-time faculty. As for how the ratios would change if such faculty were taken into account, little information is available for making an exact calculation, but we can perform some simple simulations based on plausible assumptions about the average teaching load of the visiting staff. In the table the ratios in column (B) assume that a visiting or part-time faculty member supplies, on average, one-quarter of the regular load of a full-time faculty member; column (C) assumes that such a faculty member supplies one-half of the regular load. The simulation results show that the differences in staffing

14. Faculty at other public institutions are also being upgraded through overseas government scholarships. There are 12 such faculty members from the KHI and 4 from the ISAE. Similar information is unavailable for the KIST and the KIE. Among the private institutions, the UAAC currently has two faculty members studying abroad, one jointly financed by the Roman Catholic Church and the government of Rwanda and the other sponsored by Canada.

TABLE 7-10: NUMBER OF FACULTY AND ACTUAL AND SIMULATED STAFFING RATIOS IN PUBLIC AND PRIVATE HIGHER EDUCATION INSTITUTIONS, RWANDA, 2000–01

Sector and institution	Number				Staffing ratios			
	Full-time faculty	Part-time and visiting faculty	Nonteaching staff	Students	Students to teaching staff (A)[a]	(B)[b]	(C)[c]	Students to nonteaching staff
Public								
UNR	389[d]	222	701[e]	4,840	12	11	10	9
KIST	162	19	189	1,592	10	10	9	8
KIE	85	—	148	959	11	—	—	6
KHI	63	—	43	690	11	—	—	16
ISAE	31	15	76	526	17	15	14	7
Private								
ULK	55	73	30	3,250	59	44	36	108
UAAC	12	21	6	445	37	26	20	74

— Not available

Note: For the full names of institutions, see table 7-8.

a. The denominator includes only full-time faculty.

b. The denominator includes both full-time faculty and part-time and visiting faculty. It is assumed that, on average, a part-time or visiting faculty member supplies the equivalent of one-quarter the official teaching load of a full-time staff member.

c. The denominator includes both full-time faculty and part-time and visiting faculty. It is assumed that, on average, a part-time or visiting faculty member supplies the equivalent of one-half the official teaching load of a full-time staff member.

d. Includes 35 teachers in the Ecole pratique des langues modernes (EPLM) and 22 United Nations volunteer lecturers.

e. Excludes the 228 administrative staff employed at the university hospital.

Source: For data on enrollments and number of faculty, appendix tables A7-1, A7-3, and A7-8; for number of nonteaching staff, personal communications from the individual institutions.

ratios between the public and private sectors diminish but remain large. Under assumption (C), the ratio ranges from 9 at the KIST and 10 at the UNR to 14 at the ISAE. By contrast, in the private sector the ratio is 36 at the ULK and 20 at the UAAC.

With regard to nonteaching staff, the difference between public and private institutions is even greater. The ratio of students to nonteaching staff is less than 10 at all the public institutions except the KHI, where it is 16. By contrast, the ratio is 108 at the ULK and 74 at the UAAC.

The large differences in staffing ratios for both teaching and nonteaching faculty inevitably imply much costlier services in the public sector than in the private institutions. It may therefore be appropriate to explore the potential for tighter cost management through better staff utilization at the public institutions.

Student-Faculty Ratios by Field of Study at the UNR

As a refinement of the estimates presented above, we examine the situation at the UNR in greater detail. The available data allow us to adjust the ratios by removing from the denominator the number of faculty who are on overseas government scholarships and including the actual

hours of teaching supplied by visiting and part-time faculty.[15] We are also able to compute the ratios by field of study. The results, shown in table 7-11, should provide a more accurate picture of staffing ratios at the university. For the institution as a whole, the ratio of students to full-time faculty on active duty is 16.3, but this falls to 11.3 if visiting and part-time staff are included as units of full-time equivalent staff. The latter estimate is comparable to the simulated ratio of 11 derived in table 7-10 under the assumption that a visiting faculty member or part-time faculty member supplies one-half of the teaching load of a full-time staff member. In the discussion below, we focus only on the ratios that take into account both full-time faculty and visiting and part-time faculty.

The average ratio for the institution as a whole masks wide differences across fields of study. For the 27 percent of the university's students who were enrolled for language training in the Ecole pratique des langues modernes (EPLM), the ratio was 21.8, whereas it was 10.3 for the remaining students, who were enrolled in specialized programs. Within the specialized programs, the ratios in the humanities and social sciences tend to exceed those in the applied and natural sciences, but there are important exceptions. The ratio for journalism and communications was lower (3.5) than for any of the specialties in the applied and natural sciences, and that for arts and human sciences was only slightly higher (9.2) than the corresponding ratios of 7.4 for medicine and 8.8 for science and technology.[16]

These estimates by field of study provide even clearer evidence of the highly favorable staffing ratios in the public sector. Two fields—law, and economics, social sciences, and management—account for the bulk of the students at the ULK and the UAAC, the two main private institutions in the country.[17] In the public sector, the ratio for law at the UNR was 12.5 and that for economics, social science, and management was 14.2. The average ratios for the private sector ULK and UAAC were much higher, even under the conservative assumption that part-time and visiting staff supplied, on average, half the teaching load of full-time faculty. Under this assumption, the average ratio for the humanities and social sciences field would be 36 at the ULK and 20 at the UAAC. The available evidence, at least as it pertains to the humanities and social sciences, thus points to potential scope for improving staff utilization in the public sector.

Costs of Service Delivery and Student Finance

Higher education is costly in Rwanda, in part because of the staffing patterns documented above. As was shown in chapter 3, the cost to the government for each student in the public system is much higher in Rwanda than in other developing countries; it averaged more than 9 times per capita GDP in 1999, whereas the average for countries in Anglophone Africa, the region with the highest costs among low-income countries, was 6.3. In this section we document differences in the cost of service delivery among institutions in the public sector and within the UNR by field of study. We also examine the arrangements for student finance and the fees charged for private higher education.

15. About a quarter of the UNR's full-time staff is on overseas government scholarships. Even though some of them may be away only part of the time and may continue to teach some classes, we exclude them completely to generate ratios that are likely to be overestimated rather than underestimated. For the conversion of visiting and part-time faculty to full-time equivalents, see the notes to table 7-11.

16. The low ratios for these three fields may be driven by temporary dips in enrollments for the year to which the data relate, but even if the higher enrollments in adjacent years are used instead, the ratios remain modest.

17. The ULK and the UAAC together accounted for 91 percent of all students in the private sector in 2000–01. Less than 2 percent of their student bodies were enrolled in applied and natural sciences programs. The ULK catered exclusively to programs in the humanities and social sciences, and the UAAC had only 68 students in the applied and natural sciences in a total student body of 440 (see appendix table A7-3).

Table 7-11: Student-Faculty Ratios by Field of Study, Université Nationale du Rwanda (UNR), 2000–01

Field of study	Number of students	Full-time faculty			Part-time and visiting faculty		Student-faculty ratio	
		Total	Number on overseas scholarships	Number on active duty[a]	Total hours of teaching services provided	Number in full-time equivalent units[b]	Full-time faculty on active duty[a]	Full-time and full-time equivalent faculty
Law	338	26	7	19	1,599	8.0	17.8	12.5
Arts and human sciences	371	45	17	28	2,445	12.2	13.3	9.2
Economics, social sciences, and management	1,142	61	15	46	6,858	34.3	24.8	14.2
Education	562	43	8	35	1,545	7.7	16.1	13.2
Journalism and communications	30	7	0	7	315	1.6	4.3	3.5
Agronomy	79	31	17	14	1,386	6.9	5.6	3.8
Medicine	419	51	8	43	2,790	14.0	9.7	7.4
Science and technology	569	63	17	46	3,730	18.7	12.4	8.8
Total in specialized fields	3,510	327	89	238	20,668	103.3	14.7	10.3
Ecole pratique des langues modernes (EPLM)	1,330	35	2	33	5,585[c]	27.9	40.3	21.8
United Nations volunteer lecturers		22	0	22	0	0		
Other[d]		5	1	4	0	0		
Overall total	4,840	389	92	297	20,668	131.3	16.3	11.3

Blanks denote not applicable.

a. Excludes those on overseas scholarships.

b. Assumes a conversion rate of 200 hours annually per full-time staff. The official load for faculty by rank is as follows: 180 hours for *assistants*, 210 hours for *chargés des cours* and *chargés des cours associés*, and 240 hours for *professeurs associés* and *professeurs titulaires*.

c. Estimated from the reported expenditure of FRw 29.6 million in 2000 on visiting faculty teaching in the EPLM and assuming that visiting faculty are remunerated at US$15 (FRw 5,300) per hour, the typical rate for holders of master's degrees.

d. Teachers in the Ecole de santé publique et de nutrition, which in 2000–01 had faculty but no enrollments.

Source: For enrollment by field of study, appendix table A7-4; for number of faculty, appendix table A7-8; for hours of teaching provided by part-time and visiting staff, personal communications by UNR officials.

Cost of Service Delivery in Public Institutions

Cost of service delivery here refers to the running cost of providing teaching and other student services. The bursaries received by students, net of the portion deducted to help defray the cost of student services, are an additional burden on the public purse, but they are not part of the direct operating costs of the institutions and are therefore considered separately, below.

The relevant data on cost per student at five of the country's six public institutions appear in table 7-12.[18] Consider first the pattern within the UNR. Unit costs are lowest for students in the preparatory language training program offered through the EPLM, but at FRw 545,000 per student (equivalent to 6.6 times per capita GDP), they nonetheless appear high for a nonspecialized course.[19] For the specialized programs, the costs vary from FRw 669,000 per student in economics, social sciences, and management to FRw 1,385,000 in science and technology. These patterns are generally (although not completely) consistent with the staffing ratios considered previously, in that costs tend to be higher in fields with more favorable student-faculty ratios.[20]

As expected, a wide variation also exists in the cost of service delivery across institutions, from FRw 757,000 at the ISAE (which has the highest student-faculty ratio among the public institutions) to FRw 1,360,000 at the KIST. The per student cost at the KIST is comparable to that for courses in science and technology at the UNR—which is not surprising, given the similarity in the corresponding staffing ratios. Operating costs at the KIE are also on the very high side: at FRw 1,066,000 per student, the cost is 23 percent higher than the corresponding cost in the field of education at the UNR. The KIE's higher cost is undoubtedly associated with its lower student-faculty ratio, which is estimated at no more than 11.0 to 1, compared with about 13.2 to 1 for the education faculty at the UNR, but its relatively large shares of expatriate staff (40 percent in 2000–01) and of highly qualified faculty (45 percent holding doctorates) may be contributing factors.[21] At the KHI, operating costs are smaller than for medicine at the UNR: they come to FRw 702,000 per student, compared with FRw 933,000. The KHI has a slightly higher student-faculty ratio, which may explain its cost advantage, but the main reason for the difference probably has to do with the KHI's focus on less costly training programs such as nursing, physiotherapy, and radiography rather than on training medical doctors.

In addition, the available data for the UNR permit us to examine the distribution of operating costs across three broad categories of spending—faculty-level academic services and administration; university-level administration; and student services (food, housing, and student health)—as well as the share of spending on personnel, overall and within each category (see table 7-13).[22]

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18. As in other aspects of higher education documented so far, the financial data presented here have been carefully culled from reports supplied to the authors by each institution. To illustrate the work underlying the cost estimates in table 7-12, consider those for the UNR. The data refer to actual spending in 1999–2000 and 2000–01, weighted by 9 and 3 months, respectively, to coincide with the span of the academic year. Care was taken to exclude spending at the university hospital and the associated laboratory because these are largely separate operations from the teaching function of the university (although they may provide medical and pharmacy students with the venue for their practical training). The components of spending per student—on faculty-level academic services and administration, university-level administration, and student services—reflect actual reported spending. The latter two categories are, obviously, uniform across faculties, but the first category is not.

19. For comparison, the cost of public upper secondary education, excluding bursaries, was only 0.85 times per capita GDP in 1999, implying that the operating costs of the language training program at the UNR are more than eight times those of public upper secondary education.

20. Aside from staffing ratios, other factors, including the cost of materials and supplies and the need for support staff such as laboratory assistants, also influence costs.

21. See tables 7-10 and 7-11 and their explanatory notes for the relevant data and details on their estimation.

22. The share of spending on personnel within each category is estimated by first computing total spending on personnel based on (a) data on the number of staff by salary grade and seniority and the structure of staff remuneration by pay grade and seniority, (b) the number and cost of visiting and part-time staff, and (c) the number, seniority, and qualifications of nonteaching staff and their pay scale. The result from this bottom-up approach is then checked for consistency against the university's aggregate spending.

TABLE 7-12: COST OF SERVICE DELIVERY PER STUDENT IN PUBLIC HIGHER EDUCATION INSTITUTIONS, AND DISTRIBUTION BY FIELD OF STUDY AT THE UNR, 2000

Field of specialization	Overall cost of services per student[a]	
	Thousands of current FRw	As multiple of per capita GDP
Université nationale du Rwanda (UNR)[b]	**784**	**9.5**
Law	670	8.2
Arts and human sciences	964	11.7
Economics, social sciences, and management	669	8.1
Education	867	10.6
Journalism and communication	820	10.0
Medicine	933	11.3
Science and technology	1,385	16.8
Ecole pratique des langues modernes (EPLM)	545	6.6
Ratio of spending on personnel to overall spending	(0.49)[c] (0.61)[d]	
Kigali Institute of Science, Technology and Management[e]	1,360	16.5
Kigali Institute of Education[e]	1,066	13.0
Kigali Health Institute[f]	702	8.5
Institut supérieur d'agronomie et d'élevage (ISAE)	757	9.2

Blanks denote not calculated.

a. Costs include salaries of full-time faculty, part-time and visiting faculty, and administrative and service personnel; costs of materials and supplies; and other operating outlays, including those associated with providing student services (food, housing, and health care). Spending on student bursaries, net of the amount taken at the source by the institution to cover registration fees and for student services (i.e., food, lodging, and medical care), constitutes a transfer to students and is excluded from the calculation. For the UNR, costs associated with the university hospital and the hospital laboratory are excluded.

b. Includes data for agronomy and the Ecole de santé publique et de nutrition; information on these activities is insufficiently reliable to show separately in the table.

c. The denominator includes spending on faculty-level academic services and administration, university-level administration, and student services. See table 7-13 for a breakdown of costs by these three categories.

d. The denominator includes spending on faculty-level academic services and administration and university-level administration but excludes the cost of student services.

e. To the extent that the underlying data contain some double counting of student bursaries and the cost of student services, the figures shown here may be somewhat overestimated.

f. Reflects an estimate for 2000 based on data for 2001.

Source: Authors' estimation based on expenditure data supplied by officials at individual institutions.

The per student cost of university-level administration and student services is the same throughout the university—about FRw 275,500 and FRw 181,600, respectively. As a result of this uniformity, the variation in the faculty-specific shares of spending by category is driven exclusively by differences in the absolute level of academic and administration costs at the faculty level and not at all by faculty-level differences in spending priorities.

Nearly a quarter of the UNR's operating expenses is devoted to student welfare services, and more than a third goes for systemwide administrative overhead, leaving just 42 percent for actual teaching and related support services at the faculty level. Although no clear benchmark indicates that the existing balance is suboptimal, an allocation of 42 percent for what is, after all, a core function of the university does appear low, suggesting a possible area for exploration in the process of policy development. Furthermore, most of the resources that do reach the faculties are

TABLE 7-13: PER STUDENT COSTS OF SERVICE DELIVERY, UNIVERSITÉ NATIONALE DU RWANDA, 2000

Item	Faculty-level academic services and administration	University-level administration	Student services
Percentage share of overall costs	42	35	23
Percentage share of spending on personnel	89	28	24

Note: Faculty-level costs are specific to each faculty and reflect the number and composition of the staff and the amount of nonpersonnel outlays. University-level administration includes expenditure on personnel and materials by offices with universitywide functions (rector's office, departments of finance and audit, personnel office, printing, library, computer center, etc.). Student services include the cost of personnel and materials for student food, housing, and health care.

taken up by personnel costs, which average 89 percent for the institution as a whole and fall no lower than 85 percent in any faculty. Some of the nonpersonnel costs that account for 72 percent of systemwide administrative overhead may be for materials bought in bulk by the university for distribution to the faculties.[23] Although the available data do not permit this aspect of spending to be traced, the share of personnel in the combined spending for faculty-level and universitywide administration works out to about 61 percent, suggesting that the balance between staff and the material resources that support teaching might in fact be better than is apparent at first sight. Whether it is optimal is beyond the scope of the present report; we simply flag it here as yet another issue for additional analysis.

Student Finance

As in many systems of higher education in Francophone countries, full-time students in public institutions in Rwanda generally receive a bursary.[24] Until January 2002, the arrangement was for deductions to be taken at the source to cover the cost of food, housing, and health care; the remainder was given to students as a cash transfer.[25] The registration fee for the students is paid directly rather than deducted from the bursary. This fee is small and typically covers a minuscule fraction of the cost of the academic services provided by the institutions.

As it turned out, the size of the deductions from the bursaries was also modest in relation to the costs of student welfare services. Each public institution therefore received additional budget allocations to make up the difference (figure 7-1). These arrangements implied that beyond the bursary, students also received in-kind benefits in the form of subsidized services. In the context of preparation of the 2002 budget, the government agreed to a plan under which the operating costs of student welfare services were transferred to the students rather than to each establishment. The change, adopted in January 2002, effectively made explicit the full value of the welfare subsidies provided to students.

Keeping the foregoing context in mind, we now examine the available data on students who receive government bursaries at three public institutions—the UNR, the KIE, and the ISAE

23. Nonpersonnel costs make up an even larger share of total spending for student welfare services; much of the spending is for food for the student cafeteria.

24. Although the bursary is given in the form of repayable loans, no mechanism has ever been put in place to collect repayment, and students in fact perceive their bursaries as nonrepayable grants. The ministry has proposed that a student financing agency be established to monitor student loans and collect repayment, and the agency was expected to be operational by early 2003.

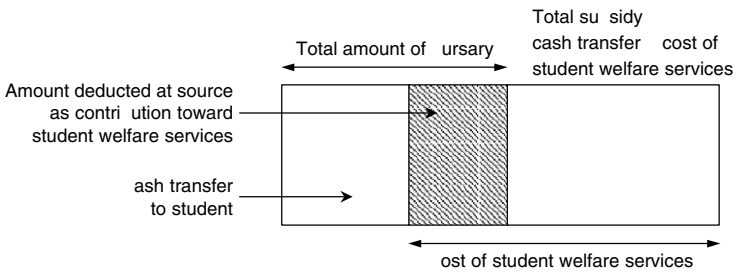
25. See appendix table A7-9 for details on the deductions for UNR students who are fed and housed on campus and for those who eat and live off campus. The arrangements at other public institutions are comparable to those at the UNR.

TABLE 7-14: NUMBER AND SHARE OF STUDENTS RECEIVING BURSARIES AND VARIOUS STUDENT SERVICES, SELECTED PUBLIC INSTITUTIONS, RWANDA, 1994–2001

	Université national du Rwanda (UNR)				Kigali Institute of Education (KIE)		Institut supérieur d'agronomie et d'élevage (ISAE)	
Year	Number of students	% receiving a bursary	% on a meal plan	% in student housing	Number of students	% receiving a bursary	Number of Students	% receiving a bursary
1994–95	3,261	98.5		49.8	—	—	—	—
1995–96	3,948	98.8		41.1	—	—	—	—
1996–97	4,178	98.7		38.8	—	—	—	—
1997–98	4,548	98.6	60.4	40.1	—	—	—	—
1998–99	*Année blanche* (classes cancelled)				299	72.2	164	96.3
1999–2000	4,535	98.4	77.2	40.2	597	95.8	314	89.5
2000–01	4,840	98.4	76.3	45.1	959	97.3	526	89.2
2001–02	5,922	92.4	79.9	36.9	—	—	—	—

— Not available.
Source: Authors' compilation based on data supplied by individual institutions.

FIGURE 7-1: ARRANGEMENTS FOR STUDENT FINANCE IN PUBLIC HIGHER EDUCATION IN RWANDA UP TO JANUARY 2002



Source: Authors' construction.

(table 7-14). The share of such students at the UNR has been relatively constant, at almost 99 percent, throughout the postgenocide period except for 2001–02, when it fell to 92 percent. At the KIE, the share has been rising, from 72 percent in 1998–99 to 97 percent in 2000–01. The trend is in the opposite direction at the ISAE, where the share of students receiving bursaries fell from 96 percent in 1999–99 to 90 percent in 2000–01. Although precise data are not available for the other public institutions (the KIST and the KHI), comparably high shares of their students receive bursaries. Overall, therefore, securing a place in public higher education literally guarantees that a student will receive a bursary.[26]

26. For completeness, the data for the UNR in table 7-14 also show the shares of students who take their meals at the university and who live in student housing. The share of students on a meal plan rose from 60 percent in 1997–98 to 80 percent in 2001–02; the share living on campus fluctuated between 37 and 50 percent during the whole period.

TABLE 7-15: AVERAGE ANNUAL VALUE OF STUDENT BURSARIES, CASH TRANSFERS, AND DEDUCTIONS FOR STUDENT SERVICES IN PUBLIC HIGHER EDUCATION, RWANDA, 2000–01

	Amount of bursary per student (FRw)		Deductions from bursary per student		
Institution	Total[a]	Cash transfer to students	FRw[b]	As % of the cost of all student welfare services	As % of the cost of food
Université nationale du Rwanda (UNR)	101,200	56,739	44,461	24.5	27.8
Kigali Institute of Science, and Management (KIST) Technology	104,500	60,214	44,286	—	51.0
Kigali Institute of Education (KIE)	106,700	89,728[c]	16,972	—	59.8
Kigali Health Institute (KHI)[d]	110,000	56,440	53,560	—	41.9

— Not available.

Note: FRw, Rwandan francs.

a. Refers to the standard bursary of FRw 110,000 a year (FRw 11,000 per month for 10 months a year) multiplied by the share of students receiving a bursary. No information is available on the precise percentage of KIST students receiving a bursary. For the purpose of this calculation, we assume it to be the average of the percentages in the UNR and the KIE, that is, 95 percent.

b. The amount is deducted to pay for student welfare services (e.g., meals, housing, and health care). It is calculated here as the difference between the two preceding columns.

c. The amount may be an overestimate because of possible double counting in the available raw data.

d. The cost of student welfare services includes the cost of service personnel, the cost of materials, and other operating outlays.

Source: Authors' construction based on data supplied by individual institutions.

During the past few years, the bursary amounted to FRw 11,000 per month for a period of 10 months per academic year. From this amount, deductions were made at the source for health services, meals, and housing, and the remainder was transferred to the student in cash. The amounts deducted differed depending on the institution, the meal plan students chose, and whether they lived in student housing. At the UNR, for example, the deductions amounted to FRw 500 for health services, FRw 5,400 for a meal plan, and FRw 650 for student housing. For students living and boarding on campus, the cash transfer was thus FRw 4,450 per month, and for those fending for themselves and receiving only health services, it was FRw 10,500 per month. Students also paid an annual registration fee of FRw 7,300. The remaining pocket money after the deductions and the registration fee ranged from FRw 37,200 to FRw 97,700 a year, depending on whether or not the student lived and ate on campus.

Some estimates for what these arrangements imply in the aggregate are shown in table 7-15 for four public institutions. The data are not precise, especially for the KIST and the KIE, where the reporting systems are still being streamlined, but they are sufficiently robust for our purpose. The average bursary per student is computed simply by weighting the value of a full bursary by the share of students who receive the benefit. The average cash transfer to students is computed from the financial accounts supplied by each institution and the number of students receiving bursaries. These data allow us to derive the amount deducted, on average, for student services. At the UNR, the deductions covered 25 percent of the cost of all student services and about 28 percent of the cost of food alone. Because the cost of student services amounted, on average, to FRw 180,000 per year, the value of welfare subsidies received by UNR students, in cash and in

kind, totaled FRw 236,700 annually (= 180,000 + 101,200 – 44,500; see figure 7-1 for a graphical illustration of the calculation). The amount was generous, as it was equivalent to nearly 80 percent of the average pay, including benefits, of a primary school teacher (see table 3-6 in chapter 3 for the relevant data on teacher pay).

As noted above, the government decided during the preparation of the 2002 budget that all direct costs of student welfare would be transferred to the students rather than have institutions provide indirect subsidies for student accommodation and food. The plan was implemented in January 2002, and all government-financed students began receiving a bursary of FRw 25,000 per month. As in the past, the bursary is being offered for 10 months per academic year, for a total of FRw 250,000 per year. Under the new system, the annual amount of the subsidies is expected to shrink gradually, to FRw 200,000 in 2003 and FRw 150,000 in 2004. Implementation of this part of the plan, however, has been delayed, and during 2003, students continued to receive FRw 25,000 per month.

If the value of the bursaries fell to FRw 150,000 a year, and if the cost of services remained at about FRw 180,000 a year, students would have to top up their bursaries with out-of-pocket contributions of FRw 30,000 if they were still expected to pay the full cost of these services. This would represent a break from the tradition of complete subsidization, but it is only a small step in the right direction. At the UNR, for example, the change would affect only the 23 percent of operating costs associated with student services; the remaining 77 percent would still require wholesale government subsidization unless additional cost-sharing policies were put in place. It should also be noted that although higher education institutions are no longer to provide in-kind subsidies to students under the new plan (and thus no longer receive a budget allocation for food), they may still be providing in-kind subsidies to the extent that they pay for the salaries of staff who provide student welfare services.

Fees and Student Finance in the Private Sector

Table 7-16 summarizes the patchy information on private sector fees and student finance that could be compiled in the context of this study. Most students in higher education institutions pay only a registration fee, which currently amounts to FRw 7,300 a year.[27] In the private sector, students pay annual fees of about FRw 160,000 to FRw 210,000 at the ULK, depending on the level of study, and up to FRw 225,000 at the ISPG. These rates are comparable to the charges for privately financed students who enroll at public institutions, and they appear to be consistent with what private institutions would need to collect to be financially viable, assuming that fees constituted their primary source of income.[28] At some private institutions, however, a significant share of students defray their costs through a government bursary awarded through the Genocide Fund.

Student Flow Efficiency and Output of Graduates

Institutions of higher education produce many outputs, including research and scientific knowledge, but a primary function is to produce graduates. How smoothly do students make the transition from year to year through the system? How many are being produced each year, and in

27. In recent years some public institutions have begun catering to self-financed students, who incur other costs in addition to the registration fee that all students pay. For example, at the UNR, there were 67 such students in 2001–02, and they paid FRw 200,000 in annual tuition fees. At the KIST, the amounts charged for self-financed students include FRw 198,000 a year for tuition, FRw 1,000 for application fees, FRw 4,000 for registration fees, FRw 5,000 for examination fees, FRw 1,000 for identity card costs, and a refundable FRw 30,000 for deposit ("caution") money. Lunch expenses, averaging FRw 88,000 a year, are levied on students who participate in the institution's meal plan.

28. As a simple check, we note that the cost per student at the UNR amounts to about FRw 784,000 and that the student-faculty ratio is about 10.3. At the ULK the student-faculty ratio (after taking into account the probable teaching loads of visiting and part-time faculty) is about 36. If the cost structure for teaching and other activities is comparable in the public and private sectors, these data would imply a cost per student of about FRw 224,000 in the private sector.

TABLE 7-16: FEES AND PERCENTAGE OF STUDENTS RECEIVING GOVERNMENT BURSARIES, PRIVATE HIGHER EDUCATION INSTITUTIONS, RWANDA, 1998–2002

	ULK	UAAC	UNILAK	ISPG
Fees (thousand FRw)				
Annual registration fees	10	—	10	5
Annual tuition fees (circa 2001)				
Bachelier degree	120	201	120–130	200
Licence degree	150		190	
Other annual fees	30–50[a]	—	—	20[b]
% of students receiving government bursary[c]				
1998–99	18	—	—	—
1999–2000	31	—	31	—
2000–01	13	—	17	—
2001–02	—	36	8	9

— Not available.

Note: FRw, Rwandan francs; ULK, Université libre de Kigali; UAAC, Université adventiste d'Afrique central; UNILAK, Université laïque de Kigali; ISPG, Institut supérieur des pédagogie de Gitwe.

a. Amount reflects the approximate annualized ranges of fees (*frais de mémoire*) of FRw 100,000 charged to final-year students.

b. Amount reflects charges for internship training.

c. Almost all the bursaries are given by the Genocide Fund.

Source: Authors' compilation based on information supplied by officials at individual institutions.

what fields of specialization? Answers to these questions are documented in this section, again on the basis of data supplied by the institutions.

Promotion, Repetition, and Survival Rates

Table 7-17 presents data on promotion, repetition, and survival rates for selected public and private institutions and by field of specialization within the UNR.[29] Because the data for the private institutions are somewhat patchy, we note only that the pattern of student flow is not worse than in the public institutions and in some cases is much better. The data for public institutions are more complete and allow us to make comparisons among fields within the UNR and among several of the institutions.

At the UNR, promotion rates among students in their first year in a specialized field range from a very low 44 percent in science and technology to highs of only 74 percent in economics, social sciences, and management and in education. The promotion rates at the KHI and the ISFP are much better, but at the ISAE the rate falls to 55 percent. Students who fail to be promoted either drop out or repeat the year. Among first-year law students, for example, 70 percent are promoted and 10 percent repeat the first year, implying that 20 percent drop out. In all fields, some dropout does occur among first-year cohorts. The attrition rate appears to be particularly high for students in science and technology at the UNR (35 percent) and at the ISAE (30 percent).

29. Because the promotion rates from the second to the penultimate year tend to be relatively flat, they are shown in the table as averages rather than for each year in the cycle. The number of years involved varies across field of study, ranging from the basic four years (excluding the year spent in the language training program at the EPLM) to five years for agronomy and six years for medicine. The promotion rate for students in the language program is reasonably high, at 84.7 percent.

TABLE 7-17: PROMOTION, REPETITION, AND SURVIVAL RATES, SELECTED HIGHER EDUCATION INSTITUTIONS, RWANDA, CIRCA 2000

Institution and field of study	Promotion rates by year of study in the selected field (%)			Repetition rates by year of study in the selected field (%)			Survival rate (%)[a]	Index of student flow efficiency[b]
	1st year	2nd to penultimate year	Final year	1st year	2nd to penultimate year	Final year		
UNR								
Law	70	78	11	10	16	89	58	38
Economics, social sciences, and management	74	85	40	6	4	60	53	69
Education	74	90	51	8	3	49	60	75
Arts and human sciences	73	87	49	13	3	51	58	74
Agronomy	—	90	30	—	6	70	76	65
Medicine	66	89	11	8	7	89	50	46
Science and technology	44	77	—[c]	21	12	—[c]	—[c]	—[c]
KHI	84	84	89	5	10	9	81	85
ISAE	55	85	94	15	6	0	55	73
ISFP	90	100	—	7	0	—	97	95
ULK (average for all years of study)	78	—	—	11	—	—	—	—
UNILAK	69	88	—	8	0	—	66	77
ISPG	90	98	95	5	0	5	90	94

— Not available.

Note: UNR, Université nationale du Rwanda; KHI, Kigali Health Institute; ISAE, Institute supérieur d'agronomie et d'élevage; ISFP, Institut supérieur des finances publique; ULK, Université libre de Kigali; UNILAK, Université laïque de Kigali; ISPG, Institut supérieur des pédagogie de Gitwe.

The first year refers to the first year of study in the selected field, not the first year of enrollment at the university, during which some students may attend the Ecole pratique des langues modernes (EPLM) to become bilingual in French and English. The duration of study differs across fields; it is five years in agronomy, six years in medicine, and four years in all other fields shown in this table. The rate for promotion from the second year to the penultimate year in the cycle refers to the average of the rates, which shows a relatively stable pattern.

a. Refers to the percentage of first-year students in the indicated field of specialization who eventually obtain a diploma or degree, with or without repeating a year.

b. The index has a maximum value of 100, corresponding to a situation in which all students complete their studies without repeating or dropping out. Here, it is computed from the data shown in the preceding columns on promotion and repetition rates and by weighting dropouts in proportion to the number of years they complete before leaving the system.

c. Not computed because the underlying data pertain to only 12 students in physics and chemistry.

Source: Authors' computation on the basis of data supplied by individual institutions.

Once past the first year, the rates of progression improve, with much better promotion rates and lower repetition rates for all fields in the UNR and in the other public institutions as well. Dropout correspondingly falls to reasonably low levels. These salutary trends are perhaps the result of a selection process that winnows out the weaker students in the first year. The situation continues to improve among final-year students at the KHI and the ISAE, but it deteriorates dramatically at the UNR for all fields. The rate of promotion (that is, of graduation) falls to only

11 percent in law and medicine and rises no higher than about 50 percent in education and in the arts and human sciences. Although part of the reason for this startling lapse may be practices and policies peculiar to the UNR, a more sinister view is that prevailing labor market conditions and the current bursary scheme combine to give students an incentive to remain at the university as long as possible. The prospects of salaried employment are not bright—in 2000 the unemployment rate among degree holders ages 25–29 was about 35 percent—and the value of the bursary and the in-kind welfare services that repeaters apparently continue to receive is quite attractive. Under these circumstances, it makes sense for students to repeat their final year. Although this explanation of the high repetition rates among final-year students at the UNR is only conjecture at this point, these rates nonetheless point to a serious problem in student flow management that warrants attention as part of development of policy for the sector.

As a summary measure of the efficiency of student flow, table 7-17 shows two additional indicators: the percentage of first-year students who graduate (the survival rate), and an index of student flow efficiency, which measures the wastage in the system in relation to a hypothetical situation in which students neither drop out nor repeat (in which case the index would be 100). The results suggest that much room for improvement exists, especially at the UNR, where the graduation rate reaches no higher than 76 percent, for agronomy, and sinks to 50 percent for medicine and 53 percent for economics, social sciences, and management. The impact of the high repetition rate among final-year students shows up in the dismal efficiency indices for law and medicine. In the remaining public institutions for which data are available, performance is excellent at the ISFP, where the graduation rate is 97 percent and the efficiency index is 95 percent. The KHI boasts reasonably good results too, but the ISAE's performance is no better than the UNR's.

Output of Graduates

The numbers of graduates, grouped into two broad domains—social sciences and management, and sciences and technology—appear in table 7-18. The UNR is now producing more than three times as many graduates as in the 1980s, but its share of the number of graduates countrywide in 2001–02 (26 percent) nonetheless seems modest in relation to its share of enrollments (36 percent). The volume of output for the public sector as a whole exceeds the private sector's output by nearly 40 percent, and the distribution of the skills mix is roughly balanced between the arts and the sciences, whereas it is skewed almost entirely toward the arts in the private sector. The system, public and private, is currently producing about 1,700 higher education graduates, two-thirds of them in social sciences and management. The output can be expected to increase in coming years, given recent increases in enrollments. To illustrate, if enrollments remained at the estimated total of about 17,000 in 2001–02, and if survival rates were conservatively assumed to be 50 percent, which is comparable to the average rate across fields of study at the UNR, the output of graduates would exceed 2,100 a year (assuming that courses last an average of four years). If survival rates were higher—say, 75 percent, which is possible because survival rates at other public institutions, and probably at private ones as well, are better than at the UNR—the output of graduates would approach 3,200 annually. These simulations raise the question of whether the Rwandan labor market can effectively absorb this volume of output. Unless job creation keeps pace with the recent explosive growth in higher education enrollments, graduate unemployment could easily develop into a major social problem in the coming years.

Policy Implications

Rwanda's system of higher education has expanded and diversified rapidly in the postgenocide period. Once dominated by the UNR, it now includes three new public institutions—the KIST, the KIE, and the KHI—with combined enrollments in 2001–02 roughly equal to the UNR's, as well as several new private institutions. The largest of these private institutions, the ULK, enrolled about as many students as the UNR in 2001–02. The system's expansion has been fueled by a strong demand for higher education, which in turn has been stimulated by the widespread scarcity,

TABLE 7-18: NUMBER OF GRADUATES BY INSTITUTION AND BROAD FIELD OF SPECIALIZATION, RWANDA, 1980S AND CIRCA 2000

Sector, institution, and period	Social sciences and management	Sciences and technology	All fields
Public	**497**	**493**	**990**
UNR[a]			
1980s	90	53	142
2001–02	325	124	449
KIST, 2001	34	98	132
KIE, projected for 2002[b]	90	90	180
KHI, 2001	0	110	110
ISAE, 1999–2000	0	71	71
ISFP, 2000–01	48	0	48
Private	**709**	**10**	**719**
ULK, 1999–2000[c]	605	0	605
UAAC, 2000–01	66	0	66
UNILAK, 2000–01	38	0	38
ISPG, 2000–01	0	10	10
Total	**1,206**	**503**	**1,709**

Note: UNR, Université nationale du Rwanda; KIST, Kigali Institute of Science, Technology and Management; KIE, Kigali Institute of Education; KHI, Kigali Health Institute; ISAE, Institute supérieur d'agronomie et d'élevage; ISFP, Institut supérieur des finances publique; ULK, Université libre de Kigali; UAAC, Université adventiste d'Afrique centrale; UNILAK, Université laïque de Kigali; ISPG, Institut supérieur des pédagogie de Gitwe.

a. Data for the 1980s refer to the average annual number of students graduating with a *licence* degree. For 2001–02, data refer to the number of final-year students in the second cycle, which leads to the licence degree.

b. The number of graduates in the two domains is an approximation based on the distribution of enrollments between the domains in 2000–01.

c. Includes graduates of the first and second cycles, which lead to, respectively, the *baccalauréat* and *licence* degrees.

Source: For data for the UNR in the 1980s, Rwanda, *Annuaires statistiques de l'enseignement supérieur au Rwanda* (various years, 1981–86); for recent years, data supplied by individual institutions.

in the aftermath of the genocide, of qualified labor in government and in the modern sector of the economy.

In the past few years the system has developed in ways that have strengthened it in several respects. The increased diversity has created healthy competition across institutions, as each tries to adapt its course offerings to match labor market needs. The changes are especially evident at the UNR, where enrollments have shifted dramatically since the 1980s toward fields with an explicit labor market orientation. The highly pragmatic approach, in both public and private institutions, of using expatriate teachers and visiting and part-time staff to deliver courses has enabled the system to rise quickly to the challenge of rebuilding the country's depleted human capital. At the same time, it has given the system the flexibility and suppleness that it will need to remain responsive in an evolving environment.

Yet not all is well in the sector. The single most important issue is the unsustainability of current arrangements for financing higher education. At present, the subsector absorbs nearly 40 percent of total public current expenditure on education—a level of spending that can continue only to the detriment of efforts to develop primary and secondary education and at the cost of seriously compromising the country's broader poverty reduction agenda. Three factors combine

to create the crisis in financing: the arrangements for student finance for in-country study, government financing of overseas study, and the high cost of service delivery in the public institutions.

Student Finance for Study in Rwanda

Almost all students in Rwandan public institutions of higher education, including repeaters, receive a full government bursary, as well as subsidized welfare services. The total value of the cash and in-kind subsidies currently amounts to about FRw 237,000 per student per year. These arrangements have persisted even as the number of students in the system has risen nearly 2.5 times since the genocide. That the current system of student subsidization is unsustainable is quickly becoming evident, and the government has proposed addressing the problem through a gradual reduction in the value of the subsidies. Yet the proposed reform appears timid in relation to the scale of the problem. The real challenge is to move away from the present blanket system of subsidization to one in which subsidies are offered much more selectively—for example, to students pursuing particular fields or who come from particularly disadvantaged backgrounds—and are thus more sustainable.

Government Scholarships for Study Abroad

Scholarships for study abroad currently account for about a quarter of the government's current spending on higher education. The trends have been moving in the right direction in recent years: fewer students are being sent abroad, and those who do go are being increasingly directed to such lower-cost countries as India, where the host government has waived tuition fees, and Uganda and South Africa, where physical proximity helps lower costs, instead of, as in the past, to OECD countries. Nevertheless, on average, a scholar studying in another country still costs nearly three times as much as one studying at government expense in Rwanda. The proportion enrolled overseas at the undergraduate level or lower is currently very high (87 percent), and nearly half of the scholars pursue degrees in the humanities and social sciences. In the past, when higher education in Rwanda was still nascent, there might have been a stronger rationale for sending students—even undergraduates—to other countries. In today's greatly changed situation, it might make sense to channel students to domestic institutions whenever feasible rather than to institutions abroad. This move would reduce the burden on the public purse while supporting the development of the domestic system.

High Cost of Service Delivery

The cost problem pervades the entire public sector. Unit costs in Rwanda's public education sector are now among the highest among low-income countries. One of the main reasons is the high staffing ratios for both teaching and nonteaching staff in all public institutions—only one-third to one-half the ratios for comparable fields in the private sector. Most of the available resources in the public system are eaten up by personnel expenses, with little left to finance complementary inputs. Improving staff utilization in the public system is thus a key challenge in policy development. One potential intervention in this regard is to rationalize course offerings—not only within each institution but also in the public sector as a whole—to avoid duplication and take advantage of economies of scale in service delivery. More broadly, the scope for reducing duplication in course offerings by the public and private sectors, particularly in fields in which private institutions have demonstrated their capacity to deliver training, should be explored. Allowing the largely self-financing private institutions to expand and to serve more students would reduce the financial burden on the public sector.

Student Flow

The analysis presented in this chapter points to the need for tighter management of student flow in the public system. In the newer institutions, such as the KHI and possibly also the KIST and the KIE, the first batches of students appear to have moved through the system expeditiously, without too much dropout or repetition. By contrast, the pattern of student flow at the UNR

leaves much to be desired: repetition in the final year of study is high across all faculties but reaches extremely high levels of nearly 90 percent in law and medicine. A more general issue in managing student flow pertains to the volume and skills mix of the system's output of graduates. The current output of 1,700 graduates a year could rise to 3,200 a year under plausible assumptions about the pattern of student flow. Although the system's capacity to ramp up production so dramatically is indeed remarkable, success must ultimately be judged by how well the output matches the availability of jobs. As the emergency of replacing lost human capital is overcome and the task becomes one of supplying a steady stream of graduates to fill positions created by a modernizing economy, tighter management of intake to the system, particularly in the highly subsidized public sector, and of students' movement through the system will increasingly be needed to achieve a good balance between the supply of and demand for highly educated labor.

Conclusion

Higher education faces many development challenges in Rwanda. Following the explosive growth of the system in the postgenocide years, it is now time to take stock and explore possible directions for the future development of the sector. The most important task facing policymakers is to get the system onto a development path that is more fiscally sustainable than the one it has been traveling on so far. The data and analysis presented in this chapter suggest that this will require not only changes in the system of student finance but also improvements in staff utilization within the public institutions, reform of government sponsorship of study abroad, care in expanding the public sector to avoid crowding out the private sector, and better management of student flow, particularly at the UNR, the country's largest public institution. Although these are not the only issues that matter in higher education, they cannot be ignored as the country grapples with what has now become a serious imbalance in the allocation of public spending on education that is clearly at odds with the country's expressed commitment to poverty reduction.

CHAPTER 8

EDUCATION AND THE LABOR MARKET

The preceding chapters examined the financing, coverage, and internal operations of Rwanda's education system. In this chapter we look at the system's external efficiency. An important concern is how well the education system is responding to the labor market's demand for educated workers.[1] The issue is complicated and, inevitably, dynamic in nature. In Rwanda its complexity has been accentuated by the country's recent history and the ensuing disruption of economic activity and massive movements of population, both within and across the country's borders. In the initial phase of recovery in the mid-1990s, acute shortages of educated workers were felt everywhere in both the public and private sectors. Many qualified Rwandans in the diaspora have since returned to the country, and the education system has expanded. The situation is thus shifting from one of meeting emergency shortages of qualified workers to one in which a steady flow of school leavers is entering the labor force in search of suitable jobs. This chapter looks at whether school leavers are landing jobs for which their education has prepared them and whether the investment in producing qualified workers is yielding the expected returns.

The kinds of data needed for a comprehensive assessment of these issues—such as tracer studies to track the employment experience of recent school leavers—are unavailable. Nonetheless, insights can be gained by reviewing cross-sectional data on the overall structure of employment, the educational profile of workers, and returns to education by level and by examining indirect evidence on the school-to-work transition of recent entrants to the labor market.

1. Besides supplying educated labor for the economy, investments in education produce other social benefits such as better health-seeking behaviors and outcomes, lower fertility, and greater participation in community life. In this chapter, however, we are concerned only with the link between education and the labor market.

TABLE 8-1: SELECTED DATA ON POPULATION, LABOR FORCE, EMPLOYMENT, AND RELATED INDICATORS, RWANDA, 1991 AND 2000

(Thousands, unless otherwise indicated)	1991	2000
Total population	7,157.6	7,979.9
Population age 10 and above	4,674.1	5,595.1
Population in the labor force[a]	3,569.4	3,482.0
Employed population[b]	3,547.0	3,425.2
Nonworking population[c]	3,610.6	4,554.7
Dependency ratio[d]	1.0	1.3
Labor force participation rate (%)[e]	76.4	62.2
Unemployment rate (%)[f]	0.6	1.6

a. Includes all employed persons, as well as those actively seeking a job.
b. Includes all workers, whether paid or unpaid.
c. Includes all persons who are neither employed nor actively seeking a job.
d. Ratio of the nonworking population to the working population.
e. Labor force (employed persons and active job seekers) as a percentage of the population age 10 years and above.
f. Working population as a percentage of the labor force.
Source: 1991 Population Census; authors' estimates based on the 1999–2001 Household Living Conditions Survey.

Employment Structure, Educational Attainment of Workers, and Returns to Education

In this section we present data on the structure of employment and the educational profile of workers and examine the current pattern of returns to education by level.

Structure of Employment

Table 8-1 presents data on the overall size of the labor force and selected indicators on labor force participation, unemployment, and dependency. Between 1991 and 2000, the labor force (those working or actively seeking a job) fell by nearly 2.5 percent, and the population with a job, whether paid or unpaid, fell by more than 3.4 percent—a loss of 122,000 jobs. Meanwhile, the total population grew by 11.5 percent, and the population age 10 and above grew by 19.7 percent. As a result of these trends, the labor force participation rate (the labor force relative to the population age 10 and above) fell from 76.4 percent in 1991 to 62.2 percent in 2000; the unemployment rate climbed from 0.6 to 1.6 percent; and the dependency ratio (the nonworking population relative to the working population) rose from 1.0 to 1.3.

Continued dominance of jobs in agriculture. Trends in the distribution of employment by sector appear in table 8-2. Even though agriculture employed nearly 190,000 fewer workers in 2000 than in 1991, the sector continues to dominate employment in Rwanda, accounting for nearly 89 percent of all jobs in 2000. The number of jobs in industry and public works shrank between 1991 and 2000, by roughly one-third in both cases, further reducing these sectors' already tiny shares of employment. In contrast to these trends, the number of jobs in the transport and communications sector and, especially, in the commerce and services sector grew. Commerce and services employed 110,000 more workers in 2000 than in 1991, raising its share of employment from about 6 percent to almost 10 percent.

Increasing share of unpaid family workers and continued importance of self-employment. Table 8-3 shows the number and distribution of workers by type of employment and type of job. In 2000 there were some 108,000 more salaried jobs, about 11,000 more employers, and an estimated

TABLE 8-2: DISTRIBUTION OF EMPLOYMENT BY SECTOR, RWANDA, 1991 AND 2000

Sector	1991 Number of workers (thousands)	1991 %	2000 Number of workers (thousands)	2000 %
Agriculture	3,224.4	90.9	3,034.6	88.5
Industry	49.7	1.4	33.1	1.0
Energy	3.5	0.1	3.7	0.1
Public works	31.9	0.9	20.4	0.6
Transport and communications	14.2	0.4	23.0	0.7
Commerce and services	195.1	5.5	306.2	8.9
Other	28.4	0.8	4.2	0.1
All sectors	3,547.2	100.0	3,425.2	100.0

Source: 1991 Population Census; authors' estimates based on the 1999–2001 Household Living Conditions Survey.

8,000 more apprentices than in 1991. Correspondingly, during the same period the share of salaried jobs in total employment rose from 7.6 percent in 1991 to 11.0 percent in 2000; the share of employers rose from 0.1 percent to 0.4 percent; and the share of apprentices grew from a negligible figure to 0.2 percent. These shifts are nowhere near the size of the increase of 417,000 unpaid family workers between 1991 and 2000, which swelled the share of such workers in total employment from 25.5 to 38.6 percent. Moving in the opposite direction is self-employment, which dropped sharply, by nearly 639,000 persons, during the period. Despite the large decrease, self-employment continues to account for nearly 50 percent of the jobs in the Rwandan economy.

Looking at the distribution by type of employment, agricultural jobs declined between 1991 and 2000, as noted above. Similar job losses also occurred in production (11,000 fewer jobs) and managerial positions (a decline of more than 2,000). By contrast, administrative jobs grew by about 2,000, professional and technical jobs by 7,000, service provider jobs by 39,000, and commerce and sales jobs by 55,000. Even with their growth, however, these four job categories together accounted for less than 9 percent of total employment in 2000.

Trends in Workers' Educational Profile

Despite the disruption to the education system caused by the 1994 genocide, Rwanda's labor force had a better educational profile in 2000 than in 1991. The number of workers with no schooling fell by 21 percent, and the number of those with one to three years of primary schooling fell by 8 percent, while the number with at least four years of primary schooling swelled by 22 percent. These shifts show up in the trends in the educational composition of the workforce documented in table 8-4. In 1991, 40 percent of the workers had no schooling, but by 2000 the share was down to 33 percent. Workers with at least four years of primary schooling made up 37 percent of the workforce in 1992 but 47 percent in 2000. The improvement holds for all levels of education: workers with at least some secondary education accounted for 4.1 percent of the workforce in 2000, compared with 2.6 percent in 1991.

The rising educational attainment of Rwanda's labor force may be the result of the improvement in cohort survival rates in primary schooling documented in chapter 5. A more likely explanation, particularly for the observed improvements at the high end of the educational ladder, is that

TABLE 8-3: NUMBER AND DISTRIBUTION OF WORKERS BY TYPE OF EMPLOYMENT AND JOB, RWANDA, 1991 AND 2000

	1991		2000	
Type of employment and job	**Number of workers (thousands)**	**%**	**Number of workers (thousands)**	**%**
By type of employment				
Salaried jobs	—	—	—	—
Public sector	—	—	54.1	1.6
Quasi public sector	—	—	21.3	0.6
Private formal sector	—	—	59.3	1.7
Private informal sector	—	—	242.8	7.1
Total salaried jobs	269.6	7.6	377.5	11.0
Apprentices	0.0	0.0	8.2	0.2
Employers	3.5	0.1	14.8	0.4
Self-employed	2,341.2	66.0	1,702.5	49.7
Unpaid family workers	904.5	25.5	1,321.5	38.6
Other	28.4	0.8	0.7	0.0
All types of employment	**3,547.2**	**100.0**	**3,425.2**	**100.0**
By type of job				
Professional and technical	46.1	1.3	52.6	1.5
Managerial	3.5	0.1	1.3	0.0
Administrative and related workers	21.3	0.6	23.4	0.7
Commerce and sales	35.5	1.0	90.0	2.6
Services	81.6	2.3	120.3	3.5
Agricultural and related workers	3,224.4	90.9	3,031.6	88.5
Production and related workers	110.0	3.1	99.5	2.9
Other	24.8	0.7	6.5	0.2
All types of jobs	**3,547.2**	**100**	**3,425.2**	**100.0**

— Not available.

Source: 1991 Population Census; authors' estimates based on the 1999–2001 Household Living Conditions Survey.

as civil peace was reestablished following the genocide, employment conditions and other factors improved sufficiently to attract significant numbers of educated Rwandans who had been living abroad to return and take up jobs. As we shall see below, the pattern of returns to education is consistent with this explanation.

Structure of Earnings and Returns to Education

The 1999–2001 Household Living Conditions Survey provides the most up-to-date data on earnings, but the information pertains only to wage earners. According to the survey, the wage differentials are relatively wide for workers in different sectors of the economy (table 8-5). The average worker in the informal sector earns only about one-fifth as much as his or her counterpart in the formal sector. Significant gaps in educational attainment are part of the reason: workers in the informal sector have, on average, only 3.5 years of schooling, compared with more than 9 years among formal sector workers.

TABLE 8-4: PERCENTAGE DISTRIBUTION OF THE EMPLOYED POPULATION BY EDUCATIONAL ATTAINMENT, RWANDA, 1991 AND 2000

Educational attainment	1991	2000
No schooling	40.1	32.8
Primary education	53.5	60.1
1–3 years	20.9	19.9
4 or more years	32.6	40.2
Secondary vocational and technical education	2.2	3.0
General secondary education	2.6	3.7
Higher education		0.4
Other	1.5	0.0
Total	100.0	100.0

Sources: 1991 Population Census; authors' estimates based on the 1999–2001 Household Living Conditions Survey.

TABLE 8-5: AVERAGE SALARIES AND YEARS OF SCHOOLING OF WAGE EARNERS IN THE FORMAL AND INFORMAL SECTORS, RWANDA, 2000

Sector	Average annual salary (thousand FRw)	Years of schooling
Formal sector		
Public	575.3	10.4
Quasi public	1,095.4	9.2
Private	706.6	8.2
Average	711.0	9.3
Informal sector	142.9	3.5
Overall average	356.7	5.7

Note: FRw, Rwandan francs.
Source: Authors' estimates based on the 1999–2001 Household Living Conditions Survey.

Given the significant disparities in earnings and education, one can expect the private returns to education, particularly for upper levels of educational attainment, to be high. Table 8-6 confirms this expectation: an extra year of schooling above the sample mean yields a return of 17.5 percent for the average wage earner.

The return to schooling varies substantially by level of education: it is 13.2 percent for primary education, compared with 18.4 for secondary vocational education and 21.3 percent for general secondary education. The smaller relative return to vocational education is at odds with the commonly held belief that vocational and technical education tends to confer significant labor market advantages on students who follow that curriculum. Although deficiencies in the content of courses offered in the past may explain the lower returns, the possibility that such courses are inherently less responsive than general education to labor market needs cannot be dismissed. This possibility is, moreover, consistent with the findings in most developing country settings regarding the labor market performance of public sector vocational and technical education and training (see for example, Johanson and Adams forthcoming).

TABLE 8-6: RATES OF RETURN TO EDUCATION BY LEVEL AND SECTOR OF EMPLOYMENT, RWANDA, 2000

Level of education	All sectors	Public and quasi-public sectors	Private sector	
			Formal	Informal
Average rate of return[a]	17.5	17.3	12.2	15.1
Rate of return by level[b]				
Primary	13.2	n.s.	n.s.	12.7
Secondary vocational and technical	18.4	n.s.	n.s.	25.0
General secondary	21.3	9.6	10.8	25.3
Higher education	46.9	30.8	34.0	—

— Not available because of lack of sufficient observations in the dataset.

n.s. Statistically insignificant.

a. Corresponds to the coefficient on total years of schooling in the Mincerian earnings functions reported in Lassibille and Tan (2003).

b. Corresponds to the coefficients on years of schooling in primary, secondary vocational, general secondary, and higher education in the Mincerian earnings functions reported in Lassibille and Tan (2003).

Source: Lassibille and Tan (2003), based on the 1999–2001 Household Living Conditions Survey.

Noteworthy, too, is the exceptionally high profitability of higher education, which yields a private return of 46.9 percent. High rates of return to this level of education are not uncommon in low-income countries: their modern sectors are usually small, and wages at the high end tend to be "sticky" in that imbalances in the supply and demand for highly educated workers are accommodated more often through quantity than through price adjustments. These forces are reinforced in Rwanda by the need, in the aftermath of the genocide, to set sufficiently high wages to attract highly educated Rwandans and others to positions in government and elsewhere.

For completeness, table 8-6 also shows the rates of return to education by level and sector of employment. The results indicate that the profitability of education varies widely across the three sectors of the economy. In the public and formal private sectors, primary education and vocational and technical secondary education yield hardly any returns; general secondary education yields a respectable return of almost 10 percent; and higher education fetches a return of more than 30 percent. Because workers with modest levels of schooling are likely to work in the informal sector, the returns to education in this part of the economy are of special interest: even primary education yields an attractive return of nearly 13 percent; and both general secondary and vocational and technical secondary education generate returns of about 25 percent, which is substantial by any benchmark.

Taken as a whole, these results imply that the private incentives for investing in education in Rwanda are strong at all levels. In both secondary and higher education, the private returns are so high that even in the absence of public subsidies, one would expect the demand for education to be strong. That this is the case is confirmed by the rapid growth of private higher education in recent years and the continued high share of students in private secondary schools.

Output of Graduates and Their Absorption into the Workforce

The foregoing evidence on the pattern of returns to education provides one piece of the puzzle regarding the link between education and the labor market. Because the results pertain to earnings differentials for those who already hold a job, the information may not capture the experience of more recent entrants to the labor market, particularly in a labor market that is probably evolving from one of general scarcity to a situation of shortages in specific areas. From a policy

perspective, we would want to know whether, at the current rate of production of school leavers, there are too many or too few graduates in relation to the availability of jobs and whether graduates are landing jobs in their field of specialization and earning a reasonable return on their education. Although a full assessment would require data not available at this writing, we can nonetheless glean some insights from evidence, based on the 1999–2001 Household Living Conditions Survey, concerning the incidence of overeducation and undereducation in the workforce and unemployment rates by educational level among new entrants to the labor market. The discussion below concludes with a cross-country perspective on the size of the higher education sector in Rwanda.

Overeducation and Undereducation

Following the terminology used by, for example, Sicherman (1991) and Verdugo and Verdugo (1989), we can define three categories of workers: (a) those who are adequately qualified, (b) those who are overeducated, and (c) those who are undereducated. The "adequately qualified" are those whose educational attainment lies within one standard deviation of the mean years of schooling of wage earners in the same occupation.[2] "Overeducated" refers to wage earners whose number of years of schooling exceeds the mean of those in the same occupation by more than one standard deviation, and "undereducated" refers to those whose number of years of schooling is smaller than the mean in their occupational group by more than one standard deviation.

Table 8-7 shows the overall pattern of over- and undereducation in Rwanda in 2000. According to the foregoing definition, 60 percent of the wage earners with higher education are in jobs for which they are overeducated, compared with 13 percent among general secondary school graduates and 37 percent among vocational and technical graduates. Because jobs become more skill-intensive with time, particularly in a context of technological progress, we would expect some overeducation in most occupations. Nevertheless, the extent of overeducation, particularly among those with higher education and those with secondary vocational and technical education and training, appears somewhat excessive in Rwanda.

Two cautionary remarks on these results are in order. The first is that they pertain to overall conditions in the country, and the possibility that in some occupations workers with these qualifications might be adequately educated or even undereducated is not ruled out. The second is that in some occupations the bulk of workers may in fact be underqualified in relation to an objective definition of the minimum qualifications required to perform the job adequately. For example, a large number of upper secondary school teachers have no more than an upper secondary education themselves and are therefore clearly underqualified for the job. In such situations our calculations might find a degree holder teaching upper secondary classes to be overqualified relative to other secondary school teachers when in fact he or she is appropriately qualified and the other teachers are underqualified. But although such instances of misclassification cannot be ignored, they are unlikely to be so pervasive as to eliminate the likelihood that too many degree holders and vocational and technical graduates have qualifications that exceed the skills generally required to perform the jobs they hold.

Unemployment among New Entrants to the Labor Market.

Because workers entering the labor market for the first time tend to be concentrated in certain age groups, we can capture school leavers' likely experience in the transition from school to work by disaggregating the incidence of unemployment by age group. The results, based on survey data for 2000, appear in table 8-8; data for 1991 based on aggregated census results are included for comparison.

2. Occupation is specified at the two-digit level of the International Labour Organization (ILO) job classification.

TABLE 8-7: PERCENTAGE DISTRIBUTION OF WAGE EARNERS BY EDUCATIONAL ATTAINMENT RELATIVE TO WORKERS IN THE SAME JOBS, RWANDA, 2000

	No schooling	Primary			Secondary vocational and technical	General secondary	Higher education	All levels of education
		1–3 years	4–6 years	All				
Adequately educated	64.9	87.9	66.1	73.2	46.4	79.1	40.2	69.4
Overeducated	0.0	0.0	27.9	18.8	37.2	12.8	59.9	16.3
Undereducated	35.1	12.1	6.0	8.0	16.4	8.1	0.0	14.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a. A wage earner is classified as "adequately educated" if the number of years of schooling falls within one standard deviation of the sample mean years of schooling for workers in the same occupation (specified at the two-digit level of the International Labour Organization classification of jobs) and as "overeducated" or "undereducated" when the number of years of schooling is at least one standard deviation more or less, respectively, than the sample mean.

Source: Authors' calculations based on the 1999–2001 Household Living Conditions Survey.

TABLE 8-8: UNEMPLOYMENT RATES BY EDUCATIONAL LEVEL AND AGE, RWANDA, 1991 AND 2000

Educational attainment	1991, all ages	2000[a] 14 and younger	15–19	20–24	25–29	30–34	>34	All ages
No schooling	0.1	0.9	1.7	0.8	0.4	0.2	0.2	0.5
Primary	0.2	2.9	2.3	1.4	1.3	1.5	0.8	1.5
Secondary vocational and technical	1.4		3.8	5.9	5.7	1.3	1.3	3.1
General secondary	} 3.0			14.1	10.6	6	4.4	9.3
Higher					35.3	2.0	5.6	19.0
All groups	0.3	2.3	2.4	2.6	2.4	1.4	0.7	1.6

Blanks indicate that the number of observations in the dataset is too small to compute reliable rates of unemployment.

a. The shaded cells refer to the age groups in which first-time entrants from each education category are likely to be concentrated.

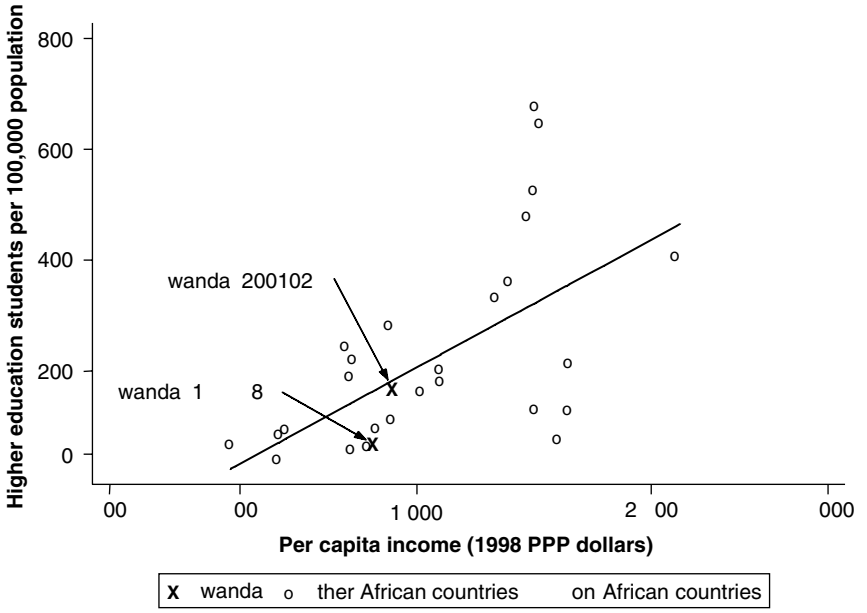
Source: 1991 Population Census of 1991; authors' estimates based on the 1999–2001 Household Living Conditions Survey.

Across all age groups, unemployment in both 1991 and 2000 was more widespread among those with secondary and higher education than among those with lower educational attainments, but the gap was substantially wider in 2000 than in 1991. The jump in unemployment rates among secondary and higher education graduates is consistent with the loss of modern sector jobs between 1991 and 2000 that was documented earlier in this chapter. If we focus on recent entrants to the labor market, whose unemployment rates are highlighted in the shaded cells in the table, the unfavorable situation of secondary and higher education graduates comes into even sharper relief. In 2000 the unemployment rate was 14 percent among general secondary school leavers in the 20–24 age group and an astonishing 35 percent among degree holders in the 25–29 age group. By contrast, unemployment rates among new labor market entrants with no schooling or only primary education stood, respectively, at less than 1 percent and just over 2 percent.

Cross-Country Perspective on the Size of Rwanda's Higher Education Sector

In view of the substantial rates of unemployment among recent degree-holding entrants to the labor market, a reasonable question is whether higher education in Rwanda, taken as a whole, is overdeveloped. One would expect that the more developed an economy, the stronger would be the demand for highly educated workers, and therefore the larger would be the appropriate size of higher education. This expectation is generally borne out in figure 8-1, which shows the relation across low-income countries between per capita GDP and the number of students in higher education as a share of the size of the country's population. In 1997–98 Rwanda was well below the regression-predicted level of enrollments in higher education, given its per capita GDP. By 2001–02, enrollments in higher education, particularly in the private sector, had expanded so rapidly as to bring them very close to the level that would be expected in a country with Rwanda's per capita income. This result, coupled with the evidence presented earlier on graduate unemployment, suggests that the catch-up phase in higher education enrollments is largely over and that the expansion of higher education, particularly in the publicly financed sector, will increasingly need to be calibrated to the growth of the economy and the creation of jobs requiring highly educated labor.

FIGURE 8-1: RELATION BETWEEN PER CAPITA INCOME AND COVERAGE IN HIGHER EDUCATION, LOW-INCOME COUNTRIES, CIRCA 1998, AND RWANDA, 1997–98 AND 2001–02



Note: PPP, purchasing power parity.

Source: Authors' construction based on data on per capita income, higher education enrollments, and population size from the World Bank's Statistical Information Management and Analysis (SIMA) database (December 16, 2002, version).

Policy Implications

In the aftermath of the genocide, acute shortages of qualified labor were felt throughout the Rwandan economy. These shortages were met during the latter half of the 1990s by increasing the output of degree holders and other graduates, both in local institutions and through scholarships for study abroad, and by attracting qualified Rwandans in the diaspora to return home to fill the vacancies. Although highly educated workers with at least a general secondary education remain a small fraction of Rwanda's workforce, the share is significantly larger today than in 1991. Enrollment in higher education in relation to the population is now on a par with that in other low-income countries at Rwanda's level of economic development, thanks to the very rapid expansion of the sector after 1997.

Although shortages of certain types of qualified labor will undoubtedly continue to be felt in parts of the economy, the high end of the labor market is beginning to show signs of saturation: significant numbers of degree holders are now in jobs for which they appear to be overqualified, and unemployment rates are high among probable first-time job seekers holding a university degree or a general secondary school certificate. These patterns suggest that the market for educated labor is being transformed from one of mass shortages everywhere to one that is driven, and probably will increasingly be driven, by the pace and direction of job creation in the economy. In other words, the challenge of filling the gaps left by the genocide-related loss of educated labor is giving way to the same generic task faced by policymakers in all low-income countries—that of ensuring a good match between the volume and skills mix of graduates from the education system and the economy's capacity to absorb these graduates into productive employment.

What are the implications for policy development? Although a full treatment would require more extensive data than were available for this study, and more analysis than could be carried out in this chapter, the results presented here provide some suggestions for shaping future policy. An important contextual consideration is the nature of Rwanda's economy: agriculture dominates employment, accounting for nearly 90 percent of the labor force in 2000, and this situation is likely to persist for the foreseeable future. A majority of Rwandans are currently self-employed or work as unpaid family labor. As the economy develops, the pattern of employment is likely to evolve along the trajectory followed by most low-income economies: a gradual shift in production away from agriculture and toward industry and services, and a concomitant shift away from unpaid family labor and toward paid employment in the modern sector.

Given the context and its likely evolution, investments in education can make an effective contribution in two directions. The first is to ensure that all children receive at least the minimum amount of schooling required to remain literate and numerate throughout their lives. The second is to manage the expansion of postprimary education so that it responds both to the social demand created as increasing numbers of children complete primary schooling and to the absorptive capacity of the labor market for highly educated workers.

Primary Education

The suggested direction for policy development in primary education is premised on the critical role that this level of schooling plays in a country's economic and social transformation. Even in traditional agriculture, studies have shown that in most developing country contexts this modicum of schooling substantially boosts farmers' productivity (see, for example, Lockheed, Jamison, and Lau 1980; Foster and Rosenzweig 1996), and this superior productivity facilitates the shift of employment away from agriculture. Ensuring that all children become literate and numerate adults also generates societal benefits such as better health and greater and more effective engagement in community life. These widely recognized benefits led the world community to include universal primary schooling among the eight Millennium Development Goals. As chapter 5 demonstrated, Rwanda is making good progress toward achieving universal primary education in the postgenocide era. The challenges in the future will be to persist in this direction by addressing the remaining pockets of nonenrollment and reducing the country's excessively high rates of grade repetition.

Postprimary Education

In postprimary education, the pressures for expansion will be felt most immediately at the lower secondary level. Accommodating this pressure to the extent permitted by the availability of resources would be consistent with the increasingly widespread view among development policymakers and educators, in Rwanda and elsewhere, that lower secondary schooling is best viewed as an extension of the primary cycle. The reasoning is that primary school leavers are often still too young to enter the labor force and that the extra few years of lower secondary schooling would reinforce their basic skills and better prepare them for adult life.

These social considerations become less persuasive in upper secondary and higher education. At these levels, cost considerations and the capacity of the economy to absorb graduates into productive employment in their field of training become increasingly relevant. As we have seen above, signs of saturation are already emerging in Rwanda's labor market, particularly for graduates from higher education. Careful management of enrollments is thus an important challenge for the future. The menu of policy instruments includes: (a) administrative measures such as setting tighter selection criteria for the intake of students; (b) other supply-side interventions such as reforming curricula and developing new courses or fields of study in response to labor market demand; (c) mobilization of market signals to guide students' choice of studies, through, for example, cost-sharing arrangements to encourage students to view their education more as an investment than an entitlement and through better dissemination of labor market information;

and (d) encouragement of greater participation by the private sector in satisfying the demand for upper secondary and higher education. Although the government is already taking appropriate action in many of these domains, it is important to monitor the policies' success in ensuring a good match between the output of graduates from the education system and the graduates' absorption into the labor market.

Conclusion

As in most other low-income countries, in Rwanda the education sector receives priority attention in the country's poverty reduction strategy. Yet in a context of limited resources, the sector's claim on the public purse needs to be justified by evidence of its contribution toward improving the welfare of the population. In this regard, the link between education and the labor market warrants close consideration. At the high end of the educational ladder, investments per student are costly and are intended to equip students with specialized skills to perform modern sector jobs. The possibility of overproduction of degree holders poses a special concern because of the high cost of higher education and the difficulties of managing graduates' job expectations. Jobs in the modern sector are generated by economic growth, and rather than simply produce more graduates in the hope that they will land the desired positions, it is important to heed the signs of saturation that have recently emerged and to manage expansion accordingly.

At the other end of the educational ladder, investments are less costly and are intended to equip students with the general-purpose skills of basic literacy and numeracy. Such skills are effective in traditional agriculture and in informal sector work, and they generate nonmarket social benefits as well. These considerations imply that the highest priority should be to ensure that all children receive at least a complete primary education and, eventually, a complete lower secondary education as resources and implementation capacity permit.

These broad policy directions for managing the education–labor market link need to be strengthened, particularly by ensuring that basic education is given priority in the allocation of public spending. Because the situation in Rwanda is not static, it is important to monitor and evaluate it regularly to ensure that policies are so adjusted as to maintain a good balance between what the education system supplies and what the labor market can productively absorb.

Statistical Appendix

TABLE A1-1: GOVERNMENT REVENUE AND EXPENDITURE, RWANDA, 1980–2002

(billions of current FRw)

		Government revenue			Government expenditure				
						Interest payments			
Year	GDP at market prices	Current revenue, excluding grants	Grants	Total government revenue	Current spending net of interest payments	On external debt	On domestic debt	Capital spending	Total government spending
1980	108.0	—	—	—	10.2	0.2	0.1	0.0	10.5
1981	122.6	10.4	4.5	14.9	13.0	0.2	0.2	9.1	22.6
1982	131.0	11.7	3.6	15.2	13.9	0.3	0.3	11.1	25.7
1983	142.2	11.6	3.9	15.4	15.3	0.2	0.5	12.5	28.6
1984	159.1	14.3	3.6	17.9	14.8	0.3	0.7	8.0	23.9
1985	173.7	17.2	4.0	21.2	15.9	0.4	0.9	11.2	28.4
1986	170.3	19.8	3.7	23.5	18.2	0.4	1.0	12.0	31.6
1987	171.4	19.7	3.4	23.1	21.5	0.6	1.2	14.0	37.3
1988	183.1	17.1	5.7	22.9	21.1	0.7	1.3	11.6	34.6
1989	192.8	19.2	5.3	24.4	21.5	0.7	1.3	12.2	35.7
1990	213.5	21.6	5.9	27.5	27.3	0.6	1.5	12.7	42.1
1991	239.3	25.0	11.1	36.1	34.5	1.0	3.3	16.8	55.6
1992	272.9	27.6	16.7	44.3	40.6	1.4	3.8	20.1	65.8
1993	282.2	25.9	18.1	44.0	37.4	1.6	4.5	21.6	65.2
1994	165.8	6.0	1.5	7.5	14.8	2.5	4.9	4.4	26.6
1995	339.0	23.1	38.4	61.5	34.3	3.8	4.0	27.4	69.5
1996	424.3	39.4	31.4	70.8	49.0	4.0	2.9	39.4	95.3
1997	558.3	58.0	37.8	95.8	57.2	3.8	3.0	45.6	109.6
1998	621.3	66.0	33.0	99.0	69.6	3.4	2.3	42.1	117.4
1999	644.0	63.5	38.4	101.9	80.6	3.5	2.4	40.4	126.9
2000	696.6	68.5	63.8	132.3	82.8	4.5	2.0	42.5	131.8
2001	765.8	83.9	55.6	139.5	99.4	5.0	1.6	58.2	164.2

— Not available.

Note: FRw, Rwandan francs; GDP, gross domestic product.

Source: World Bank Africa Live Database (April 24, 2002, version).

TABLE A1-2: CURRENT AND CAPITAL PUBLIC SPENDING ON EDUCATION, RWANDA, 1981–2001

(millions of current FRw)

Year	Current	Capital	Total
1981	3,285	—	—
1982	3,868	—	—
1983	4,573	—	—
1984	5,119	145	5,263
1985	5,050	308	5,358
1986	5,528	367	5,895
1987	5,557	456	6,012
1988	5,686	—	—
1989	5,690	—	—
1990	6,239	—	—
1991–95	—	—	—
1996	8,626	5,158	13,784
1997	11,360	7,871	19,231
1998	13,916	5,650	19,566
1999	21,738	6,103	27,841
2000	22,347	5,267	27,614
2001	25,341	16,769	42,110

— Not available.

Note: FRw, Rwandan francs; Numbers may not sum to totals because of rounding.

Source: For data up to 1990, World Bank (1989); Rwanda (1985b). For data for 1996–2001, Rwanda (1996, 1998, 1999a, 2000a, 2000f, 2001b).

TABLE A2-1: ENROLLMENTS BY LEVEL OF EDUCATION, RWANDA, SELECTED YEARS, 1970–2001

				Secondary				Higher education								
					Private			Public[d]								
Year	Preprimary	Primary[a]	CERAI, SF, and CERAR[b]	State and *libre subsidié*[c]	Recog.	Nonrecog.	Total	UNR	KIST	KIE	KHI	ISAE	ISFP	Total public	Private[e]	All
1970–71	n.d.	419,059	n.d.	10,117		n.d.	—	n.d.	0	0	0	0	0	390	n.d.	—
1975–76	n.d.	401,520	7,890	12,064		n.d.	—	657	0	0	0	0	0	859	n.d.	—
1980–81	n.d.	704,924	10,005	10,667		n.d.	—	n.d.	0	0	0	0	0	1,294	118	1,243
1985–86	n.d.	836,877	28,865	18,133		n.d.	—	1,565	0	0	0	0	0	1,565	422	1,987
1986–87	n.d.	904,378	27,596	20,692		n.d.	—	1,491	0	0	0	0	22	1,839	190	2,029
1987–88	n.d.	969,908	27,220	23,411		n.d.	—	1,674	0	0	0	0	47	1,721	540	2,261
1988–89	n.d.	1,030,182	26,952	26,091		9,740	35,831	2,050	0	0	0	77	51	2,178	631	2,809
1989–90	n.d.	1,058,529	26,206	26,251	7,636	5,231	39,118	2,185	0	0	0	83	61	2,329	680	3,009
1990–91	n.d.	1,100,437	25,302	28,162	9,351	7,585	45,098	—[f]	0	0	0	79	70	—	—	3,389
1991–92	n.d.	1,104,902	31,885	39,002	15,671	8,028	62,701	2,510	0	0	0	n.d.	n.d.	—	—	—
1992–93	n.d.	1,134,540	n.d.	30,094		n.d.	—	3,031	0	0	0	n.d.	n.d.	—	—	—
1993–94	n.d.	820,232	n.d.	3,077		n.d.	—	—[f]	0	0	0	n.d.	n.d.	—	—	4,597
1994–95	n.d.	938,365	n.d.	20,533		n.d.	—	3,261	0	0	0	n.d.	n.d.	3,261	—	—
1995–96	n.d.	1,039,657	n.d.	26,333		23,667	50,000	3,948	0	0	0	n.d.	n.d.	4,394	—	4,791
1996–97	n.d.	1,154,768	n.d.	48,926		33,298	82,224	4,178	0	0	0	113	67	4,358	299	4686
1997–98	n.d.	1,270,733	n.d.	45,045		45,786	90,831	4,548	209	0	147		94	—	656	—
1998–99	n.d.	1,288,617	n.d.	60,556		44,736	105,292	—[f]	561	299	281	164	110	—	1,794	—
1999–2000	n.d.	1,428,708	n.d.	68,457		56,667	125,124	4,535	1,149	597	391	338	98	7,108	2,982	10,05
2000–01	18,399	1,475,572	n.d.	79,699		61,464	141,163	4,840	1,592	959	691	526	121	8,729	4,029	12,757
2001–02	n.d.	n.d.	n.d.	n.d.		n.d.	n.d.	5,922	1,751	1,269	700	579	133	10,354	6,314	16,668

— Not available, or not calculated because of missing data.

n.d. No data.

a. The primary cycle was six years until 1979–80, when it was extended to seven years. The following year, it was lengthened to eight years; this change was formalized in a law of June 1985. In 1991 a new law restored the six-year cycle, with the transition to the shorter duration phased in by 1992–93.

b. CERAI, centres de l'enseignement rural et artisanal intégré; SF, section familiale (girls only); CERAR, centres de l'enseignement rural et artisanal de Rwanda (boys only). These institutions offered three-year vocational training after the eight-year primary cycle. They were discontinued after 1991–92.

c. *Libre subsidié* schools are government-aided schools in which the salaries of teachers and other school personnel are paid by the government.

d. UNR, Université nationale du Rwanda; KIST, Kigali Institute of Science, Technology and Management; KIE, Kigali Institute of Education; KHI, Kigali Health Institute; ISAE, Institut supérieur d'agronomie et d'élevage; ISFP, Institut supérieur des finances publiques (now the Institute of Finance and Banking).

e. Private sector enrollments refers to students in the following institutions: Université libre de Kigali; Université laïque de Kigali; Université adventiste d'Afrique centrale (UAAC), which enrolled some government-sponsored students beginning in 1988; Grande seminaire de Nyakibanda; Faculté de pédagogie protestante.

f. *Année blanche* (classes suspended).

g. For primary and secondary schooling, the data refer to enrollments after the 1994 genocide; for higher education, the data refer to enrollments before the genocide.

Source: For enrollments in preprimary schools, primary schools, CERAI, SF, and CERAR, Rwanda (1999b, 2000c, N.d.-a, N.d.-b, N.d-d); for enrollments in secondary education, UNESCO (1995); Rwanda (2000d, 2000e, 2001a); IBE (2001); for enrollments in higher education, Cuenin (1992); Rwanda (1990, 1994a, 2000g); TFHES (2000); and personal communications from officials at individual institutions.

TABLE A3-1: PUBLIC SPENDING ON EDUCATION BY LEVEL, RWANDA, 1971–2001

(millions of current FRw)

	Current spending				Capital spending			Total		
Year	Primary (includes secondary through 1995)[a]	Secondary	Higher	All education	Primary and secondary	Higher	All education	Primary and secondary	Higher	All education
1971	463.0	—	—	—	—	—	—	—	—	—
1972	563.2	—	—	—	—	—	—	—	—	—
1973	694.7	—	—	—	—	—	—	—	—	—
1974	930.7	—	—	—	—	—	—	—	—	—
1975	1,063.8	—	—	—	—	—	—	—	—	—
1976	1,231.9	—	—	—	—	—	—	—	—	—
1977	1,397.5	—	—	—	—	—	—	—	—	—
1978	1,455.2	—	—	—	—	—	—	—	—	—
1979	1,962.0	—	—	—	—	—	—	—	—	—
1980	2,361.8	—	—	—	—	—	—	—	—	—
1981	2,865.8	—	419.3	3,285.1	—	—	—	—	—	—
1982	3,378.1	—	490.3	3,868.4	261.0	—	—	3,639.1	—	—
1983	3,981.3	—	591.3	4,572.6	132.2	—	—	4,113.5	—	—
1984	4,472.7	—	645.8	5,118.5	34.8	110.0	144.8	4,507.5	755.8	5,263.3
1985	4,319.1	—	731.0	5,050.1	198.1	110.0	308.1	4,517.1	841.0	5,358.1
1986	4,768.7	—	759.0	5,527.7	257.2	110.0	367.2	5,025.8	869.0	5,894.8
1987	4,821.5	—	735.2	5,556.8	291.1	164.5	455.5	5,112.6	899.7	6,012.3
1988	4,810.1	—	876.3	5,686.3	297.5	—	—	5,107.6	—	—
1989	5,690.0	—	—	5,690.0	341.4	—	—	6,031.4	—	—
1990	5,812.2	—	—	6,239.1	331.1	—	—	6,143.4	—	—
1991–95	—	—	—	—	—	—	—	—	—	—

TABLE A3-1: PUBLIC SPENDING ON EDUCATION BY LEVEL, RWANDA, 1971–2001 (CONTINUED)

(millions of current FRw)

	Current spending				Capital spending			Total		
Year	Primary (includes secondary through 1995)[a]	Secondary	Higher	All education	Primary and secondary	Higher	All education	Primary and secondary	Higher	All education
1996	7,357	1,311	1,269	8,626	—	—	5,158	—	—	13,784
1997	9,161	1,822	2,199	11,360	—	—	7,871	—	—	19,231
1998	9,046	2,183	4,870	13,916	—	—	5,650	—	—	19,566
1999	14,386	4,020	7,352	21,738	—	—	6,103	—	—	27,841
2000	13,998	3,888	8,349	22,347	—	—	5,267	—	—	27,614
2001	15,900	4,450	9,441	25,341	—	—	16,769	—	—	42,110

— Not available.

Note: FRw, Rwandan francs.

a. From 1996 on, the data exclude spending on secondary education.

Source: For 1971–80, Rwanda, Official Gazette of the Republic of Rwanda (various years); for 1981–88, World Bank (1989); for higher education in 1985, Rwanda (1985a, 1985b); for 1996–2001, Rwanda (1996, 1998, 2000a, 2000f, 2001b). For further details on the data for 1996–2001, see appendix table 3-2.

TABLE A3-2: PUBLIC SPENDING ON EDUCATION, RWANDA, SELECTED YEARS, 1985–2001

(Millions of current FRw except as indicated)	1985	1996	1997	1998	1999	2000	2001
Spending by Ministry of Education	—	**13,784**	**19,231**	**19,566**	**27,841**	**27,614**	**42,110**
Recurrent spending	4,919	8,626	11,360	13,916	21,738	22,347	25,341
Primary and preschool	3,295[a]	5,505	6,624	6,305	9,713	9,895	10,914
Secondary	771	1,194	1,645	2,006	3,767	3,805	4,241
Higher education, domestic study	606	1,155	1,985	4,475	5,000	6,353	6,947
Scholarships for higher education abroad	49				1,889	1,818	2,051
Administration	198	772	1,106	1,130	1,369	476	1,188
Capital spending	—	**5,158**	**7,871**	**5,650**	**6,103**	**5,267**	**16,769**
Domestically financed	—	581	—	550	503	321	583
Externally financed	—	4,577	—	5,100	5,600	4,946	16,186
Capital spending as share of total (%)	—	37.4	40.9	28.9	21.9	19.1	39.8
Spending by other ministries or government agencies (recurrent spending only)	—	—	—	—	**860**	**3,492**	**3,724**
Institut supérieur des finances publiques (ISFP)[b]		56		30	96	68	81
Vocational training[c]	—	15	—	42	216	142	165
Nonformal education[d]	—	121	—	74	35	77	78
Subsidies for secondary students							
Genocide Fund[e]	0	0	0	0	0	2,500	2,650
Ministère de l'administration local et des affaires sociales (MINALOC)	—	—	—	—	513	505	550
Subsidies for higher education students							
Genocide Fund[e]	0	0	0	0	0	200	200

Blanks denote not applicable.
— Not available.
Note: FRw, Rwandan francs.
a. Includes spending on the centres de l'enseignement rural et artisanal intégré (CERAI) and similar institutions, which offered three-year vocational training after the eight-year primary cycle. These institutions were discontinued after 1991–92. See appendix table A2-1 for additional details on the structure and duration of the various cycles.
b. Under various configurations of the Ministry of Finance.
c. Under various ministries during 1996–2001, including the Ministry of Labor and Social Affairs (1996); the Ministry of Youth, Sports and Trades (1998); the Ministry of Youth, Culture and Sports (1999); and the Ministry of Youth, Sports and Culture (2000 and 2001).
d. Under various ministries during 1996–2001, including the Ministry of Labor and Social Affairs (1996); the Ministry of Gender, Family and Social Affairs (1998); the Ministry of Social Affairs (1999); and MINALOC (2000 and 2001).
e. In French, Fonds national pour l'ássistance aux rescapés du génocide et des massacres au Rwanda (FARG).
Source: For 1985, World Bank (1989); Rwanda (1985b) and *Official Gazette of the Republic of Rwanda* (various years); for 1996, 1997, and 1998, Rwanda (1996, 1998); for 1999, 2000, and 2001, Rwanda, *Official Gazette of the Republic of Rwanda* (various years), supplemented by unpublished MINALOC data on subsidies to secondary students in 2000 and 2001.

TABLE A3-3: ITEMIZED HOUSEHOLD SPENDING ON EDUCATION, RWANDA, CIRCA 2000

	Primary		Secondary		Higher[a]	
	Public	Private	Public	Private	Public	Private
Share of total enrollments (%)	**99.3**	**0.7**	**56.6**	**43.4**	**78.5**	**21.5**
% reporting nonzero spending on:						
Overall school-related expenses	97.9	99.5	97.4	97.2	93.8	
School fees	65.0	83.5	73.3	81.5	79.2	
PTA contribution or other charges	40.8	28.0	17.9	13.2	4.2	
Books and school supplies	90.4	92.3	87.8	88.8	70.8	
Transport to and from school	0.8	11.5	56.1	50.4	62.5	
School uniforms	59.7	78.6	75.2	79.3	5.6	
Food, board, and lodging	0.2	1.6	20.6	13.7	12.5	
Club fees and field trips	8.0	19.2	18.9	17.9	8.3	
Miscellaneous school-related expenses	27.1	22.5	34.5	38.4	27.8	
Annual spending per student among students reporting nonzero spending (FRw)[b]						
Overall school-related expenses	1,847	10,421	38,958	58,362	136,433	
As % of per capita GDP	2.3	12.7	47.6	71.3	166.6	
In US$	4.7	26.7	99.9	149.6	349.8	
School fees	689	8,010	28,941	48,076	108,568	
PTA contribution or other charges	272	290	10,356	6,722	2,098	
Books and school supplies	486	1,717	5,080	5,664	15,821	
Transport to and from school	614	3,011	4,361	5,651	21,867	
School uniforms	1,374	2,653	5,959	6,594	4,034	
Food, board, and lodging	49	54	9,960	10,446	36,888	
Club fees and field trips	66	97	911	758	73,371	
Miscellaneous school-related expenses	61	349	3,324	4,362	13,359	
Weighted annual spending per student averaged across all students (FRw)						
Overall school-related expenses	1,807	10,370	38,173	56,644	124,002	
As % of per capita GDP	2.2	12.7	46.6	69.2	151.5	
In US$	4.6	26.6	97.9	145.2	317.9	
School fees	411	6,242	20,767	38,730	84,776	
PTA contribution or other charges	117	95	2,130	1,098	48	
Books and school supplies	439	1,616	4,514	5,096	10,071	
Transport to and from school	4	235	2,340	2,738	14,391	
School uniforms	814	2,083	4,418	5,076	402	
Food, board, and lodging	0	0	2,505	2,083	4,581	
Club fees and field trips	6	25	196	141	5,209	
Miscellaneous school-related expenses	17	74	1,302	1,683	4,525	

Note: FRw, Rwandan francs; GDP, gross domestic product; PTA, parent-teacher association.

a. Higher education includes universities and other institutions not classified as primary or secondary schools. Because of the low number of observations for higher education (72), data for public and private institutions are not shown separately.

b. Because individuals incur nonzero spending for different items of spending, the sum of the separate items of spending exceeds the overall average. For example, at the primary level the sum of the items is FRw 3,612, but the overall average is FRw 1,847. The difference suggests that households pay expenses on some items by economizing on spending in other categories. The extent to which this occurs is roughly comparable among levels of education and between the public and private sectors.

Source: For distribution of enrollments, Ministry of Education 2000–01 censuses of primary and secondary schools and sources cited in appendix table A2-1; data on spending on schooling were tabulated by the authors from the 1999–2001 Household Living Conditions Survey.

TABLE A3-4: CURRENT SPENDING ON EDUCATION BY LEVEL OF EDUCATION AND FUNCTION, RWANDA, 1999–2001

(Millions of current FRw except as otherwise specified)	1999	2000	2001
Primary and preschool services[a]	8,963	9,325	9,483
Secondary education			
Education services[a]	2,205	2,222	2,508
Student feeding	263	908	1,000
Higher education			
Education services[a]	1,739	2,331	2,717
Student feeding	1,045	1,150	1,389
Bursaries			
For studies in local institutions	733	1,114	1,144
For studies abroad	1,889	1,818	2,051
Administration[b]	1,585	1,011	1,975
Other operating expenditures[c]	2,927	2,128	1,854
Teacher salary arrears	390	340	1,222
Total recurrent spending by the Ministry of Education	21,739	22,347	25,342
Bursaries administered outside the Ministry of Education[d]			
Secondary	513	3,005	3,200
Higher education (local study)	0	200	200
Memorandum:			
GDP at factor prices (billions of FRw)	644.0	696.6	765.8

a. Includes spending on salaries for teachers and school personnel and on textbooks and pedagogical supplies.
b. Excludes spending on the university hospital, which is listed under this budget head for the Ministry of Education.
c. Includes spending on maintenance, repairs, and other running costs.
d. Refers to bursaries awarded through the Ministère de l'administration local et des affaires sociales (MINALOC) and the Genocide Fund.
Source: For 1999, 2000, and 2001, Rwanda, *Official Gazette of the Republic of Rwanda* (various years), supplemented by unpublished data from MINALOC on subsidies to secondary students in 2000 and 2001.

TABLE A3-5: PER STUDENT SPENDING IN PUBLIC PRIMARY AND SECONDARY SCHOOLS, RWANDA, 1999

Itemized spending per student (FRw)	Primary education	Secondary education		
		Tronc commun	Upper secondary	Both levels
Overall spending	7,604	60,273	73,628	65,223
Teacher salaries	5,433	19,100	27,252	22,122
Average annual teacher salary	308,522	443,211	526,231	477,481
Ratio of students to teachers	56.8	23.2	19.3	21.6
Salaries of school-level administrative staff	375			10,250
Average annual salary of administrative staff	388,594			594,943
Ratio of students to administrative staff	1,036			58.2
Material inputs at the school level	244			18,137
Student welfare[a]	0			7,845
Management overhead	1,552			6,869
Memoranda:				
Average annual teacher salaries, including benefits, as multiple of per capita GDP	4.0	5.7	6.8	6.2
Number of students in public (state and *libre subsidié*) schools	1,418,707	44,256	26,064	70,320
Number of students in private schools	10,001	35,198	19,606	54,804
Number of teachers in public sector with teaching duties	24,982	1,907	1,350	3,257

Note: GDP, gross domestic product. Blanks denote cost items shared by the *tronc commun* and upper secondary cycles, which are not calculated separately.

a. Excludes bursaries awarded to students attending private schools; estimated according to the distribution of students between the public and private sectors.

Source: For education spending, tables 3-6 and 3-7; for enrollments, table A2-1; for number of teachers, Ministry of Education 1999 census of teachers.

TABLE A3-6: MINCERIAN EARNINGS FUNCTION, EXCLUDING WAGE EARNERS WORKING FOR EDUCATIONAL INSTITUTIONS, RWANDA, 2001

	Coefficient	*t*-statistic	Sample mean
Level of education (omitted category: 0–5 years of primary education)			
6 years of primary education	0.179	8.33	0.218
1–2 years of postprimary education	0.330	12.73	0.110
3–4 years of postprimary education; D4–D5	0.535	24.26	0.194
6 years of technical secondary education; D6–D7	0.883	38.24	0.193
Baccalauréat; graduate	1.206	35.28	0.049
Licence; ingéniorat; doctorat	1.490	34.91	0.026
Age (in years)	0.016	25.59	37.4
Age^2 (in years)	–0.000	24.27	2,564.3
Intercept	11.422	393.86	
R^2		0.46	
Number of observations		17,127	

Note: The regressions exclude non-Rwandan workers, employees of international organizations, and workers who had left the firm. The regression dependent variable is the natural logarithm of annual wages. The model is specified as a fixed-effect model with dummy variables for each enterprise. Because of space limitations, these variables and their coefficient estimates are not shown.

Source: Authors' analysis of June 2001 survey of enterprises and their workers conducted by the Ministère de la fonction public et du travail (MINFOTRA).

TABLE A4-1: SCHOOL ATTENDANCE STATUS OF A COHORT OF CHILDREN AGES 7–12 IN 1998, RWANDA

	Both parents alive						One or both parents dead										Children with at least one parent alive and not living with a parent	
	Live with both parents		Live with one or neither parent		Total		Mother dead		Father dead		Both parents dead		Total		Whole sample			
	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Children ages 7–12 enrolled in 1998–99																		
Boys	77.0	721	68.6	185	75.3	906	70.8	72	76.6	380	70.4	108	74.6	560	75.0	1,466	69.8	222
Girls	76.5	695	72.9	221	75.6	916	63.6	66	72.4	424	67.6	142	70.4	632	73.5	1,548	68.1	313
Total	76.8	1,416	70.9	406	75.5	1,822	67.4	138	74.4	804	68.8	250	72.4	1,192	74.3	3,014	68.8	535
Status in 1999–2000																		
Children entering grade 1 in 1999–2000 who were not enrolled in 1998–99																		
Boys	57.2	166	48.3	58	54.9	224	57.1	21	53.9	89	53.1	32	54.2	142	54.6	366	47.8	67
Girls	52.8	163	48.3	60	51.6	223	29.2	24	54.7	117	34.8	46	46.5	187	49.3	410	32.0	100
Total	55.0	329	48.3	118	53.2	447	42.2	45	54.4	206	42.3	78	49.8	329	51.8	776	38.3	167
Children enrolled in 1998–99 who advanced a grade in 1999–2000																		
Boys	61.4	555	68.5	127	62.7	682	72.5	51	66.0	291	63.2	76	66.3	418	64.1	1,100	63.9	155
Girls	61.8	532	60.9	161	61.6	693	76.2	42	63.2	307	72.9	96	66.5	445	63.5	1,138	67.6	213
Total	61.6	1,087	64.2	288	62.1	1,375	74.2	93	64.5	598	68.6	172	66.4	863	63.8	2,238	66.0	368
Children enrolled in 1998–99 who repeated the same grade in 1999–2000																		
Boys	34.8	555	29.9	127	33.9	682	23.5	51	31.6	291	28.9	76	30.1	418	32.5	1,100	29.0	155
Girls	35.0	532	32.9	161	34.5	693	21.4	42	33.9	307	20.8	96	29.9	445	32.7	1,138	26.3	213
Total	34.9	1,087	31.6	288	34.2	1,375	22.6	93	32.8	598	24.4	172	30.0	863	32.6	2,238	27.4	368

Children enrolled in 1998–99 who dropped out in 1999–2000																		
Boys	3.8	555	1.6	127	3.4	682	3.9	51	2.4	291	7.9	76	3.6	418	3.5	1,100	7.1	155
Girls	3.2	532	6.2	161	3.9	693	2.4	42	2.9	307	6.3	96	3.6	445	3.8	1,138	6.1	213
Total	3.5	1,087	4.2	288	3.6	1,375	3.2	93	2.7	598	7.0	172	3.6	863	3.6	2,238	6.5	368

Note: Among children attending school in 1998–99, only those enrolled in primary school are counted. "No." refers to number in sample.
Source: Authors' estimates based on the 2000 Multiple Indicator Cluster Survey (MICS).

TABLE A4-2: SCHOOL PROGRESSION RATES DURING TWO CONSECUTIVE YEARS AMONG CHILDREN AGES 7–12 BY ORPHANHOOD STATUS, RWANDA, 1998–2000

Orphanhood status	Entry rate to grade 1 in 1999–2000 among those not in school in 1998–99 (%)	Schooling status in 1999–2000 among those already in school in 1998–99 (% distribution)		
		Advanced a grade	Repeating same grade	Dropped out
Both parents alive	**53.2**	**62.1**	**34.2**	**3.6**
Living with both parents	55	62	35	3.5
Living with only one parent or neither	48	64	32	4.2
At least one parent dead	**49.8**	**66.4**	**30.0**	**3.6**
Mother dead; father alive	42	74	23	3.2
Father dead; mother alive	54	65	33	2.7
Both parents dead	42	69	24	7.0
All children in sample	**51.8**	**63.8**	**32.6**	**3.6**
Children not living with biological parent(s)	**38.3**	**66.0**	**27.4**	**6.5**
Sample size	776		2,238	

Source: Authors' estimates based on the 2000 Multiple Indicator Cluster Survey (MICS); see table appendix A4-1 for details.

TABLE A4-3: REGRESSION ESTIMATES OF SCHOOL ATTENDANCE STATUS IN A COHORT OF CHILDREN AGES 7–12 IN 1998, RWANDA, 1998–2000

		School attendance status in 1999–2000		
	School attendance status in 1998–99: probability of being enrolled[a]	Among those not enrolled in 1998–99: probability of entering grade 1[b]	Among those enrolled in 1998–99 and 1999–2000	
Regression variable			Probability of repeating[c]	Probability of dropping out[c]
Sex (omitted category: girl)				
Boy	0.062	0.209	–0.013	–0.070
	(0.73)	(1.44)	(0.15)	(0.30)
Orphanhood status (omitted category: living with both parents)				
Both parents dead	–0.588	–0.529	–0.381*	0.723
	(3.77)**	(2.07)*	(1.96)	(2.03)*
Mother dead	–0.475	–0.521	–0.616	–0.332
	(2.38)*	(1.62)	(2.38)*	(0.54)
Father dead	–0.112	–0.022	–0.105	–0.383
	(1.07)	(0.12)	(0.95)	(1.24)
Both parents alive; living with one or neither parent	–0.289	–0.281	–0.145	0.066
	(2.22)*	(1.30)	(1.01)	(0.19)
Location (omitted category: living in urban area)				
Living in rural area	–0.812	–0.113	0.342	0.502
	(5.95)**	(0.45)	(2.80)**	(1.48)
Income group (omitted category: poorest 40%)				
Middle 40%	0.274	0.120	0.003	–0.450
	(2.91)**	(0.76)	(0.03)	(1.76)
Richest 20%	0.659	0.061	–0.196	–0.799
	(5.05)**	(0.27)	(1.50)	(2.26)*
Constant	1.631	0.151	–0.797	–2.890
	(9.91)**	(0.53)	(5.03)**	(6.96)**
Pseudo R^2	0.031	0.009	0.012	
Number of observations	3,014	776	2,238	2,238

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

Note: Figures in parentheses are robust *t*-statistics.

a. Logit model; sample: school-age children (ages 7–12 in 1998–99) not enrolled in 1998–99 or enrolled in primary education; omitted category: school-age children not enrolled in 1998–99.

b. Logit model; sample: school-age children (ages 7–12 in 1998–99) not enrolled in 1998–99 and entering grade 1 in 1999–2000 (or not entering it); omitted category: school-age children not enrolled in either school year 1998–99 or school year 1999–2000.

c. Multilogit model; sample: school-age children (ages 7–12 in 1998–99) enrolled in 1998–99; omitted category, children advancing in grade during school year 1999–2000.

Sources: Authors' estimate based on the 2000 Multiple Indicator Cluster Survey (MICS).

TABLE A4-4: NUMBER AND CHARACTERISTICS OF CANDIDATES PASSING END OF-CYCLE EXAMINATIONS FOR PRIMARY AND SECONDARY EDUCATION, RWANDA, 2001 AND 2002

Level of education and indicator	2001	2002
Primary		
Number of candidates	63,931	79,226
% female	48	49
% exceeding cutoff mark for promotion to next cycle		
Overall	26	24
Among girls	20	18
Among boys	31	29
Tronc commun		
Number of candidates	18,477	26,270
% female	52	50
% exceeding cutoff mark for promotion to next cycle		
Overall	58	42
Among girls	46	29
Among boys	71	56
Upper secondary (A-levels)		
Number of candidates	17,718	24,852
% female	47	49
% exceeding pass mark		
Overall	77	69
Among girls	71	63
Among boys	81	76
% of passers selected for public higher education		
Overall	17	12
Among girls	8	6
Among boys	24	16

Note: Because the cutoff mark varies from year to year, the percentage exceeding the pass mark for the two years cannot be interpreted as showing an achievement trend.

Source: Personal communication from the National Examination Council of Rwanda.

TABLE A5-1: TEACHER'S EDUCATIONAL ATTAINMENT, QUALIFICATIONS, AND REMUNERATION, RWANDA, 2001

			Structure of gross monthly remuneration		
Educational attainment	**Qualification**	**Grade**	**Pay category**	**Salary range, 1996[a]**	**Benefits introduced in 1999 (transport and lodging)**
Primary (8-year cycle)	CA (*certificat d'aptitude*)	Unqualified		4,000	4,000
Lower secondary					
General	ES 1, 2, 3 (1–3 years general secondary)	Unqualified		6,250–7,750	
Vocational diploma	CERAI (centre d'enseignement rural et artisanal intégré)	Unqualified		6,750	
	SF (section familiale) (for girls)				
	CERAR (centre d'enseignement rural et artisanal de Rwanda) (for boys)				
Teacher training diploma	EAP (enseignement apprentissage pédagogique)	*Instituteur auxiliaire*	V	9,300–28,800	
	EMA (école moniteur auxiliaire)				
	EMM (école ménager moyen)				
	EMP (école ménager pédagogique)				
	ENA (école normale auxiliaire)				
	ENTA (école normale technique auxiliaire)				
Upper secondary[b]					
Incomplete	ES 4, 5, 6 (4–6 years general secondary)	Unqualified	VI	10,750–12,700	
Complete (old system)	D3, D4, D5 (3–5 years general secondary)	*Instituteur adjoint*	IV	15,400–36,100	
Complete (new system)	D6, D7 (6–7 years general secondary)	*Instituteur*	III	20,400–50,100	6,500

(*Continued*)

TABLE A5-1: TEACHER'S EDUCATIONAL ATTAINMENT, QUALIFICATIONS, AND REMUNERATION, RWANDA, 2001 (CONTINUED)

			Structure of gross monthly remuneration		
Educational attainment	**Qualification**	**Grade**	**Pay category**	**Salary range, 1996[a]**	**Benefits introduced in 1999 (transport and lodging)**
Postsecondary	*Bachelier* or 2-year postsecondary diploma	*Professeur adjoint*	II	27,000–62,000	10,000
	Lic., BA, BSc, BEd (*licence*, bachelor of arts, bachelor of science, bachelor of education)	*Professeur*	I	30,800–66,200	25,000
	Maîtrise, MEd (master's degree)				
	Doctorat, PhD (doctorate)				

Blanks denote not applicable.

a. For teachers in a titled qualification grade, the top and bottom figures in the range are separated by 9 to 11 steps in the salary scale. For teachers in the "unqualified" group, the pay structure contains no stepwise progression with seniority.

Although the annual increase may range from 0 to 3.5 percent, 80 to 90 percent of the teachers have been receiving an average increase of 3 percent annually since 1996. Since 1996, the pay scale has been increased at 3 percent a year.

b. Teachers with an incomplete upper secondary education are those who have not received the relevant diploma for this level of schooling. Those with a complete upper secondary education fall into two groups depending on whether they received their diplomas before or after the reforms of 1982, which introduced the six-year secondary education cycle currently in place.

Source: Ministry of Education data.

TABLE A5-2: PUPIL-TEACHER RATIOS IN PUBLIC (STATE AND *LIBRE SUBSIDIÉ*) PRIMARY SCHOOLS BY PROVINCE, RWANDA, 2000

	State		*Libre subsidié*	
	Ratio	**Index (Butare = 100)**	**Ratio**	**Index (Butare = 100)**
Rwanda	**59.7**		**56.9**	
Butare	55.2	100	51.8	100
Byumba	58.3	106	58.6	113
Cyangugu	56.6	103	55.7	108
Gikongoro	50.8	92	51.2	99
Gisenyi	69.7	126	63.1	122
Gitarama	57.4	104	55.8	108
Kibungo	62.9	114	62.0	120
Kibuye	68.4	124	62.4	120
Kigali Rural	66.8	121	58.5	113
Kigali Ville	46.0	83	40.4	78
Ruhengeri	53.3	97	55.8	108
Umutara	52.3	95	51.5	99

Blanks denote not applicable.

Note: Ratios are unweighted averages across schools. Private schools are not included because their small number precludes meaningful results.

Source: Authors' estimates based on Ministry of Education 1999–2000 census of primary schools.

TABLE A5-3: REGRESSION ESTIMATES OF THE RELATION BETWEEN NUMBERS OF TEACHERS AND PUPILS IN PUBLIC (STATE AND *LIBRE SUBSIDIÉ*) PRIMARY SCHOOLS, WITH PROVINCIAL DUMMY VARIABLES, RWANDA, 2000

	State schools		*Libre subsidié* schools		All public schools	
Regressors	**Coefficient**	***t*-statistic**	**Coefficient**	***t*-statistic**	**Coefficient**	***t*-statistic**
Number of pupils	0.02	41.67**	0.02	69.53**	0.02	81.42**
Provincial dummies (omitted variable: Butare)[a]						
Byumba	–0.46	–0.84	–1.07	2.79**	–0.90	2.92**
Cyangugu	–0.43	–0.5	–0.38	–1.13	–0.27	–0.88
Gikongoro	–0.13	–0.07	0.46	–1.39	0.60	–1.94
Gisenyi	–2.00	3.29**	–2.06	6.31**	–2.00	6.95**
Gitarama	0.30	–0.47	–0.87	2.85**	–0.61	2.23*
Kibungo	–1.05	–1.78	–1.23	3.29**	–1.19	3.80**
Kibuye	–2.08	2.67**	–1.86	5.75**	–1.79	6.04**
Kigali Rural	–0.04	–0.07	–1.03	2.70**	–0.66	2.21*
Kigali Ville	4.74	5.19**	5.92	10.15**	5.42	11.07**
Ruhengeri	1.27	2.20*	0.03	–0.1	0.39	–1.34
Umutara	0.11	–0.19	0.58	–1.04	0.04	–0.1
Constant	1.98	4.14**	2.34	8.58**	2.24	9.42**
Number of schools	548		1,440		1,988	
R^2	0.82		0.81		0.81	

Blanks denote not applicable.
* Statistically significant at the 5 percent level.
** Statistically significant at the 1 percent level.
a. As the omitted variable, Butare is the reference province.
Source: Authors' estimates based on data from Ministry of Education 1999–2000 census of primary schools.

TABLE A5-4: REGRESSION ESTIMATES OF THE CORRELATES OF SCHOOL-LEVEL PASS RATES ON THE NATIONAL PRIMARY SCHOOL LEAVING EXAMINATION, PUBLIC SCHOOLS, RWANDA, 1999

		Model 1			Model 2		
Regression variable	**Sample mean**	**Coefficient**	***t*-statistic**	**Marginal effect[a]**	**Coefficient**	***t*-statistic**	**Marginal effect[a]**
Pupil-teacher ratio							
Less than 40 (reference category)	6.0						
40–55	48.2	0.006	0.15	0.14			
> 55	45.9	0.052	1.41	1.28			
Teacher qualification (% in category)							
Upper secondary diploma (D6–D7) with preservice teacher training (reference category)	32.3						
Primary education	1.3	–0.003	1.07	–0.06			
Lower secondary education	8.0	–0.003	3.08**	–0.07			
General (1–3 years)	13.7	–0.003	3.78**	–0.07			
Vocational	4.1	–0.002	1.78	–0.06			
Teacher training	11.8	–0.004	5.26**	–0.11			
Upper secondary education	18.3	–0.001	1.50	–0.03			
Incomplete	9.9	0.000	0.04	0.00			
Diploma holder (D3–D5)[b]	0.6	–0.006	1.70	–0.14			
Diploma holder (D6–D7) with no preservice teacher training[b]	1.3	–0.003	1.07	–0.06			
Other	8.0	–0.003	3.08**	–0.07			
Teachers' average years of experience	8.2	0.002	0.84	0.05			
% of classrooms in acceptable condition	48.5	0.000	0.1	0.00			
Per pupil cost of all personnel (FRw, log scale)	86,684				0.0778	2.57**	0.3052[c]
Province							
Butare (reference province)	11.3						
Byumba	9.8	–0.008	21.49**	–19.1	–0.007	22.25**	–17.0

(*Continued*)

TABLE A5-4: REGRESSION ESTIMATES OF THE CORRELATES OF SCHOOL-LEVEL PASS RATES ON THE NATIONAL PRIMARY SCHOOL LEAVING EXAMINATION, PUBLIC SCHOOLS, RWANDA, 1999 (CONTINUED)

		Model 1			Model 2		
Regression variable	**Sample mean**	**Coefficient**	***t*-statistic**	**Marginal effect[a]**	**Coefficient**	***t*-statistic**	**Marginal effect[a]**
Province							
Cyangugu	8.4	–0.004	9.20**	–9.2	–0.003	8.79**	–7.6
Gikongoro	9.2	–0.006	17.27**	–15.1	–0.006	16.7**	–14.3
Gisenyi	0.0	–0.004	6.19**	–10.8	–0.004	4.83**	–8.9
Gitarama	14.8	–0.006	16.20**	–15.3	–0.005	17.38**	–13.3
Kibungo	6.8	–0.004	10.95**	–10.9	–0.004	11.15**	–10.7
Kibuye	8.8	–0.006	15.24**	–15.0	–0.005	16.28**	–12.9
Kigali Rural	12.4	–0.004	12.64**	–10.8	–0.004	12.5**	–9.3
Kigali Ville	1.5	–0.007	10.54**	–17.8	–0.006	9.89**	–15.4
Ruhengeri	12.6	–0.005	11.93**	–11.2	–0.004	11.22**	–8.8
Umutara	4.5	–0.005	8.32**	–12.8	–0.006	10.51**	–14.5
Constant		0.3699	6.71**		–0.4645	1.75	
Number of observations			1,362			1,362	
R^2			0.29			–0.26	

Blanks denote not applicable.

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

Note: The regression specification follows a log-logit model; that is, $\ln[y/(1-y)] = bX$, where y is the pass rate at the school level and X is a vector of school-level characteristics. Robust *t*-statistics appear in the table.

a. The marginal effect is evaluated at the sample mean for continuous variables (e.g., years of teacher experience), according to $y(1-y)b$, where y is the sample mean and b is the coefficient estimate; for categorical variables (e.g., teacher qualification), it is evaluated relative to the omitted category. The results show the percentage point change in the pass rate in response to a unit change in the corresponding regressor.

b. Teachers in the D3–D5 group received their diplomas with three to five years' secondary schooling under the old structure of the education system, whereas those in the D6–D7 group had six to seven years of secondary schooling under the new 6-3-3 structure that was fully in place by 1992. The distinction between teachers with and without such training is made only for the D6–D7 group, the only one for which the share of teachers with preservice teacher training is sizable.

c. Marginal effects refer to the percentage change in the pass rate, calculated at the sample means for continuous variables and with reference to the omitted category for categorical variables, and for a change of FRw 1,000 around the sample mean for the cost variable.

Source: Authors' estimate based on school-level data on examination pass rates for 1998–99 supplied by the National Examination Council of Rwanda, merged with data from Ministry of Education 1999–2000 primary school census and 1999 census of teachers.

TABLE A6-1: DISTRIBUTION OF SECONDARY SCHOOLS BY LEVEL AND TYPE OF INSTRUCTION OFFERED, RWANDA, 2000–01

Combinations of *tronc common* and upper secondary streams	Number of schools by type			
	State	***Libre subsidié***	**Private**	**All**
Tronc commun alone	37	27	66	130
***Tronc commun* combined with upper secondary cycle**				
1 stream				
General	12	29	21	62
Vocational	7	12	20	39
Technical	0	0	6	6
Normal (teacher training)	2	3	27	32
2 streams				
General + vocational	6	17	10	33
Vocational + *normal*	0	3	23	26
General + *normal*	0	7	8	15
General + technical	0	0	1	1
Vocational + technical	0	0	1	1
3 streams				
General + vocational + *normal*	0	2	3	5
General + technical + vocational	0	2	1	3
Vocational + technical + *normal*	0	0	1	1
Upper secondary cycle only				
1 stream				
Vocational	1	0	0	1
Technical	4	1	3	8
Normal	1	7	0	8
2 streams				
General + *normal*	1	0	0	1
Vocational + technical	1	0	0	1
All secondary schools	**72**	**110**	**191**	**373**

Note: Except for teacher training, the courses in each stream are further divided into various fields of study (see table 6-5 for the complete list).

Source: Authors' summary based on electronic data files from Ministry of Education 2000–01 census of secondary schools.

TABLE A6-2: NUMBER OF SECONDARY SCHOOL TEACHERS BY QUALIFICATIONS AND LEVEL OF CLASSES TAUGHT, RWANDA, 1999

	Teaching *tronc commun* classes only	Teaching *tronc commun* and upper secondary classes	Teaching upper secondary classes only
Teachers with postsecondary diploma or university degree[a]			
State schools	135	67	105
Libre subsidié schools	232	334	251
Teachers with upper secondary diploma[b]			
State schools	335	163	127
Libre subsidié schools	488	489	342
All teachers, including those with less than an upper secondary diploma			
State schools	514	240	263
Libre subsidié schools	752	850	632

a. Teachers in pay category 2 (those with a *baccalauréat* or a two-year postsecondary diploma) and pay category 1 (those with a university degree).
b. Teachers in pay category 3 (those with six to seven years of general secondary education).
Source: Authors' tabulations based on Ministry of Education 1999 census of teachers.

TABLE A6-3: REGRESSION ESTIMATE OF THE RELATION BETWEEN NUMBERS OF TEACHERS AND STUDENTS, PUBLIC SECONDARY SCHOOLS, RWANDA, 1999–2000

	State	*Libre subsidié*	Total
Number of students	0.043	0.039	0.042
	(14.72)**	(8.67)**	(16.66)**
Constant	1.268	4.870	2.866
	(1.26)	(2.46)*	(2.78)**
Number of observations	60	102	162
R^2	0.85	0.55	0.70

* Statistically significant at the 5 percent level.
** Statistically significant at the 1 percent level.
Note: Figures in parentheses are robust *t*-statistics.
Source: Based on Ministry of Education 1999–2000 census of secondary schools merged with the 1999 census of teachers.

TABLE A6-4: CORRELATES OF END-OF-CYCLE *TRONC COMMUN* NATIONAL EXAMINATION RESULTS AT SCHOOL LEVEL, RWANDA, 1999

Regression variable	Sample mean	Pass rate (%)[a] Model 1 Coefficient	Pass rate (%)[a] Model 1 Marginal effect[b]	Pass rate (%)[a] Model 2 Coefficient	Pass rate (%)[a] Model 2 Marginal effect[b]	Average score (linear specification) Coefficient, model 1	Average score (linear specification) Coefficient, model 2
Student/teacher ratio (omitted category: <18)							
18–27	48.53	–0.466 (1.24)	–6.872			–0.283 (1.99)*	
>27	27.94	–0.930 (2.14)*	–13.707			–0.217 (1.30)	
Teacher qualifications (%) (omitted group: university)							
Postsecondary	14.90	–0.038 (1.57)	–0.549			–0.004 (0.58)	
Upper secondary	74.97	–0.027 (1.33)	–0.394			–0.009(1.50)	
Other	1.70	0.071 (1.14)	1.061			0.015 (1.07)	
% teachers with preservice teacher training	67.92	0.008 (0.61)	0.126			–0.004 (0.16)	
Teacher experience (years)	5.04	–0.031 (0.37)	–0.466			0.003 (0.81)	
Province (omitted region: Butare)							
Byumba	12.50	–0.265 (0.44)	–4.195	–0.142 (0.24)	–2.456	0.277 (1.37)	0.298 (1.63)
Cyangugu	7.35	–0.186 (0.23)	–2.650	0.520 (0.86)	7.371	0.423 (1.92)*	0.546 (2.78)**
Gikongoro	8.09	1.203 (1.18)	11.153	1.695 (1.62)	16.383	0.601 (3.07)**	0.702 (3.78)**
Gisenyi	13.97	–0.828 (1.10)	–14.155	–0.612 (0.90)	–11.903	–0.319 (1.60)	–0.325 (2.03)**
Gitarama	11.76	–0.326 (0.50)	–4.788	0.136 (0.21)	2.179	0.002 (0.01)	0.063 (0.40)
Kibungo	7.35	–0.002 (0.00)	1.033	0.465 (0.54)	6.711	–0.040 (0.15)	0.058 (0.24)
Kibuye	10.29	–0.824 (1.32)	–14.676	–0.474 (0.78)	–8.931	–0.211 (1.06)	–0.180 (1.01)
Kigali Rural	8.09	0.264 (0.33)	3.869	0.306 (0.36)	4.635	0.357 (1.23)	0.378 (1.31)
Kigali Ville	2.21	0.620 (1.00)	8.662	0.093 (0.14)	1.500	0.934 (2.24)**	0.866 (2.78)**
Ruhengeri	5.88	1.090 (0.97)	10.585	1.483 (1.38)	15.346	0.366 (1.35)	0.516 (1.99)*
Umutara	1.47	–2.407 (1.33)	–51.267	–0.278 (0.15)	–4.991	–0.433 (1.09)	0.104 (0.49)
Ln(cost of personnel per student)	10.01	—	—	0.717 (1.78)	0.468		0.252 (1.57)
Constant		3.978 (2.11)*		–5.847 (1.43)		3.870 (7.75)*	0.586 (0.36)
Number of observations		136		136		137	137
R^2		0.20		0.13		0.31	0.27

Blanks denote not applicable.

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

Note: Figures in parentheses are robust *t*-statistics.

a. Log-logit model; that is, $\ln[y/(1-y)] = bX$, where y is the pass rate at the school level and X is a vector of school-level characteristics.

b. Marginal effects refer to the percentage change in the pass rate, calculated at the sample means for continuous variables and with reference to the omitted category for categorical variables, and for a change of FRw 1,000 around the sample mean for the cost variable.

Source: School-level data on examination results for 1999 merged with data from Ministry of Education 1999–2000 census of secondary schools and 1999 census of teachers.

TABLE A7-1: ENROLLMENTS IN HIGHER EDUCATION BY INSTITUTION, RWANDA, 1963–2002

Year	Public institutions (year founded, if known)[a]									Private institutions (year founded, if known)[b]										Total, public and private[d]
	UNR (1963–64)	IPN (1966)	KIST (1997–98)	KIE (1999)	KHI (1997)	ISAE (1988–89)	ISFP (1986–87)	ESM	CFATS	Total public	ULK (1996–97)	UNILAK (1997)	ISPG (1993–94)	UAAC (1984–85)	GSN (1936)	FTB (1970)	GSK	CESK	ISCPA (1986–87)	ESGI (1985–86)	IAMSEA (1976–77)	Total private[c]	
1963–64	51									51													
1964–65	87									87													
1965–66	127									127					55								
1966–67	130	34								164													
1967–68	161	72								233													
1968–69	199	131								330					82								
1969–70	265	181								446					96								
1970–71	390	169								390													
1971–72	526	197								526													
1972–73	489	225								489													
1973–74	619	223								619													
1974–75	672	256								672													
1975–76	657	202								657													1,108
1976–77	657	174								657													
1977–78	760	177								760													
1978–79	976	196						108		976					133								
1979–80	1,037	199						81		1,037					146						21		
1980–81	1,125	169								1,125					102						20	118	1,243
1981–82	1,211	34						105		1,211					103						22	98	1,309
1982–83	1,317									1,317					110						21	178	1,495
1983–84	1,367									1,367					127						24	212	1,579
1984–85	1,572									1,572				28	148						30	313	1,885
1985–86	1,565									1,565				30	170					47	27	422	1,987
1986–87	1,491						22			1,513				34	180				20	91	30	516	2,029
1987–88	1,674						47			1,721												540	2,261
1988–89	2,049					77	51			2,177												631	2,809
1989–90	2,185					83	61			2,329												680	3,009
1990–91						79	70																3,389
1991–92	2,501																						
1992–93	3,031																						
1993–94	—[e]												35										4,597
1994–95	3,261																						

1995–96	3,948												133			4,791
1996–97	4,178				113	67		4,387	208			91			299	4,686
1997–98	4,548		209		147	—[e]	94		406	66	35	149			656	
1998–99	—[e]		561	299	281	164	110		1,406	109	63	216			1,794	
1999–2000	4,535		1,149	597	383	314	98	7,076	2,312	238	81	351			2,982	10,058
2000–01	4,840		1,592	959	690	526	121	8,729	3,250	280	54	445			4,029	12,757
2001–02	5,922		1,751	1,269	700	579	133	10,354	5,500	250	69	495			6,314	16,668

Note: Shaded areas denote years when the institution was not in operation; blanks denote data not available. Data refer to regular enrollments only. Enrollments for 2001–02 for the KIST, the ISAE, and the ISFP reflect estimates based on a 10 percent increase from the previous year.

a. UNR, Université nationale du Rwanda; IPN, Institut pédagogique national (merged with the UNR in 1981); KIST, Kigali Institute of Science, Technology and Management; KIE, Kigali Institute of Education; KHI, Kigali Health Institute; ISAE, Institut supérieur d'agronomie et d'élevage: ISFP, Institute supérieur des finances publiques (now the Institute of Finance and Banking, IFB); ESM, Ecole supérieure militaire; CFATS, Centre de formation des adjoints techniques de la statistique.

b. ULK, Université libre de Kigali; UNILAK, Université laïque de Kigali; ISPG, Institut supérieur de pédagogie de Gitwe; UAAC, Université adventiste d'Afrique centrale; GSN, Grand séminaire de Nyakibanda; FTB, Faculté de théologie de Butare; GSK, Grand séminaire de Kabgayi; CESK, Centre d'enseignement supérieur de Kigali; ISCPA, Institut supérieur catholique de pédagogie appliquée de Nkumba; ESGI, Ecole supérieure de gestion et d'information; IAMSEA, Institut Africain et Mauricien de statistiques et d'économie appliquée.

c. Because of incompleteness of the data, enrollments prior to 1996–97 are computed as a residual between total enrollments and enrollments in public institutions.

d. Because of data gaps, total enrollments prior to 1996–97 are taken from TFHES (2000) for 1975–76, 1980–91, 1985–86, 1990–91, and 1995–96; data for the remaining years prior to 1996–97 are from Cuenin (1992).

e. Année blanche.

Source: Personal communications from officials at individual institutions, supplemented by Cuenin (1992); Rwanda, *Annuaires statistiques de l'enseignement supérieur au Rwanda* (various years, 1981–86); Rwanda (1990, 1994a, 2000g); TFHES (2000).

TABLE A7-2: ENROLLMENTS IN PUBLIC AND PRIVATE HIGHER EDUCATION INSTITUTIONS BY GENDER, RWANDA, SELECTED YEARS, 1984–2002

Sector and name of institution	Gender	1984–85	1986–87	1994–95	1995–96	1996–97	1997–98	1998–99	1999–2000	2000–01	2001–02
Public institutions											
Université nationale du	M	1,299	1,222	2,472	2,942	3,032	3,388	*Année*	3,475	3,705	4,640
Rwanda (UNR)	F	273	269	789	1,006	1,146	1,160	*blanche*	1,060	1,135	1,282
	T	1,572	1,491	3,261	3,948	4,178	4,548		4,535	4,840	5,922
Kigali Institute of Science,	M						181	418	793	1,169	—
Technology and	F						28	143	356	423	—
Management (KIST)	T						209	561	1,149	1,592	—
Kigali Institute of	M							193	415	689	928
Education (KIE)	F							106	182	270	341
	T							299	597	959	1,269
Kigali Health	M					20	88	151	184	377	—
Institute (KHI)	F					9	59	128	199	313	—
	T					29	147	279	383	690	—
Institut supérieur d'agronomie	M		—	—	—	100	*Année*	145	262	420	—
et d'élevage (ISAE)	F		—	—	—	13	*blanche*	19	52	106	—
	T		—	—	—	113		164	314	526	—
Institut supérieur des	M		16	—	—	51	74	75	59	85	—
finances publiques (ISFP)[a]	F		6	—	—	16	20	35	39	36	—
	T		22	—	—	67	94	110	98	121	—
All public institutions	M	1,299	—	—	—	3,203	—	—	5,188	6,445	—
	F	273	—	—	—	1,184	—	—	1,888	2,283	—
	T	1,572	—	—	—	4,387	—	—	7,076	8,728	—
Private institutions											
Université libre de Kigali	M					149	270	764	1,187	1,658	—
(ULK)	F					59	136	642	1,125	1,592	—
	T					208	406	1,406	2,312	3,250	—

Université laïque de Kigali (UNILAK)	M						—	60	128	117	—
	F						—	49	110	163	—
	T						—	109	238	280	—
Institut supérieur de pédagogie de Gitwe (ISPG)	M			—	—	—	—	—	38	22	33
	F			—	—	—	—	—	43	32	39
	T			—	—	—	—	—	81	54	72
Université adventiste d'Afrique centrale (UAAC)	M	—	—			52	89	116	191	208	245
	F	—	—			39	60	100	160	237	250
	T	—	—			91	149	216	351	445	495
All private institutions	M	—	—	—	—	—	—	—	1,544	2,005	—
	F	—	—	—	—	—	—	—	1,438	2,024	—
	T	—	—	—	—	—	—	—	2,982	4,029	—
Total	M	—	—	—	—	—	—	—	6,732	8,450	—
	F	—	—	—	—	—	—	—	3,326	4,307	—
	T	—	—	—	—	—	—	—	10,058	12,757	—

— Not available, or not calculated for lack of data.

Note: Shaded areas indicate years when the institution was not in operation. M, male; F, female; T, total.

a. Now the Institute of Finance and Banking (IFB).

Source: For 1980s, Rwanda, Annuaires statistiques de l'enseignement supérieur au Rwanda (various years, 1981–86), and Rwanda (1990, 1994a); for the 1990s and 2000s, personal communications from officials at individual institutions.

TABLE A7-3: DISTRIBUTION OF STUDENTS BY FIELD OF STUDY, SELECTED HIGHER EDUCATION INSTITUTIONS, RWANDA, 2000–01

	Public institutions[a]								Private institutions[b]						All	
Field of study	UNR	KIST	KIE	KHI	ISAE	ISFP	Total	%[c]	ULK	UNILAK	ISPG	UAAC	Total	%[c]	Number of students	%[c]
Literature and humanities	**963**						**963**	**13.6**	**986**			**174**	**1,160**	**28.8**	**2,123**	**19.2**
Lit. & humanities	371						371								371	
Social sciences							0		986				986		986	
Ed. psychology							0					126	126		126	
Theology							0					48	48		48	
Education	562						562								562	
Journalism	30						30								30	
Law	**338**						**338**	**4.8**	**901**	**132**			**1,033**	**25.7**	**1,371**	**12.4**
Economics and management	**1,142**	**686**				**48**	**1,876**	**26.6**	**1,363**	**100**		**198**	**1,661**	**41.3**	**3,537**	**31.9**
Management		686					686								686	
Economics	1,142						1,142		1,363	100			1,463		2,605	
Accounting												198	198		198	
Public finance						48	48								48	
Science and technology	**569**	**906**					**1,475**	**20.9**				**68**	**68**	**1.7**	**1,543**	**13.9**
Sciences	569						569								569	
Engin. & technology		749					749								749	
Food science		157					157								157	
Computer science							0					68	68		68	
Health sciences	**419**			**451**			**870**	**12.3**		**48**			**48**	**1.2**	**918**	**8.3**
Medicine	419						419								419	
Anesthetics				43			43								43	
Dentistry				66			66								66	
Laboratory science				52			52								52	
Physiotherapy				48			48								48	
Radiology				23			23								23	
Mental health				45			45								45	
Nursing				174			174								174	
Medical technology							0			48			48		48	

Agriculture	**79**				**520**		**599**	**8.5**							**599**	**5.4**
Agronomy	79						79								79	
Crop science					183		183								183	
Animal husbandry					160		160								160	
Ag. engineering					174		174								174	
Soil science					3		3								3	
Teacher education			**940**				**940**	**13.3**			**54**		**54**	**1.3**	**994**	**9.0**
Sciences			523				523				54		54		577	
Arts			417				417								417	
Total in specialized fields	**3,510**	**1,592**	**940**	**451**	**520**	**48**	**7,061**	**100.0**	**3,250**	**280**	**54**	**440**	**4,024**	**100.0**	**11,085**	**100.0**
Prespecialized courses	**1,330**			**230**		**73**	**1,633**								**1,633**	
Common core						73	73								73	
Language training[c]	1,330			230			1,530								1,530	
Overall total	**4,840**	**1,592**	**940**	**681**	**520**	**121**	**8,694**		**3,250**	**280**	**54**	**440**	**4,024**		**12,718**	

Blanks denote zero enrollment or not applicable.

a. UNR, Université nationale du Rwanda; KIST, Kigali Institute of Science, Technology and Management; KIE, Kigali Institute of Education; KHI, Kigali Health Institute; ISAE, Institut supérieur d'agronomie et d'élevage; ISFP, Institut supérieur des finances publiques (now the Institute of Finance and Banking, IFB).

b. ULK, Université libre de Kigali; UNILAK, Université laïque de Kigali; UAAC, Université adventiste d'Afrique centrale; ISPG, Institut supérieur de pédagogie de Gitwe; FTB, Faculté de théologie de Butare.

c. Includes training for first-year enrollees in the Ecole pratique des langues modernes (EPLM) in the UNR and other comparable arrangements for enabling students to become bilingual in English and French.

Source: Personal communications from officials at individual institutions.

TABLE A7-4: ENROLLMENTS BY FIELD OF STUDY, UNIVERSITÉ NATIONALE DU RWANDA, SELECTED YEARS, 1982–2002

Field of study	1982–83	1983–84	1984–85	1985–86	1994–95	1995–96	1996–97	1997–98	1999–2000	2000–01	2001–02
Agronomy	130	123	130	120	139	142	111	121	110	79	121
Law	114	129	117	143	562	670	552	625	455	338	394
Literature	213	231	292	291	375	387	247	345			
Literature and humanities									356	371	559
Educational sciences	105	146	175	187	199	225	152	238			
Teacher training (Ecole normale supérieure)					67	168	105	69			
Education									326	562	892
Economics, social sciences, and management	275	297	367	291	1,150	1,340	1,077	1,259	1,073	1,142	1,516
Information sciences and technology (Ecole des sciences et techniques de l'information)							114	112			
Journalism and communications (Ecole de journalisme et communication)									85	30	49
Medicine	145	144	127	114	263	296	238	331	348	419	441
Public health and nutrition (Ecole de santé publique et de nutrition)					155	219	158	131	61		
Pharmacology	42										
Sciences	117	170	219	260	160	121	87	204	247		
Applied sciences	70	65	81	95	191	245	179	93			
Science and technology										569	676
Modern technology (Ecole supérieure des techniques modernes)	66	62	64	64							

Total, specialized courses	**1,277**	**1,367**	**1,572**	**1,565**	**3,261**	**3,813**	**3,020**	**3,528**	**3,061**	**3,480**	**4,599**
Prespecialized courses (language upgrading, etc.)							1,158	1,020	1,474	1,330	1,274
Overall total	**1,277**	**1,367**	**1,572**	**1,565**	**3,261**	**3,813**	**4,178**	**4,548**	**4,535**	**4,810**	**5,873**

Note: Blanks denote zero enrollments.

Source: For the 1980s, Rwanda, *Annuaires statistiques de l'enseignement supérieur au Rwanda* (various years, 1981–86); for the 1990s and 2000s, personal communications from officials at the Université nationale du Rwanda.

TABLE A7-5: NUMBERS OF RWANDAN STUDENTS ON GOVERNMENT OVERSEAS SCHOLARSHIPS AND ENROLLED LOCALLY, SELECTED YEARS, 1967–2002

	Number on overseas scholarships		Number enrolled in local institutions		Students on overseas scholarships as a percentage of all enrollments[a]	
Year	Total	% women	Public sector	Public and private sectors	(A)	(B)
1967–68	156	—	233	—	40.1	
1968–69	233	—	330	—	41.4	
1969–70	271	—	446	—	37.8	
1970–71	364	—	390	—	48.3	
1971–72	508	—	526	—	49.1	
1972–73	525	—	489	—	51.8	
1973–74	530	—	619	—	46.1	
1974–75	498	—	672	—	42.6	
1975–76	559	—	657	1,108	46.0	33.5
1976–77	486	—	657	—	42.5	
1977–78	610	—	760	—	44.5	
1978–79	515	—	976	—	34.5	
1979–80	448	—	1,037	—	30.2	
1980–81	593	—	1,125	1,243	34.5	32.3
1981–82	533	—	1,211	1,309	30.6	28.9
1982–83	590	8.8	1,317	1,495	30.9	28.3
1983–84	626	7.6	1,367	1,579	31.4	28.4
1984–85	708	7.5	1,572	1,885	31.1	27.3
1985–86	833	8.8	1,565	1,987	34.7	29.5
1986–87	945	11.6	1,513	2,029	38.4	31.8
1999–2000	981[b]	31.0	7,673	10,655	11.3	8.4
2000–01	915[b]	28.3	8,729	12,903	9.5	6.6
2001–02	666[b]	26.9	10,354	16,668	6.0	3.8

Blanks denote not applicable.

— Not available.

a. In column (A) the denominator includes foreign and domestic enrollments in public institutions; in column (B) it includes these plus domestic enrollments in private institutions.

b. Includes students on scholarship at the Rwanda branch of the Université adventiste d'Afrique centrale. See appendix table A7-6 for their number by year.

Source: For number of students abroad, 1967–68 to 1977–78, Rwanda (1986a); 1978–79 to 1980–81, Rwanda (1982); 1981–82 to 1986–87, Rwanda (1986b); for number abroad and percentage female, 1999–2000 to 2001–02, personal communication from the Direction de l'enseignement supérieur, Ministry of Education; for domestic higher education enrollments, appendix table A7-1.

TABLE A7-6: NUMBER OF RWANDAN STUDENTS ON GOVERNMENT OVERSEAS SCHOLARSHIPS BY HOST COUNTRY, SELECTED YEARS, 1984–2002

Region and host country	1984–85	1999–2000	2000–01	2001–02
Sub-Saharan Africa	**89**	**290**	**296**	**224**
Benin	3	0	0	0
Burkina Faso	0	3	3	3
Burundi	10	31	15	8
Cameroon	1	13	11	13
Central African Republic	1	0	0	0
Congo, Dem Rep.	23	0	0	0
Congo, Rep.	2	0	2	1
Côte d'Ivoire	5	0	0	0
Ethiopia	0	7	6	4
Gabon	0	1	1	0
Ghana	0	3	0	1
Kenya	0	11	12	9
Lesotho	0	2	2	2
Niger	4	1	1	1
Senegal	25	8	10	21
South Africa	0	65	87	94
Tanzania	13	3	5	3
Togo	0	1	0	0
Tunisia	2	0	3	3
Uganda	0	141	138	61
OECD countries	**318**	**151**	**114**	**96**
Austria	21	1	1	0
Belgium	77	20	22	15
Canada	38	28	28	33
France	48	25	15	11
Germany, Fed. Rep.[a]	70	6	6	7
Ireland	2	0	0	0
Italy	21	5	4	2
Netherlands	1	0	0	0
Switzerland	6	8	4	2
United Kingdom	1	40	22	17
United States	33	18	12	9
Middle East and North Africa	**49**	**26**	**33**	**41**
Algeria	42	24	31	40
Egypt, Arab Rep.	0	1	1	0
Israel	0	1	1	1
Libya	4	0	0	0
Saudi Arabia	2	0	0	0
Syria	1	0	0	0
Central and Eastern Europe	**225**	**5**	**27**	**19**
Bulgaria	6	0	0	0
Czechoslovakia	2	0	0	0
Poland	2	4	4	3

(*Continued*)

TABLE A7-6: NUMBER OF RWANDAN STUDENTS ON GOVERNMENT OVERSEAS SCHOLARSHIPS BY HOST COUNTRY, SELECTED YEARS, 1984–2002 (CONTINUED)

Region and host country	1984–85	1999–2000	2000–01	2001–02
Central and Eastern Europe				
Romania	6	0	0	0
Ukraine	0	1	1	1
U.S.S.R./Russia	207	0	22	15
Yugoslavia	2	0	0	0
Other	**27**	**430**	**407**	**266**
China	25	25	32	35
India	0	403	373	231
Jamaica	1	0	0	0
Mexico	1	0	0	0
Philippines	0	2	2	0
All countries, excluding students at UAAC[b]	708	902	877	646
All countries, including students at UAAC[b]		981	915	666

a. For last three columns, reunified Germany.
b. UAAC, Université adventiste d'Afrique centrale. The institution has a campus in Rwanda.
Source: For 1984–85, Rwanda, *Annuaires statistiques de l'enseignement supérieur au Rwanda* (various years, 1981–86); personal communication from Direction de l'enseignement supérieur, Ministry of Education.

TABLE A7-7: ACADEMIC FEES, WELFARE, AND TRAVEL COSTS PAID BY THE RWANDAN GOVERNMENT FOR RWANDAN STUDENTS ON GOVERNMENT OVERSEAS SCHOLARSHIPS, CIRCA 2002

(US$) Host country	Average annual academic fees[a]	Annual welfare grant by level of study			Air ticket per course of study	
		Undergraduate	Master's	PhD	Outbound	Inbound
Algeria	Paid by host country	600			563	997
China	Paid by host country	1,800	1,800	1,800	1,156	1,082
India	Paid by host country	1,800	2,400	2,400	408	408
Russia	Paid by host country	1,800	1,800	1,800	709	684
Poland	Paid by host country	3,600	3,600	3,601	709	684
Uganda		750–1,250	1,550–2,050	1,550–2,050	0	0
South Africa	1,091–1,121	3,415	3,488	4,247	406	496
Tunisia	—	600	600	600	604	905
Burundi	—	2,400			0	0
Congo, Dem. Rep.	—	2,400			488	488
Ethiopia	—	2,400			321	321
Burkina Faso	—	3,600	4,800	6,000	767	947
Cameroon	—	3,600	4,800		563	563
Egypt, Arab Rep.	—	3,600	4,800	6,000	469	469
Gabon	—	3,600	4,800	6,000	522	947
Ghana	—	3,600	4,800	6,000	—	—
Kenya	—	3,600			207	268
Niger	—	3,600	4,800	6,000	1,036	872
Senegal	—	3,600	4,800	6,000	857	1,155
Tanzania	—	3,600			286	305
Lesotho	—	4,600			455	455
Ukraine	—	6,000			709	684
Israel	—	7,200			787	1,083

(*Continued*)

TABLE A7-7: ACADEMIC FEES, WELFARE, AND TRAVEL COSTS PAID BY THE RWANDAN GOVERNMENT FOR RWANDAN STUDENTS ON GOVERNMENT OVERSEAS SCHOLARSHIPS, CIRCA 2002 (CONTINUED)

(US$) Host country	Average annual academic fees[a]	Annual welfare grant by level of study			Air ticket per course of study	
		Undergraduate	Master's	PhD	Outbound	Inbound
Canada	11,000–14,001	7,200–8,400	8,400–10,200	9,000–14,000	888	875
Austria	11,000–14,000	8,400	10,200	14,400	663	662
Belgium	11,000–14,000	8,400	10,200	14,400	663	662
France	11,000–14,000	8,400	10,200	14,400	663	662
Germany	11,000–14,000	8,400	10,200	14,400	709	569
United Kingdom	11,000–14,000	8,400	8,400	9,000	615	615
Italy	11,000–14,000	8,400	10,200	14,400	663	662
Switzerland	11,000–14,000	8,400	10,200	14,400	663	662
United States.	11,000–14,000	—	8,400	9,000	888	876

Blanks denote not applicable.
— Not available.
a. In most African countries, the fees are likely to be modest and are probably not greater than the level shown for South Africa.
Source: Personal communication from Direction de l'enseignement supérieur, Ministry of Education.

TABLE A7-8: NUMBER OF HIGHER EDUCATION FACULTY BY INSTITUTION AND NATIONALITY, RWANDA, 1985–2001

Sector, name of institution, and year	Full-time faculty			Part-time and visiting faculty			All staff
	Nationals	Expatriates	Total	Nationals	Expatriates	Total	
Public							
Université nationale du Rwanda (UNR)							
1985–86	163	54	217	—	—	121	—
1986–87	172	47	219	—	—	177	—
1994–95	—	—	125	—	—	—	—
1995–96	—	—	160	—	—	—	—
1996–97	—	—	164	—	—	—	—
1997–98	—	—	233	—	—	—	—
1998–99			*Année blanche* (classes canceled)				
1999–2000[a]	—	—	297	—	—	254	—
2000–01[a]	273	81	354	—	—	222	—
(2000–01, counting EPLM teachers)			(389)				
Kigali Institute of Science, Technology and Management (KIST)							
1997–98	—	—	15	—	—	—	—
1998–99	—	—	31	—	—	—	—
1999–2000	—	—	85	—	—	—	—
2000–01	—	—	162	18	1	19	—
Kigali Institute of Education (KIE)							
1998–99	29	10	39	—	—	—	—
1999–2000	42	23	65	—	—	—	—
2000–01	51	34	85	—	—	—	—
Kigali Health Institute (KHI)							
1998–99	21	2	23	—	—	—	—
1999–00	33	3	36	—	—	—	—
2000–01	54	9	63	—	—	—	—
Institut supérieur d'agronomie et d'élevage (ISAE)							
1997–98	—	—	—	—	—	—	25
1998–99	—	—	—	—	—	—	25
1999–2000	—	—	—	—	—	—	39
2000–01	21	10	31	15	—	15	—
Institut supérieur des finances publiques (ISFP)[b]							
1986–87	—	—	—	17	2	19	—
2000–01	2	—	2	27	—	27	—

(*Continued*)

TABLE A7-8: NUMBER OF HIGHER EDUCATION FACULTY BY INSTITUTION AND NATIONALITY, RWANDA, 1985–2001 (CONTINUED)

Sector, name of institution, and year	Full-time faculty			Part-time and visiting faculty			
	Nationals	Expatriates	Total	Nationals	Expatriates	Total	All staff
Private							
Université libre de Kigali (ULK)							
1996–97	—	—	—	—	—	—	18
1997–98	—	—	—	—	—	—	38
1998–99	—	—	—	—	—	—	62
1999–2000	—	—	—	—	—	—	116
2000–01	47	8	55	58	15	73	—
Université adventiste d'Afrique centrale (UAAC)							
1985–86	—	11	11	3	4	7	—
1986–87	2	19	21	1	—	1	—
2001–02	12	—	12	21	—	21	—
Université laïque de Kigali (UNILAK)[c]							
1997–98	—	—	—	—	—	—	19
1998–99	—	—	—	—	—	—	37
1999–2000	—	—	—	—	—	—	38
2000–01	1	3	4	36	4	40	—
Institut supérieur de pédagogie de Gitwe (ISPG)[d]							
2000–01	12	—	12	28	—	28	—
2001–02	13	—	13	28	—	28	—
Faculté de théologie de Butare							
2001–02	4	2	6	4	9	13	—

— Not available.

a. Excludes teachers in the Ecole pratique des langues modernes (EPLM), a language-upgrading program for first-year students that began in 1996–97. In 2000–01, these teachers numbered 35; the number in earlier years is unknown. Includes 21 United Nations volunteers in 1999–2000 and 22 United Nations volunteers in 2000–01.

b. Now the Institute of Finance and Banking (IFB).

c. The distribution of teachers by nationality and employment status is highly approximate.

d. So-called permanent teachers and visiting faculty have almost the same teaching loads, about 15 hours a week.

Source: For the UNR in the 1980s, Rwanda (1986a, 1986b); for all other institutions and years, personal communications from officials at individual institutions.

TABLE A7-9: CURRENT AND PROPOSED ARRANGEMENTS REGARDING STUDENT BURSARIES AT THE UNIVERSITÉ NATIONALE DU RWANDA

Type of student	Monthly amount of bursary per student	Monthly amount deducted from bursary			Monthly amount of cash recevied by each student
		Meals	Housing	Health services	
Current arrangements					
Students fed and housed on campus	11,000	5,400	650	500	4,450
Other students	11,000	0	0	500	10,500
Proposed arrangement (beginning in 2004)					
Students fed and housed on campus	25,000	15,000	1,300	500	8,200
Other students	25,000	0	0	500	24,500

Note: The amounts above are for 10 months of the year only; students receive no bursary for the other 2 months.

Source: Personal communication from officials at the Université nationale du Rwanda.

TABLE A8-1: MINCERIAN EARNING FUNCTIONS AMONG WAGE EARNERS, RWANDA, 1999–2001

Regression variable[a]	Coefficient	t	Coefficient	t	Coefficient	t
Constant	9.624	33.07**	9.747	33.11**	9.794	33.36**
Years of schooling	0.112	14.73**				
Level of education attained[b]						
Primary			0.126	1.92		
1–3 years of schooling					0.018	0.22
4–6 years of schooling					0.207	2.87**
Secondary vocational and technical			0.578	5.91**	0.620	6.25**
General secondary			0.929	9.88**	0.974	10.18**
Higher education			1.838	14.37**	1.888	14.64**
Age	0.076	4.45**	0.080	4.60**	0.077	4.40**
Age^2	0.001	2.82**	0.001	3.05**	0.001	2.87**
Male/female	0.295	5.76**	0.324	6.29**	0.320	6.23**
Employment sector[c]						
Quasi public	0.083	0.70	0.090	0.79	0.097	0.84
Private formal	0.064	0.84	0.070	0.90	0.073	0.93
Private informal	0.450	5.61**	0.464	5.61**	0.442	5.35**
Economic sector[d]						
Mining	0.033	0.12	0.213	0.79	0.135	0.48
Manufacturing	0.532	4.54**	0.664	5.55**	0.626	5.24**
Energy	0.933	4.60**	1.141	5.88**	1.112	5.55**
Construction and public works	0.642	6.05**	0.807	7.46**	0.765	7.04**
Commerce, hotel, and restaurant	0.247	2.02*	0.451	3.72**	0.405	3.31**
Transport and communications	0.870	8.04**	0.977	8.79**	0.933	8.26**
Banking and insurance	0.679	5.86**	0.715	5.99**	0.679	5.64**
Services	0.294	4.02**	0.407	5.66**	0.369	5.02**
Other	0.754	3.71**	0.873	3.81**	0.834	3.66**
Province[e]						
Butare	0.165	1.70	0.186	0.808	0.171	1.81
Byumba	0.435	3.97**	0.436	4.07**	0.435	4.07**
Cyangugu	0.525	5.34**	0.516	5.16**	0.507	5.14**
Gikongoro	0.622	5.94**	0.615	6.00**	0.614	6.02**
Gisenyi	0.149	1.24	0.196	1.55	0.194	1.54
Gitarama	0.258	2.52*	0.233	2.29*	0.213	2.09*
Kibungo	0.591	5.21**	0.606	5.30**	0.612	5.35**
Kibuye	0.657	4.25**	0.694	4.63**	0.674	4.54**
Kigali Rural	0.167	1.85	0.165	1.81	0.159	1.77
Ruhengeri	0.779	8.42**	1.97*	8.97**	0.793	8.77**
Umutara	0.134	1.08	0.106	0.86	0.099	0.79

(*Continued*)

TABLE A8-1: MINCERIAN EARNING FUNCTIONS AMONG WAGE EARNERS, RWANDA, 1999–2001 (CONTINUED)

Regression variable[a]	Coefficient	*t*	Coefficient	*t*	Coefficient	*t*
Secondary activity (occupation)	0.554	5.28**	0.550	5.14**	0.560	5.30**
R^2	0.58		0.58		0.58	
Number of observations	1,866		1,866		1,866	

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

a. The dependant variable is the annual salary (including benefits) from the main and secondary jobs. The results reflect estimates based on a semilogarithmic model specification corrected for heteroskedasticity but not for selection bias.

b. Relative to those with no schooling.

c. Relative to wage earners in the public sector.

d. Relative to wage earners in the primary sector of the economy.

e. Relative to Kigali Ville.

Source: Authors' estimates based on the 1999–2001 Household Living Conditions Survey.

TABLE A8-2: MINCERIAN EARNING FUNCTIONS AMONG WAGE EARNERS BY SECTOR OF EMPLOYMENT, RWANDA, 1999–2001

Regression Variable[a]	Public and quasi public						Private formal						Private informal					
	Coeff.	t	Coeff.	t	Coeff.	t	Coeff.	t	Coeff.	t	Coeff.	t	Coeff.	t	Coeff.	t	Coeff.	t
Constant	9.215	14.62**	10.027	15.28**	10.031	15.21**	9.845	18.07**	9.969	17.65**	9.966	17.57**	9.088	34.36**	9.191	33.82**	9.258	34.87**
Years of schooling	0.146	9.83*					0.129	8.90**					0.065	5.50**				
Level of education attained[b]																		
Primary			0.310	0.88					0.334	1.68					0.083	1.20		
1–3 years of schooling					0.341	0.85					0.361	1.13					0.057	0.67
4–6 years of schooling					0.299	0.83					0.329	1.61					0.169	2.19*
Secondary vocational and technical			0.153	0.42	0.158	0.43			0.584	2.64**	0.582	2.61**			0.539	3.67**	0.575	3.89**
General secondary			0.397	1.10	0.403	1.11			1.016	4.67**	1.014	4.61**			0.876	5.28**	0.913	5.47**
Higher education			1.380	3.68**	1.386	3.65**			1.805	7.25**	1.803	7.20**			—	—	—	—
Age	0.078	2.18*	0.083	2.29*	0.083	2.28*	0.034	1.27	0.045	1.71	0.045	1.70	0.100	5.99**	0.100	5.93**	0.096	5.89**
Age^2	0.001	1.49	0.001	1.64	0.001	1.64	0.000	0.47	0.000	0.90	0.000	0.91	0.001	4.54**	0.001	4.56**	0.001	4.52**
Male/female	0.351	3.57**	0.276	2.59*	0.275	2.57*	0.124	1.08	0.100	0.85	0.100	0.85	0.328	4.74**	0.350	5.11**	0.344	5.02**
Economic sector[c]																		
Mining	1.011	3.67**	1.659	5.61**	1.652	5.51**	0.576	1.47	0.716	1.67	0.720	1.67	0.148	0.51	0.020	0.07	0.125	0.45
Manufacturing	0.060	0.13	0.214	0.43	0.210	0.42	1.044	3.76**	1.106	3.91**	1.108	3.89**	0.713	5.09**	0.759	5.34**	0.722	5.15**
Energy	1.028	3.39**	1.391	4.71**	1.387	4.60**	1.186	2.83**	1.393	3.57**	1.397	3.56**	1.713	3.45**	1.762	3.58**	1.788	3.19**
Construction and public works	1.292	3.09**	1.670	3.08**	1.672	3.12**	0.858	2.90**	0.880	2.94**	0.878	2.92**	0.813	6.76**	0.866	7.12**	0.817	6.65**
Commerce, hotel, and restaurant	0.377	0.45	0.144	0.18	0.153	0.19	0.618	2.31*	0.763	2.88**	0.764	2.87**	0.338	2.09*	0.394	2.43*	0.349	2.15*
Transport and communications	0.315	1.17	0.596	2.17*	0.588	2.09*	1.427	4.71**	1.450	4.86**	1.452	4.78**	1.021	7.06**	1.012	6.93**	0.972	6.70**
Banking and insurance	0.612	2.25*	0.873	3.17**	0.865	3.07**	1.215	4.45**	1.271	4.56**	1.273	4.53**	0.934	4.57**	0.873	3.59**	0.844	3.45**
Services	0.296	1.30	0.634	2.74**	0.625	2.61**	0.896	3.53**	0.932	3.67**	0.933	3.66**	0.247	2.69**	0.285	3.13**	0.249	2.70**
Other	0.907	3.00**	0.897	3.04**	0.928	2.58*	1.553	3.96**	1.699	4.27**	1.702	4.27**	0.302	1.38	0.295	1.32	0.252	1.14
Province[d]																		
Butare	0.063	0.30	0.110	0.54	0.112	0.54	0.091	0.33	0.184	0.69	0.184	0.69	0.325	2.75**	0.356	0.860	0.327	2.77**
Byumba	0.040	0.23	0.135	0.88	0.136	0.89	0.746	2.59*	0.783	2.77**	0.781	2.74**	0.472	3.28**	0.494	3.42**	0.483	3.38**
Cyangugu	0.194	1.25	0.146	0.97	0.146	0.97	1.143	5.12**	1.104	4.36**	1.105	4.33**	0.654	5.00**	0.671	5.07**	0.657	5.04**
Gikongoro	0.694	3.30**	0.734	3.51**	0.734	3.50**	0.047	0.09	0.008	0.02	0.006	0.01	0.676	5.23**	0.682	5.33**	0.677	5.33**

(*Continued*)

TABLE A8-2: MINCERIAN EARNING FUNCTIONS AMONG WAGE EARNERS BY SECTOR OF EMPLOYMENT, RWANDA, 1999–2001 (CONTINUED)

Regression Variable[a]	Public and quasi public						Private formal						Private informal					
	Coeff.	t	Coeff.	t	Coeff.	t	Coeff.	t	Coeff.	t	Coeff.	t	Coeff.	t	Coeff.	t	Coeff.	t
Province																		
Gisenyi	0.511	3.27**	0.526	2.98**	0.526	2.98**	0.568	1.25	0.410	0.90	0.409	0.90	0.066	0.39	0.007	0.04	0.002	0.01
Gitarama	0.431	2.85**	0.356	2.32*	0.357	2.31*	0.196	0.79	0.167	0.65	0.169	0.65	0.143	1.00	0.150	1.05	0.117	0.81
Kibungo	0.290	1.96	0.317	2.07*	0.318	2.08*	0.165	0.82	0.129	0.65	0.128	0.65	0.923	5.46**	0.953	5.68**	0.957	5.71**
Kibuye	0.932	3.54**	0.968	3.59**	0.966	3.60**	0.854	2.87**	0.802	2.87**	0.802	2.87**	0.590	2.59**	0.635	2.83**	0.607	2.73**
Kigali Rural	0.084	0.53	0.006	0.04	0.006	0.03	0.514	2.93**	0.532	3.09**	0.533	3.08**	0.485	4.09**	0.469	3.89**	0.454	3.83**
Ruhengeri	0.853	4.61**	0.831	4.09**	0.830	4.08**	0.635	2.43*	0.732	2.92**	0.736	2.90**	0.836	7.38**	3.00**	7.79**	0.840	7.54**
Umutara	0.733	5.07**	0.630	4.48**	0.628	4.42**	0.351	2.20*	0.328	2.01*	0.325	1.92	0.034	0.20	0.025	0.14	0.038	0.22
Secondary activity (occupation)	0.626	2.52*	0.685	2.69**	0.685	2.67**	0.625	2.82**	0.643	2.97**	0.643	2.97**	0.460	3.00**	0.460	2.87**	0.483	3.07**
R^2	0.56	0.56	0.55	0.55	0.55	0.55	0.53	0.53	0.53	0.53	0.53	0.53	0.38	0.38	0.38	0.38	0.39	0.39
Number of observations	365	365	365	365	365	365	337	337	337	337	337	337	1164	1164	1164	1164	1164	1164

* Statistically significant at the 5 percent level.

** Statistically significant at the 1 percent level.

a. The dependant variable is the annual salary (with benefits) from the main and secondary occupations. The results are based on a semilogarithmic model specification corrected for heteroskedasticity but not for selection bias.

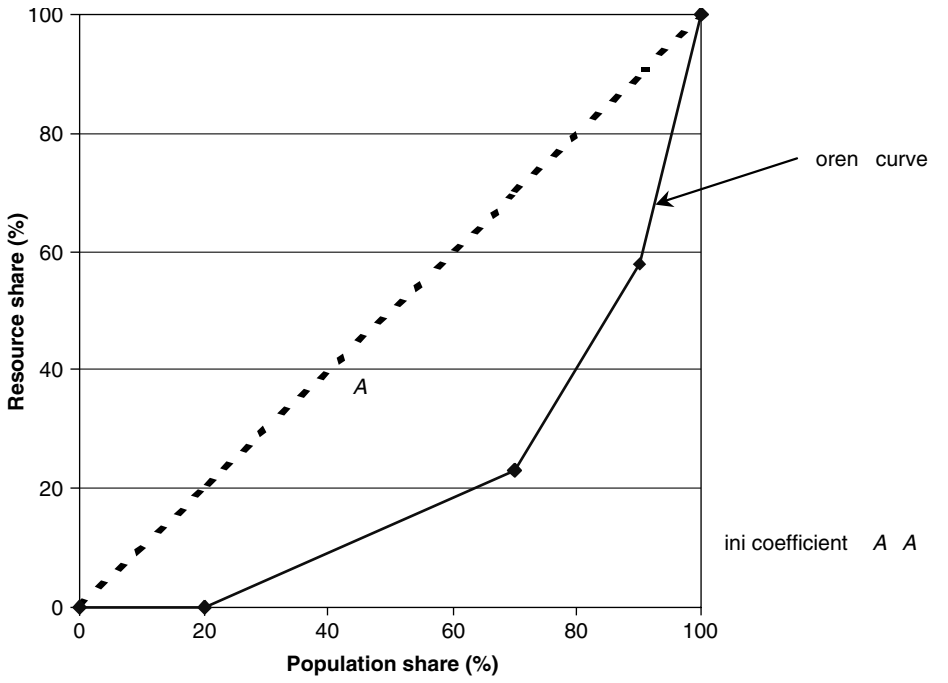
b. Relative to those with no schooling.

c. Relative to wage earners in the primary sector of the economy.

d. Relative to Kigali Ville

Source: Authors' estimates based on the 1999–2001 Household Living Conditions Survey.

Figure A4-1: Cumulative Shares of Public Spending on Education Denefiting a Hypothetical Cohort, by Educational Attainment



Source: Authors' construction, based on hypothetical data on gross enrollment ratios and shares of public spending on education indicated in note 13 in chapter 4.

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