CHAPTER 26

Achieving Universal Primary Education through School Fee Abolition: Some Policy Lessons from Uganda

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In 1997 the government of Uganda abolished school fees for primary education. Immediately, primary enrollment rates skyrocketed, with gross enrollment rates rising from 77 percent in 1996 to 137 in 1997 and net enrollment rising from 57 percent to 85 percent.[1] Enrollment remained high over the following decade, with poor children, girls, and rural residents benefiting disproportionately from the increase in access.

The quantitative success of the government's universal primary education (UPE) initiative put significant stress on the country's educational infrastructure, however, with a consequent toll on the quality of primary schooling. Increased enrollment led to overcrowding, multiple shifts, shortages of teachers and material, and an increase in overage students.[2] This chapter analyzes the outcomes of UPE in Uganda in order to draw policy lessons from the experience.

THE NEED FOR REFORM

Uganda's education sector achieved considerable progress following independence, but that progress was reversed as a result of various sociopolitical crises in the 1970s and 1980s. In 1985 the level of government expenditure on education was about 27 percent that of the 1970s (Appleton 2001). Partly as a result of the high costs of education to families, the gross primary enrollment rate stood at 50 percent in 1980—the same rate as in 1960. Significant improvement was observed in 1985, when the gross primary enrollment rate increased to 73 percent, but it remained stagnant at that level until 1995.

In 1996 the government committed itself to providing UPE. It abolished school fees at the primary level starting in January 1997. The policy was not adopted overnight. It is an integral part of a broader reform program, which can be traced back to the creation in 1987 of the Education Policy Review Commission (see discussion later in chapter).

Education contributes directly to human development and is an investment in economic prosperity. In recognition of the fact that it has both intrinsic and instrumental value for development, the government placed education at the center of its Poverty Eradication Action Plan (PEAP). The current 2010–15 five-year National Development Plan also recognizes the importance of education for sustained economic growth and social transformation.

OUTCOMES OF REFORM

The goal of Uganda's primary education policy is to ensure that every child enrolls at the appropriate age and successfully completes the full cycle of education.[3] Achievement of this objective requires expanding educational opportunities and improving educational outcomes. The review of the results of reform presented in this section focuses on four outcomes: school enrollment and its cost, age at enrollment, completion rates, and equity considerations.

School enrollment

Between 1996 (the year of the policy announcement) and 1997 (the first year of implementation), primary school

enrollment in Uganda increased from about 3.1 million (a gross enrollment rate of 77 percent) to 5.3 million (a gross enrollment rate of 137 percent), a 58 percent increase. The net enrollment rate rose from 57 percent in 1996 to 85 percent in 1997 and 90 percent in 1999 (MOES 1999).

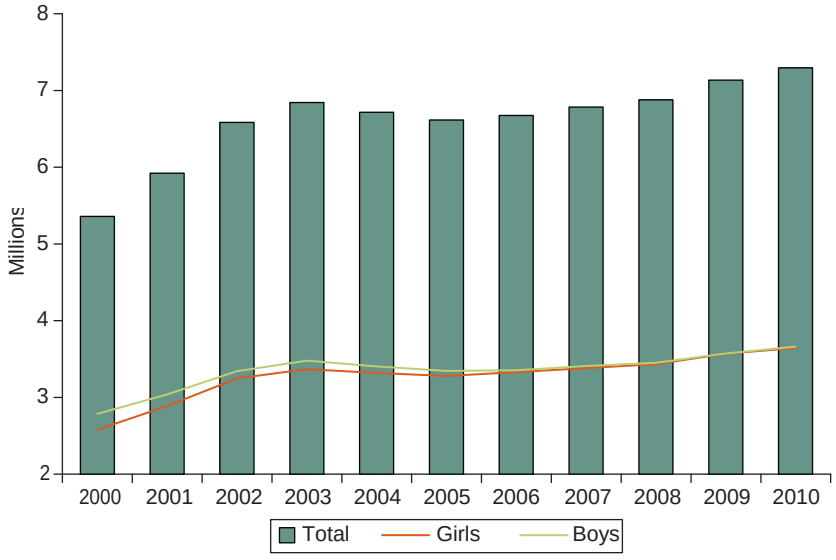
To what extent are these changes in enrollment a result of the UPE policy? The 1997 education policy reform can be viewed as a natural experiment in which a sharp change in government policy is an exogenous variation in a treatment variable to which only a segment of the population (that is, primary school students) is exposed. Deininger (2003) estimates a linear probability model for primary school enrollment among three age groups: 6–12, 6–8, and 9–12 (see annex 26A for technical details). To control for unobserved effects of factors associated with a common economic environment, he estimates the same equation for secondary school enrollment (the 12–18 age group). All primary school regressions show a positive and significant time trend, implying that the probability of primary school enrollment increased for everyone in the sample. When all other variables are set to their mean levels, the probability of a child being enrolled in primary school in 1999 is about 60 percent higher than it was in 1992. Deininger finds no significant effect of UPE on secondary school enrollment. Essama-Nssah, Leite, and Simler (2008) replicate this analysis using data for 1992 and 2005. They find similar results.

The surge in enrollment associated with the reduction in the cost of primary schooling is evidence that this cost was a significant impediment to primary school enrollment by the poor (Deininger 2003). Indeed, lack of interest and the cost of enrollment are the two major determinants of nonenrollment.

As a result of these reforms, the importance of cost as a reason for not enrolling in school declined significantly: in 1992, 42 percent of households cited cost as a factor. This figure fell to just 13 percent by 2005 (Essama-Nssah, Leite, and Simler 2008). This constraint did not change in urban areas, and it declined by less in the central region, where it fell from about 46 percent in 1992 to about 36 percent in 2005, than elsewhere in Uganda. Lack of interest, which increased from 49 percent in 1992 to 56 percent in 2005, remains a severe constraint to enrollment.

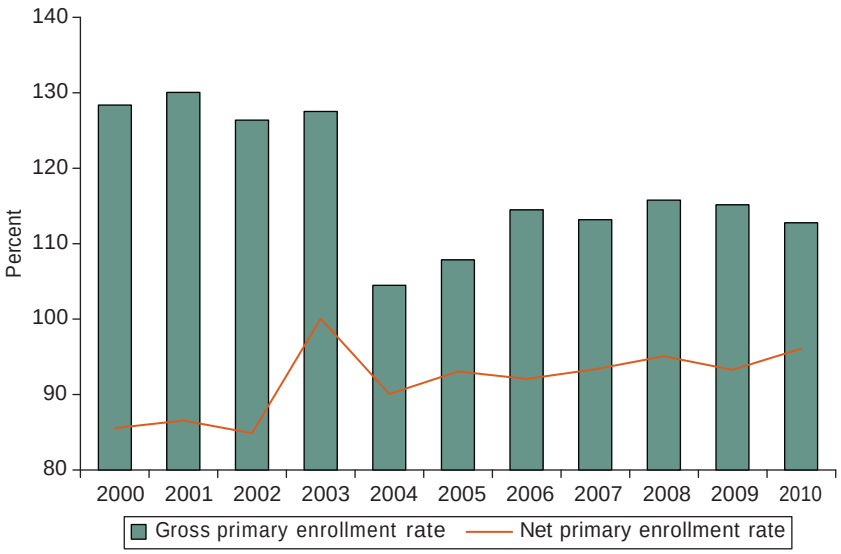
To what extent have increases in enrollment been sustained over time? Total enrollment increased steadily, from 5.4 million in 2000 to about 7.4 million in 2010 (figure 26.1). The gross enrollment ratio dropped from about 128 percent in 2000 to about 104 percent in 2004 (figure 26.2). After a slight increase in 2005, it has been hovering around 115 percent since 2006. After peaking at 100 percent in 2003, the net enrollment ratio has shown an upward trend, rising from 90 percent in 2004 to 96 percent in 2010. These trends suggest that the sustained efforts of the government to improve education policy led to and maintained an increase

Figure 26.1 Boys' and Girls' Enrollment in Public Primary Schools in Uganda, 2000–10



Source: MOES 2010.

Figure 26.2 Gross and Net Primary Enrollment Rates in Uganda, 2000–10



Source: MOES 2010.

Note: The gross primary enrollment rate (GER) is the ratio between the number of children enrolled in primary school and the number of children of primary school age. The net primary enrollment rate (NER) is the ratio between the number of children of primary school age enrolled in primary school and the number of children of primary school age. See note 1 for more information.

in enrollment not only for over-age but for under-age children as well.

Essama-Nssah, Leite, and Simler (2008) study the impact of the policy shift on the cost of enrollment using a linear regression model with interactive terms (analogous to the linear probability model discussed above). The dependent variable is the logarithm of school fees paid (as reported in the 1992 and 2005 surveys). The specification accounts for the fact that school fees are observed only for students who are enrolled and not for those who are not enrolled in school. This potential selection bias calls for the application of Heckman's (1976) two-step estimator. This approach, which is analogous to instrumental variable estimation, requires simultaneous modeling of both exposure to policy intervention and the associated outcome. Identification therefore hinges on an exclusion restriction—that is, the variation of at least one exogenous variable that affects participation (enrollment) but not the outcome (fees paid).

Essama-Nssah, Leite, and Simler apply this methodology to both the primary and secondary levels of education, using community-level costs and peers' enrollment rates in the identifying restriction. Thus at the household level, the construction of these variables excludes the information pertaining to the household under consideration. This construction ensures that the instrumental variables used for identification are not directly related to the outcome variable. They find that over time there has been a significant increase in school fees paid by families at all levels of schooling. However, students in public primary schools were paying less in 2005 than they paid in 1992, suggesting that UPE may have reduced the cost of enrolling in public primary schools. A comparison of the policy impact at the primary and the secondary levels suggests that the policy shift may indeed have moderated the increase in school fees at the primary level but that there was no spillover effect to the secondary level. Their results show that in 2005, fees paid at the secondary level of education were higher in public than in private schools. UPE did lower the cost of primary education.

Age at enrollment and completion rates

Deininger (2003) finds that mother's education is the most important factor influencing timely enrollment (that is, enrollment between the ages of 6 and 8). It does not affect children who enroll between the ages of 9 and 12.

Grogan (2009) uses data from the 1995 and 2000 Demographic and Health Surveys (DHS) along with the 2001 DHS EdData survey for Uganda to assess the impact of UPE on the likelihood of enrolling in school before the age of nine—a key factor in preventing drop-out.[4] She shows that starting school before age nine is associated with a 16–26 percent increase in the probability of completing at least

seven years of schooling. Using the regression discontinuity framework from the program evaluation literature, she shows that elimination of school fees associated with the UPE policy had a positive albeit small effect on the propensity to enroll in primary school before age nine (the overall effect is estimated at 3 percent). This finding is consistent with the conclusion reached earlier, on the basis of the evolution of enrollment rates, that UPE led to an increase in the enrollment of under-age children.

Essama-Nssah, Leite, and Simler (2008) analyze the impact of the policy shift on primary school completion. In particular, they focus on the probability of completing the seventh year of primary school (P7), the last grade of primary school in Uganda. As in the case of enrollment, household income, age, parental education, and urban residence are key determinants of the likelihood of completing primary school. These factors have a positive and significant effect on the probability of completing P7. Essama-Nssah, Leite, and Simler find that the policy shift may not have improved the chances of completing P7. They also find that the income constraint on the chances of completing P7 has become more severe.

The overall completion rate fell continuously between 2004 and 2007, from 62 percent to 47 percent (figure 26.3). This trend seems to support the results of the analysis based on the 2005 household survey discussed earlier. The completion rates for girls and boys follow the same pattern, with rates for boys consistently above those for girls. Improving completion rates thus remains a challenge to policy makers.

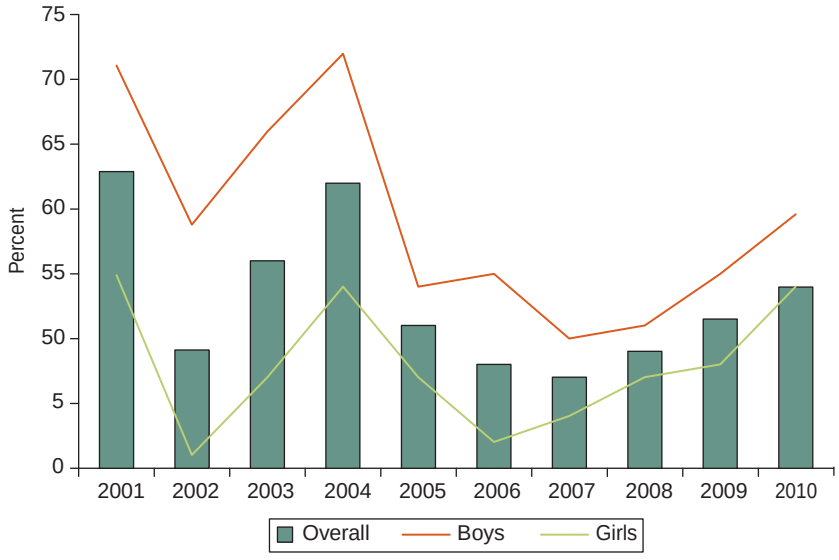
Equity

The achievement of equity is increasingly seen as an important goal of socioeconomic development. Identifying winners and losers is therefore an important concern for policy makers. Doing so depends fundamentally on the response of socioeconomic agents to the incentives of the policy under consideration.

The distributional implications of an intervention depend on the variation in the impacts across groups or individuals. Such impact heterogeneity stems from both treatment heterogeneity (if the dose received depends on some unit attributes) and heterogeneity in individual circumstances (which determine the response to treatment). The same heterogeneity that must be controlled for in identifying causal effects must be accounted for in identifying winners and losers. Models that include interaction between the treatment indicator and covariates offer a framework for the analysis of systematic variation in mean impacts across socioeconomic groups. Interactive models focus on differences in subgroup means.

The regression framework used by Deininger (2003) is suitable for the analysis of the distributional implications of the UPE policy. In 1992, before the introduction of UPE,

Figure 26.3 Boys' and Girls' Primary School Completion Rates in Uganda, 2001–10



Source: MOES 2010.

there was a strong bias against girls in Uganda, and parental income had a strong impact on the probability of enrollment. The probability of enrollment, which increases with parental income, was 5 percent higher for boys than for girls. The relationship between parental education and the probability of primary school enrollment was also positive and significant. Fixing all variables at their mean level and increasing the father's education by one year would lead to an increase in the probability of enrollment of about 3 percent; an additional year of education by the mother would increase the probability of her child enrolling in school by 4 percent. The baseline results show significant regional disparities.

Interacting the policy variable with a variety of household characteristics, Deininger (2003) shows that UPE has been pro-poor. The positive impact of parental income on the probability of enrollment is significantly lower after reform. Comparing 1992 and 2005, Essama-Nssah, Leite, and Simler (2008) find a significant increase in enrollment of the poor. At the bottom quintile, enrollment increased by more than 28 percentage points (from 50.2 percent in 1992 to 78.8 percent in 2005). However, the gap between the bottom and the top quintile does not seem to have narrowed. The gap between boys and girls that was evident in 1992 disappeared in 2005, with the gap in the gross enrollment rate for girls (23.5 percent) somewhat higher than that for boys (20.4 percent). These results confirm the trends observed by Deininger (2003).

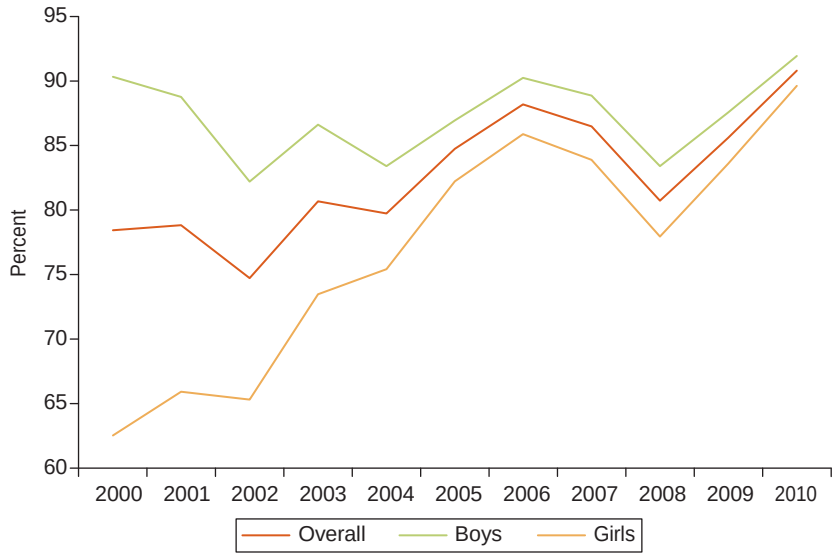
The achievement gap between boys and girls narrowed as well. In 2001 the primary school completion rate was 71 percent for boys and 63 percent for girls. The two groups almost achieved parity in 2008, when the completion rate was 51 percent for boys and 49 percent for girls. For 2010 the gap is estimated at 6 percentage points.

Convergence in achievement by boys and girls is evident from figure 26.4, which shows the success rate on the Primary School Leaving Examination over the past decade. In 2000, 90 percent of male candidates but only 63 percent of female candidates passed the examination. In 2010, 92 percent of boys and 90 percent of girls who take the exam were expected to pass.

Another dimension of gender inequality deserves special attention. The 2010–15 five- year national development plan notes that the largest proportion of out-of-school children are girls. Girls are also more likely than boys to drop out of school or repeat grades.

The *World Development Report 2006* argues for the pursuit of equity on both intrinsic and instrumental grounds. It defines equity in terms of a level playing field on which individuals have equal opportunity to freely pursue chosen life plans and are spared from extreme deprivation in outcomes. The equitable distribution of educational resources is one of the best ways to try to equalize opportunity across socioeconomic groups. Observed inequality of outcomes among groups defined on the basis of circumstances beyond their

Figure 26.4 Boys' and Girls' Success Rates on Uganda's Primary School Leaving Examination, 2000–10



Source: MOES 2010.

control is one potential indicator that current policies have not fully achieved equality of opportunity.

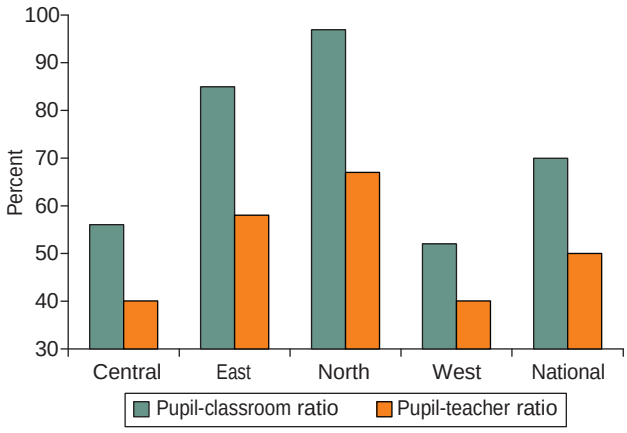
Regional differences in resource allocations are wide in Uganda (figure 26.5). Of the country's four regions, the eastern and the northern have the highest pupil-teacher and pupil-classroom ratios. These data suggest that children in these regions do not have the same learning opportunities as their counterparts in the central and western regions.

POLICY FRAMEWORK

The abolition of primary school fees and the associated measures adopted in the context of the UPE reform led to a significant and lasting expansion of educational opportunities and an improvement in equity in Uganda. The policy process that underpins these achievements has been held up as a leading example of the crucial role played by country ownership and donor cooperation within a sectorwide approach to policy reforms.

The success or failure of a policy is usually assessed in terms of its objectives. But to understand the observed outcomes one needs to consider the policy-making process. The UPE reform sought to expand educational opportunities and improve teaching and learning outcomes. There is evidence that the gains in access and equity have not been fully matched by improvement in educational outcomes. This section considers the policy framework in order to identify key determinants of these outcomes and draw policy lessons from the Ugandan experience.

Figure 26.5 Pupil-Classroom and Pupil-Teacher Ratios in Uganda, by Region, 2008



Source: MOES 2008.

Vision and political commitment

A clear strategic vision focused on the role of education in poverty reduction as well as strong political commitment at various levels of government backed by a sound policy framework underpinned the "big bang" approach adopted in Uganda and contributed to its success. In 1996–97 the top political leadership in Uganda showed its commitment to poverty reduction by spearheading the formulation of the Poverty Eradication Plan. Uganda was among the first low-income countries to prepare a comprehensive and participatory national strategy for poverty reduction; its experience inspired the design of the Poverty Eradication Plan in Uganda and the Poverty Reduction Strategy Program (PRSP) approach (Mackinnon and Reinikka 2000). The government placed education at the center of this action plan, in recognition that education has both intrinsic and instrumental value for development. To show its determination, the government quickly translated the action plan into a budget and medium-term expenditure framework.

Nature and scope of education policy reform

The *World Development Report 2004* (World Bank 2003) argues that the effectiveness of social services in developing human capital depends fundamentally on the method of delivery and the behavior of key actors, including policy makers, service providers, and potential beneficiaries.[5] Outcomes are thus jointly determined by supply- and demand-side factors and the interactions among them. Supply-side interventions seek to increase the level and quality of services provided. Such interventions usually entail building and staffing facilities, providing inputs, implementing institutional reforms, and strengthening the incentives facing services providers. On the demand side, typical interventions seek to improve the ability of participants to benefit from the service provided. Some interventions include incentives for potential beneficiaries to provide the requisite level of effort to achieve the desired outcome. One way of stimulating demand for services is to make them more affordable. Other incentive-based interventions make resource transfers conditional on some desired behavior. For example, a conditional transfer program may seek to promote human capital accumulation by making cash or in-kind transfers to poor families provided that their school-age children stay in school and young children and pregnant and nursing women participate in some health-enhancing activities.

The education policy reform in Uganda is broadly consistent with this framework. The sudden increase in the demand for public primary education created a series of challenges for the government, related mainly to financing the reform, improving the quality of primary education, ensuring equitable access to primary education, and planning beyond primary school. To improve the quality of primary education, the government has focused on five areas: curriculum development, provision of basic learning materials, teacher development, language of instruction for lower primary pupils, and establishment and maintenance of standards.

It took some time for reform in these areas to significantly improve the quality of teaching and learning in Uganda. Test results from the National Assessment of Progress in Education between 1996 and 2000 showed deterioration in student performance in math, reading, science, and social studies (Bategeka 2005). The key factors explaining the decline outcome were lack of coherence and consistency within the system and changes in teaching and learning methods (Penny and others 2008).

Over time the situation has improved, for both boys and girls. Between 2003 and 2010, the overall numeracy rate for students in P3 rose from 42 percent to 72 percent, with similar increases for girls and boys (figure 26.6). These gains were more dramatic than were gains in literacy (figure 26.7).

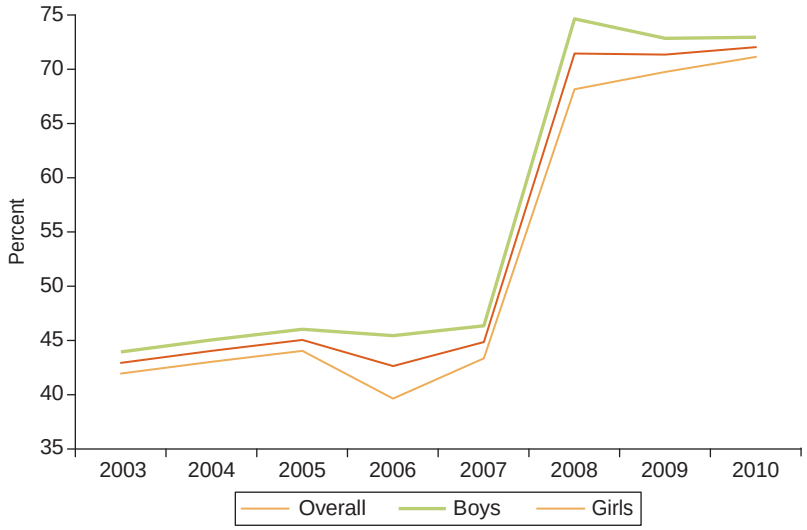
Uganda uses two types of grants to increase equitable access to primary education: capitation grants and school facilities grants. The purpose of the capitation grant is to shift some of the burden of school fees from parents to the government and to provide schools with some of the resources necessary to run the school and support teaching and learning.[6] The capitation grant is meant to cover tuition only; families remain responsible for writing materials, uniforms, and lunches. This grant is paid to schools in nine monthly installments, at an annual rate of U Sh 5,000 (about $3.00) per pupil in P1–P3 and U Sh 8,100 (about $4.75) per pupil in P4–P7 (Penny and others 2008).[7]

The school facilities grant is designed to assist schools in the neediest communities in building classrooms, latrines, and teachers' houses and procuring furniture. After a favorable review in 1999, it became the only mechanism through which public funds are channeled for the construction of school facilities. Both grants are conditional, to the extent that funding is given to districts or municipalities under strict guidelines and regulations and under the supervision of the Ministry of Education and Sports (MOES).[8]

Planning

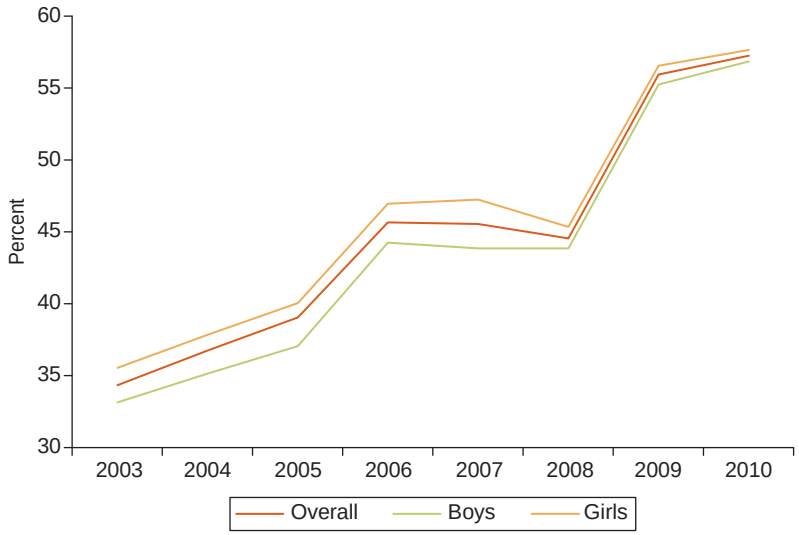
The success of a policy initiative like Uganda's UPE requires background analytical work, identification of financing sources, and the development of implementation and monitoring capacity. Analytical work could take the form of an overall assessment of the performance of the current

Figure 26.6 Numeracy Rates for Boys and Girls in P3 in Uganda, 2003–10



Source: MOES 2010.

Figure 26.7 Literacy Rates for Boys and Girls in P3 in Uganda, 2003–10



Source: MOES 2010.

system. Such an assessment would identify constraints that must be addressed and consider the feasibility and desirability of a variety of policy options. In an environment in which parents value education, as is the case in Uganda, abolition of school fees will normally lead to a surge in enrollment. It is therefore important to assess the expected increase in demand for schooling and plan for the additional resources (teachers, facilities, and teaching and learning material) needed to cope with the surge.

The UPE reform in Uganda followed the "big bang" approach to policy reform, but adoption of the reform followed a long gestation period, and it benefited from many critical prior actions, starting with the creation of the Education Policy Review Commission in 1987. In its 1989 report to the government, the commission set an ambitious goal for primary education, recommending that education policy ensure that every child enroll in school at the appropriate age and successfully complete the full cycle (P1–P7) (Grogan 2009).[9] The first response to this recommendation came in 1993, in the form of the Primary Education and Teacher Development Project, supported by the World Bank and the U.S. Agency for International Development (USAID). The project, which sought to introduce a countrywide evaluation framework for overall progress in education, led to the establishment of a Teacher Development and Management System and the creation of an Instructional Material Unit. Under the Teacher Development and Management System, all public schools (also known as government-aided schools) were organized into clusters of 18 schools. One school in each cluster serves as the coordinating center school, in the sense that it had a trained teacher (the outreach tutor) in charge of helping parents, community leaders, teachers, and principals in each school in the cluster coordinate their efforts for improving teaching and learning outcomes. Outreach tutors are supervised and supported by outreach administrators from core primary teacher colleges. By 1998, 18 core primary teacher colleges were supervising about 550 outreach tutors (MOES 1999).

In 1994 the National Curriculum Development Center lost its monopoly on the production of instructional materials. The role of the Instructional Material Unit is to help districts acquire instructional materials (including books) and to ensure that the process is consistent with government regulation designed to ensure transparency.

In 1995 a monitoring and evaluation program, the National Assessment of Progress in Education was set up to attempt to determine the amount of and type of knowledge acquired by pupils relative to the objectives of the curriculum.

Partnerships

The outcome of a policy intervention hinges critically on individual behavior and on the rules that govern interaction among stakeholders. In the context of the provision of public services, the *World Development Report 2004* argues that there is a need for a governance framework that defines

accountability for results between policy makers and providers, between policy makers and beneficiaries, and between providers and beneficiaries. The UPE reform was embedded in Uganda's national Poverty Eradication Plan, which is consistent with the key principles underlying the PRSP approach of accountability based on partnership. In the context of education reform, now a strategic component of the National Development Plan, the central government is engaged in a two-tier partnership involving development partners and domestic stakeholders.

The government of Uganda and its development partners adopted a sectorwide approach to deal with resource mobilization and aid coordination. The common vision binding this partnership stems from both the adoption of the PRSP approach toward the end of the 1990s and the principles voiced at the World Education Forum held in Dakar in 2000. The government agreed with its development partners that 31 percent of the recurrent discretionary budget would go to education and that at least 65 percent of that amount would be allocated to primary education (Higgins and Rwanyange 2005). The World Education Forum led to a commitment by the international community to support any developing country that seriously engaged in the pursuit of policies aimed at securing quality education for all (Eilor 2004).

The sectorwide approach started with the Education Strategic Investment Plan (ESIP) 1998–2003. At the end of the ESIP funding agreement, the Medium-Term Budget Framework became the common budget support modality (Penny and others 2008). The sectorwide approach emphasized actions designed to enhance local leadership and the integration of development partner and government efforts. Budget support was thus conditioned on a few key outputs, and outcomes related fiduciary integrity and progress toward improving service delivery and equitable access. The Heavily Indebted Poor Country Initiative led to an increase in funds available to the education sector. The effectiveness of this institutional arrangement was significantly enhanced by the use of sector reviews and budget working groups. These mechanisms, along with an effective and reliable Education Management Information System, are now playing a fundamental role in the education planning and budgeting processes (Penny and others 2008).

The partnership between the government of Uganda and the aid community is often cited as a success story. This partnership is based on a common vision about the effectiveness of poverty reduction strategies. It pursues a holistic approach, putting the country in the driver's seat. Both supply and demand constraints to service delivery are addressed within a common sector policy and planning framework supported by well-functioning mechanisms for the flow of funds and information.

The same cannot be said of the partnership between the central government and domestic stakeholders. Higgins and Rwanyange (2005) present results from a qualitative assessment of the education reform process in Uganda focusing on ownership and accountability in the sector. Based on data collected between 1997 and 2004, the study finds that officials at the district level acknowledge improvements in the transfer of funds but feel that they lack the autonomy to adjust the use of funds to the particular needs of the districts and that the process is designed to cater to the needs of the central government and the donor community.

At the school level, according to the same study, parents and teachers are excluded from the decision-making process for the utilization of funds allocated to schools. Some observers consider this lack of involvement and alienation a serious constraint to the performance of schools and students (Higgins and Rwanyage 2005). In the survey underlying the study, respondents cited the lack of integrity of head teachers among the factors that impede effective learning and school management. Some head teachers reportedly fail to post capitation grants on public notice boards, as required by the rules.

All stakeholders are concerned about the quality of entrants to primary teachers' colleges and the training they receive there. Teachers themselves feel marginalized, because they have little say in decisions that affect their working conditions. These considerations suggest that domestic partnerships for education in Uganda may not be as effective as they could be, because of imbalance in influence and capacity. Education reform in Uganda continues to evolve, however, and coordination mechanisms have been improving. Starting in 2007, for instance, the participation in sector reviews and discussions of the Education Sector Consultative Committee have been opened up to representatives of teachers and head teachers, local authorities, and parent teacher associations.[10]

CONCLUSION

Uganda's success in increasing access and equity in primary education stems from the following institutional factors:

- Strong political commitment to a development strategy centered on building human capital

- A comprehensive approach to policy making based on careful planning and implementation of critical prior actions
- Effective and sustained domestic and international partnerships supportive of country ownership and donor cooperation within a sectorwide approach
- Efficiency gains from measures designed to improve transparency and accountability at the school level in the use of available resources.

Reform initially put enormous stress on the country's educational infrastructure, reducing the quality of education as well as completion rates. Significant improvements have been achieved over the past few years. Policymakers in Uganda must now consolidate and expand these improvements if they are to successfully link the country to the global economy, which pays a premium for knowledge and skills.

ANNEX 26A DIFFERENCE-IN-DIFFERENCES IDENTIFICATION OF POLICY IMPACT

When repeated cross-section data are available, the impact of a policy can be identified and estimated using a two-step procedure known as difference-in-differences (DID) or double difference. The first stage involves the reflexive (or before and after) change in average outcomes of the treatment and control groups. This difference eliminates the selection bias associated with permanent group differences, leaving intact the bias as a result of the time trend. The bias that remains after the first step is removed by the difference in the second stage, in which the change in the average outcome of the comparison group is subtracted from that of the treated group.[11] Alternatively, the treatment effect can be obtained by measuring the difference in the change in average outcomes across groups (that is, comparing with- and without-treatment groups) before and after treatment. The DID method can thus be said to be path independent, because the same result is achieved regardless of the sequence in which these two differences are computed. DID estimation can be implemented within a regression framework, which also offers a convenient way to obtain the relevant estimates and the associated standard errors. This framework also makes it easier to add more groups and time periods using dummy variables (Angrist and Pischke 2009).[12]

Deininger (2003) applies a regression model that is consistent with the double difference approach to two nationally representative household surveys: the 1992 Uganda Integrated Household Survey (UIHS) and the 1999 Uganda National Household Survey (UNHS). Given that UPE took effect in 1997, observations for 1992 represent the base case; schooling outcomes observed in 1999 presumably reflect continued implementation of UPE.

To see clearly what is involved, let S_{it} stand for an indicator of enrollment status (enrolled or not enrolled) of child i in year t = 1992 or 1999. Think of this outcome as a function of individual, household, and community characteristics (X_{it}) such as gender, income, and parental education. This indicator also depends on a time trend (T) and unobservables (e_{it}) assumed to be independently and identically distributed. The time variable T is a dummy variable that is equal to one for 1999 (to mark exposure to UPE regime) and zero for 1992 (indicating no exposure). Deininger's (2003) regression is of the following form:

$$S_{it} = a + bX_{it} + gT + dX_{it}T + e_{it}.$$

The interaction terms in this equation play a crucial role in the assessment and interpretation of various effects of the shift to the UPE regime. One can think of the dummy variable T (representing the shift in policy regime) as having a moderating influence on the effects of the individual and household characteristics on the schooling outcome (here the probability of enrollment). The dummy variable T is a moderator variable.[13] The coefficient (g) associated with the moderator variable represents the effect of any secular trend captured by T. The other coefficients in the model are easily interpreted within the logic of difference-in-difference estimation.

NOTES

1. The net primary enrollment ratio is the ratio between the number of children of primary school age enrolled in primary school and the number of children of primary school age. By definition, this ratio cannot exceed 100 percent. The gross primary enrollment ratio is the ratio between the number of children enrolled in primary school and the number of children of primary school age. It can exceed 100 percent if children above (or below) primary school age are in primary school (because, for example, of repetition or delayed entry).
2. The pupil-teacher ratio rose from 38 pupils per teacher in 1996 to about 52 in 1997. The situation has improved since 2000, with the pupil-teacher ratio falling steadily from 65 in 2000 to an estimated 47 in 2010, the pupil-classroom ratio falling from 106 in 2000 to an estimated 66 in 2010, and the proportion of untrained teachers declining continuously (MOES 2010).
3. This section relies heavily on earlier work by the author and two of his colleagues (Essama-Nssah, Leite, and Simler 2008).
4. The 2001 DHS EdData survey collected information on the age at which children started and finished schooling, educational attainment, reasons for nonenrollment, the extent to which parents and guardians were aware of the UPE program. The survey also contains information about the assessment by parents and guardians of the quality of local schools.
5. Such methods include central government provision, contracting out to the private or nongovernmental sector, decentralization to local governments, community participation, and direct transfers to households (World Bank 2003).
6. Parents paid up to 90 percent of recurrent and capital expenditure for primary education in 1991 (Oketch and Rolleston 2007).
7. For students in P7, the government also pays the registration fees for the National Examination Board (Bategeka 2005).

8. For instance, guidelines from the MOES require primary schools to spend capitation grant as follows: 50 percent on instructional material, 30 percent on co-curricular activities such as sports and clubs, 15 percent on utilities and maintenance, and 5 percent on school administration (Bategeka 2005).

9. According to the commission, primary school completion is the minimum level of education that all citizens need to be able to live a full life. It noted that society would benefit a great deal from this outcome, which would probably increase national unity, moral standards, and prosperity (MOES 1999).

10. Communication with Luis Benveniste, World Bank, May 24, 2010.

11. The first stage relies on the assumption of time invariance of the group effects; the second is justified by assuming that, in the absence of treatment, the average outcome of the treated would follow the same time path as the average outcome of the control group. When combined with the fact that both groups are observed before treatment, the assumption of common time trend makes it possible to frame the DID method within the logic of the traditional counterfactual approach. The treatment effect can thus be identified and measured by comparing the observed outcome of the treated with the counterfactual predicted on the basis of the evolution of the average outcome of the control group.

12. The double difference approach (in which impact is defined by the difference in the change of outcomes for the treated and untreated group) can be implemented by a linear regression that includes a constant, a group dummy variable, a time dummy, and an interaction term between the two dummies. Impact is measured by the coefficient associated with this interaction term.

13. By definition, a moderator is a qualitative or quantitative variable that affects the direction or strength of the relationship between a response variable and a predictor or independent variable (Baron and Kennedy 1986). For instance, the shift in policy regime (the moderator) may affect the impact of gender (a predictor) on schooling outcomes (response variables).

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