CHAPTER

Costing the MDG of Universal Primary Completion

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A central implication of chapter 3 is, in essence, the following: *If* the MDG of universal primary completion *is* in fact achieved by 2015, it will be because at-risk countries have succeeded in transforming their education systems to function more like the systems of Group 1 countries. A concerted set of reforms would have improved those countries' resource mix and improved the learning environment for children, resulting in lower repetition and higher retention in school and culminating in a higher rate of primary completion. In countries where domestic financing for education was low (compared to other countries) it would have been increased, either by allocating more budgetary resources to education or by increasing the share of education spending devoted to primary education. And, in countries where domestic resources alone were insufficient, notwithstanding a maximum fiscal effort and strong commitment to financing primary education, external aid would have been available to fill the gap.

In this framework, it is clear that the mix of policy actions required for accelerated MDG progress differs considerably from one country to another. It follows that the domestic and external financing requirements for achieving the MDG will be highly sensitive to the extent to which, and pace at which, appropriate reforms are implemented. Therefore, the soundest basis for estimating global financing requirements is to aggregate these from country-level analysis.

We used a relatively simple simulation model to do this for the 47 low-income countries that have not yet achieved 90 percent completion or higher through grade six and for which adequate data could be compiled.[1] Our sample includes virtually all of the countries that are "seriously off track," many of the countries that are "off track," and nine countries that are currently "on track" but whose progress might be accelerated with appropriate reforms. The model was developed to test the proposition that accelerated MDG progress could be achieved by bringing core financing and service delivery parameters of education systems in at-risk countries into line with the parameters observed in countries that have higher primary completion.

A more detailed discussion of the model is presented in annex box A.1. Key distinguishing features of the model and our approach may be summarized as follows:

1. The simulations are country-specific and the cost of achieving UPC by 2015 is the aggregate of the estimates for the 47 countries analyzed.

1. Since the data demands are significant, we focused the analysis on countries relatively far from the goal. Afghanistan also has primary completion below this level, but since we could not obtain adequate data to run the model, we used an alternative methodology to estimate Afghanistan's financing needs (see table 4.11).

2. The target variable is primary completion—that is, the share of each school-age cohort that completes five or six years of schooling.[2]
3. The model tests a dynamic path of policy reform to improve education service delivery.
4. The model specifically responds to concerns about student learning through variables to improve quality.
5. The model responds to concerns about demand-side constraints through explicit provision for targeted subsidies to the most vulnerable populations.
6. The model specifically acknowledges the broader resource needs of the education sector by limiting spending on primary education to a sustainable share of the overall education budget.
7. The model distinguishes between recurrent and capital costs, and generates a separate estimate for each component.
8. It is assumed that universal primary completion will be achieved in all countries using public resources, with no user fees or other costs imposed on students.
9. The 2002 United Nations/World Bank projections of the school-age population through 2015 are used.
10. The baseline year for the projections is 1999 or 2000 for all countries.
11. Because of the prevalence of AIDS in many Sub-Saharan African countries, a separate effort was made to estimate the additional costs that AIDS will impose on the attainment of universal primary completion in Africa (box 4.1).

Because, as argued earlier, it is inherently impossible for many countries to achieve universal primary completion without improving the efficiency of education system functioning, our simulations expressly test how reforming key parameters of the education system in low-completion countries would affect the costs of achieving the MDG. Targets drawn from the observation of higher-performing countries are set as the goal for all countries in the sample.

The model is constructed around four sets of component variables, estimated in sequence:

- *Enrollment:* the number of pupils in publicly funded schools over the period
- *Service delivery:* the recurrent costs of services in publicly funded schools
- *System expansion:* the capital costs of needed classroom construction
- *System financing:* the volume of domestic resources mobilized for primary education.

2. In order to avoid biasing the financing gap estimates toward countries with longer primary cycles and away from countries with shorter ones, we modeled student flows through the equivalent of six grades in all countries where the primary cycle is longer than six or shorter than five years. In countries where the primary cycle is five years, we retained that, but adjusted budget shares accordingly.

Annex box A.1 provides more details on the stylized dynamics of the model and the full set of variables used, especially in the calculation of student enrollments over the projection period. The key observation is that, in order to achieve universal primary completion by 2015, each country must achieve 100 percent entry of school-age children into grade 1 by 2010 (for a five-grade system) or 2009 (for a six-grade system). For many countries in this sample, this implies a greatly accelerated pace of primary enrollment expansion over the coming years. The following sections focus on the model's key policy variables, which relate to service delivery, system expansion, and system financing (table 4.1).

Table 4.1

Benchmarks for Primary Education Efficiency and Quality

		Sample Mean in 1999/2000		
Variable	**Sample Range in 1999/2000[a]**	**Adjusted Sample[b]**	**Highest-Completion Countries**	**2015 Benchmarks**
Service delivery				
Average annual teacher salary (as multiple of per capita GDP)	0.6–9.6	4.0	3.3	3.5
Pupil-teacher ratio	13:1–79:1	44:1	39:1	40:1
Spending on inputs other than teachers (as percentage of primary education recurrent spending)	0.1–45.0	24.4	26.0	33
Average repetition rate (percent)	0–36.1	15.8	9.5	10 or lower
System expansion				
Unit construction cost	$6,500–$24,000	—	—	$6,500–$12,600[c]
System financing				
Government revenues (as percentage of GDP)[d]	8.0–55.7	19.7	20.7	14/16/18[e]
Education recurrent spending (as percentage of government revenues)	3.2–32.6	17.3	18.2	20
Primary education recurrent spending (as percentage of total education recurrent spending)	26.0–66.3	48.6	47.6	50/42[f]
Private enrollments (as percentage of total)	0–77.0	9.4	7.3	10

a. The range includes data from the full sample of 55 countries.
b. The adjusted sample excludes European and Central Asian countries.
c. Construction costs in constant dollars based on "good practice" average values observed in each region.
d. Government current revenues, excluding grants.
e. Staggered targets proportional to per capita GDP.
f. Benchmark is 50 percent for a six-year primary cycle; 42 percent for a five-year cycle.

The model highlights the four most important determinants of primary education quality and unit costs per primary graduate: the average teacher salary; the pupil-teacher ratio; the share of spending on inputs other than teacher salaries; and the repetition rate. The dynamics of these four variables in the simulations depend on whether their initial values in a country are above or below the indicative framework targets. Depending on the direction of movement, adjustments to the same parameters in different country contexts are considered either "quality enhancing" or "efficiency enhancing," as discussed below.

TEACHER SALARIES

The single largest cost item in any education system is the salary bill for teachers—accounting for more than 70 percent of recurrent spending in virtually all countries in our sample and as high as 95 percent in some of them. Across these countries there is wide variation in average annual salaries, ranging from 0.6 to 9.6 times per capita GDP. Historical and institutional factors clearly influence this variable, evident in our sample from the distinct regional patterns. In the Sahelian African countries, for example, the average is more than six times per capita GDP; in the Eastern European and Central Asian countries, the average teacher salary is lower than GDP per capita. For the simulations, the 2015 target for this parameter is set at 3.5 times per capita GDP, a round figure that is close to the observed average in the highest-completion countries in our sample (3.3). However, because the average level of teacher salaries is the most politically sensitive of all the parameters, we made special assumptions about the pace at which it could be adjusted.

For countries below the target, where average salaries need to be raised in the simulation, the political dynamics are easier. Although we programmed all other parameters to reach the target values only by 2015 through gradual movement, in the case of upward adjustment of teacher salaries, we assumed that the reform could be implemented more quickly. Given the positive impact on system quality such a change could have, it would be desirable to implement it as quickly as possible. Unlike other parameters (such as lowering the pupil-teacher ratio, which requires additional classroom construction), it is also technically possible to implement an upward salary adjustment almost immediately. And, given the political popularity of such a move, implementing it sooner rather than later could help consolidate support for the reform program as a whole. More than half of the countries in the sample (28 of the 47) were cases of upward adjustment in teacher salaries.

The major constraint to this particular reform is fiscal sustainability, not political opposition. But our financing framework explicitly assumes that countries' adoption of needed reforms (that is, those consistent with this indicative framework) would constitute a "credible plan" for EFA attainment and that any resulting financing gaps would be supported by international donors. So, in order to gain the maximum quality benefits from this reform early in the projection period, and to demonstrate how much this adjustment could maximally add to the costs of EFA, we assumed that upward adjustments of average teacher salaries—where justified, in relation to the reference parameters—are implemented immediately.

Very importantly, we also implicitly assume that such a reform is implemented in an intelligent manner that would maximize the positive impact on schooling quality—for example, by establishing new and higher standards, weeding out the weakest performers, introducing a structure of incentives to reward performance, and putting in place stringent processes for new teacher selection.

The size of the upward adjustment, which is very significant in some cases (particularly in the Europe and Central Asia region), raises obvious questions about the realism of assuming that such a change could be implemented for one segment of the civil service in isolation. In these cases the simulation should be taken as simply laying out the potential cost (and international financing) implications of moving toward the benchmark value in this area.

Because raising average salaries can be expected to improve the quality of the teaching force as well as reduce absenteeism, stimulate greater accountability for teaching effectiveness, and create incentives for high performance or deployment to remote areas, it is considered a quality improvement in countries with salaries currently below the target.

For countries with teacher salaries above the target level, the adjustment downward is considered an efficiency improvement. Since it is legally and politically impossible in most contexts to reduce the salaries of civil servants, the simulations assume that this reform must be implemented in an especially gradual way. It is assumed that a new cadre of teachers is recruited at the pace of new classroom construction and paid at the target level of 3.5 times the per capita GDP, and that all recruitment of higher-paid civil service teachers is suspended. A number of countries in francophone Africa and elsewhere have in fact implemented such a reform in teacher contracting and have generally found no shortage of well-qualified candidates willing to work at the lower salary level, suggesting that the higher salary is not (or is no longer) an efficiency wage in these economies. However, the longer-term impact of this reform on teacher motivation and performance and student learning, as well as its political sustainability, are still open questions and merit further research.

In the simulations we assume that incumbent teachers continue to be paid on their current salary scale, but that over time their weight in the overall salary bill diminishes through retirement. Thus, the average salary approaches the target level. In many countries in the sample, however, it still remains above the 3.5 target by 2015.

PUPIL-TEACHER RATIO

The range in pupil-teacher ratios across the sample is similarly wide, from 13:1 to 79:1. Although the pupil-teacher ratio is not perfectly correlated with average class size in most countries, we take it as a reasonable proxy. The target value for this parameter is 40:1, based on the observed average in the high-completion countries, and also supported by a body of research on class size, as discussed in chapter 3. For countries currently above this level, the downward movement is considered a quality improvement. For countries currently below, the adjustment upward is considered an efficiency improvement. In all countries, the simulations gradually adjust the average pupil-teacher ratio to reach 40:1 by 2015. Although careful teacher

deployment to achieve a 40:1 pupil-teacher ratio across all schools is one of the most powerful strategies an education system can pursue to promote efficiency and equity, geographic conditions and extremely low population density in some countries, such as Mongolia and the Republic of Yemen in this sample, can make it difficult to achieve in reality.

RECURRENT SPENDING ON INPUTS OTHER THAN TEACHERS

The amount of resources available for non-teacher-salary items is a crucial factor in education quality. Relatively abundant research indicates that books and other learning materials are highly cost-effective complementary inputs in the learning process. Although less extensively researched, teacher development and supervision, system management, student learning assessment, school maintenance, and other items clearly are also important elements in quality education systems. Yet most countries find that the pressure of teacher salaries means the budget for these other items is constantly squeezed.

The recurrent budget share for spending on items other than teacher salaries is the only variable in the study for which we set the target level (33 percent) significantly higher than the observed average for the high-completion countries (26 percent). We did so for three reasons: (a) to signal the crucial importance of increasing the quality of the learning environment in many countries, especially through the provision of more abundant and better-quality books and materials, if universal primary completion is to be reached; (b) to signal that school supervision, student assessment, teacher development, and many other system management functions are in urgent need of upgrading, and this will require considerable professionalization of these functions and imply additional cost; and (c) to signal that universal primary completion cannot be achieved in most settings without provision of special assistance to "the last 10 percent of children"—those at greatest risk of not enrolling in school or dropping out, be they girls, very poor children, children from ethnic minorities or remote rural communities, children with disabilities, or simply children falling behind in their learning because of illness or their families' needs for intermittent labor. All of these imply additional costs that school systems must be prepared to absorb. Given the projected growth of one particular set of children at risk—HIV/AIDS orphans—an additional specific provision is made for targeted subsidies to these children in the African countries (box 4.1).

The simulation model we used does not go to the level of identifying which specific inputs among the above should be prioritized in a given country; it simply creates budgetary space for a healthy level and appropriate mix of expenditures on schooling quality, efficient system management, and appropriate demand-side interventions. For virtually all of the countries in the sample, the increase in this variable to the target level is considered a quality improvement. Eight countries in the sample are currently above this level. In some cases, this is because the average teacher salary is very low. In other cases, the downward adjustment is considered an efficiency improvement, on the grounds that these budgetary resources—since they are not currently producing the desired outcomes—need to be better spent.

It should be noted that our target variable (the share of recurrent spending on inputs and items other than teacher salaries) is not equivalent to "non-salary

Box 4.1 The Incremental Costs of HIV/AIDS for Universal Primary Completion

The severity differs across countries, but today virtually all of Sub-Saharan Africa is battling HIV/AIDS. The epidemic is already affecting education systems in the region and its impact can be expected only to worsen in most countries between now and 2015. Given HIV/AIDS prevalence in Sub-Saharan Africa and what we know about its implications for teacher supply and student attendance, it is an important element to consider in efforts to cost the achievement of UPC. There are three main ways in which HIV/AIDS affects primary education systems.

First, future growth of the school-age population will be smaller in countries with AIDS prevalence than it would have been otherwise.

Second, the stock of teachers will be greatly affected. Teachers who are sick are likely to be absent and substitutes will be needed to avoid disruptions to school functioning. More teachers are likely to die while they are still in service, implying higher personnel turnover, increased need for new recruitment, and greater need for teacher training than would have been the case in the absence of AIDS.

Third, the proportion of orphans in the school-age population will be larger in an AIDS-affected country than it would have otherwise been. It has been shown that maternal and double orphans are more likely than non-orphans to drop out of school (Subbarao, Mattimore, and Plangemann 2001). Since the MDG goal is to ensure that all children complete at least five or six years of primary education, orphans are likely to need special support if that goal is to be achieved. Demand-side financing such as stipends or other support, tailored locally to best fit the needs of these children, will have to be developed.

Our costing exercise made special provisions in order to estimate these incremental impacts of AIDS. The United Nations/World Bank population projections used have been updated by demographers to reflect the impact of HIV seroprevalence on future population growth. To model the impact on teachers, we used new estimates produced by a team at the Imperial College, U.K., of AIDS incidence among teachers. This research shows that (a) teachers are affected in the same proportion as adults in general (the figures used are UNAIDS estimates between 2000 and 2015), and (b) the sickness evolves over 10 years and during that period, on average, teachers are absent 260 days.

To estimate the costs of keeping orphans in school, we used UNAIDS-provided estimates of the population of maternal and double orphans in 1999 and projected these to 2015 for 10 countries, using a simulation model developed by the Imperial College. We then extrapolated the pattern of evolution in these 10 countries to other countries in Africa by subregion (West Africa, East Africa, and southern Africa). Finally, we estimated that $50 per year would be required to maintain each maternal and double orphan in school, a cost estimate that is consistent with some of the recent programs in the region channeling financial support to such children.

Overall, these projections showed that the impacts of HIV/AIDS will add at least $287 million per year to the estimated costs of achieving the MDG in the 33 Sub-Saharan African countries in our sample.

spending." Our target variable includes all non-salary spending plus all salaries of personnel other than teachers—administrators, watchmen, cooks, and others employed by the education ministry who are not assigned to classroom teaching. In some countries where total spending on inputs other than teacher salaries is relatively high yet system outcomes are still poor, an excess of administrative staff on the payroll is a factor.

AVERAGE REPETITION RATE

Reported grade repetition in the countries studied ranges from 0 to 36 percent. High repetition is incompatible with the goal of universal primary completion, and the observed average in the higher-completion countries (9.5 percent, which is well below the sample mean) corroborates this. Accordingly, we assume that countries with average repetition rates above 10 percent would adopt policies to bring repetition gradually down to 10 percent by 2015.

The repetition rate is often viewed as an education outcome rather than a policy variable, but there is accumulating country experience with tailored strategies that are effective in reducing repetition. These strategies include introducing local language instruction in the critical early grades of primary school; designing the first two grades as a single curriculum block with strong emphasis on basic literacy and numeracy, to provide children more time to master key concepts; assigning the most experienced teachers to the first few grades; and providing cross-peer tutoring for children falling behind. It should be stressed that effective strategies such as these positively affect the repetition rate by increasing students' learning achievement. In contrast, a mandatory policy of universal promotion, which does not produce real effects on student learning, is not considered an effective strategy for reducing repetition.

The repetition rate is a key driver of the costs of primary completion, so in high-repetition countries effective policies to reduce it are crucial. For countries with repetition rates already below 10 percent, no change was made. Consistent with this, when universal primary completion is achieved in 2015, the gross enrollment ratio for the sample is 107 percent.

System Expansion

Unit construction costs, expressed in 2000 constant U.S. dollars per classroom, were based on values recently reported in World Bank project appraisals and other sources for the countries in the sample. In all cases the cost estimate was for a fully furnished and equipped classroom built to adequate standards. Wherever possible, regional average "good practice" cost estimates were used. For the African countries and the European and Central Asian countries, an average figure of $8,000 was used. For South Asian and East Asian countries, an average cost of $6,500 was used. For Haiti, Honduras, and Nicaragua, values of $11,000–$12,000 were used. The highest estimate in the sample—$12,600 for the Republic of Yemen—is considered by regional experts a good practice target for the country and is considerably below past unit construction costs.

For the countries outside Africa in the sample, system expansion was projected from actual data on the baseline number of classrooms. However, it was not possible to obtain these data for all of the African countries, and an assumption had to be made that the number of teachers was a rough proxy for the number of functioning classrooms. This assumption is somewhat problematic, as virtually all school systems in this sample have some degree of double-shift or even triple-shift utilization of classrooms, which means that the simulations underestimate the true incremental capital costs of reaching the UPC goal.

For all of the countries, we projected the number of additional classrooms needed to ensure universal primary completion by 2015 on the assumption of 40 students per classroom and one classroom per teacher. The projections, therefore, implicitly assume that the existing stock of classrooms is adequate, even though the baseline number of classrooms in some countries in our sample includes those as rudimentary as "classrooms" under a tree. Thus, it is important to note that the very real needs for upgrading current school facilities to the standards we assume for the future are not captured in our simulations. However, we attempt to make an adjustment for this in the final section of this chapter.

Similarly implicit in the simulations is the assumption that other system infrastructure (district and central administrative offices, teacher resource centers, teacher training institutes, and so forth) exists at the beginning of the projection period in sufficient quantity and adequate quality to support system functioning. Although our simulation target for *recurrent* spending on inputs other than teacher salaries is designed to cover operating and maintenance costs for *all* school system infrastructure—and not only classrooms—our capital cost estimates are limited to the need for incremental classroom construction, and do not capture the need for incremental expansion of other system facilities. This also clearly underestimates what may be significant needs in the countries analyzed. It was impossible within our time frame to obtain the country-specific baseline data on the quantity and quality of existing school system infrastructure, other than classrooms, that would be required to project the incremental needs in these other areas. However, in the final section of this chapter, we also make a rough estimate of these needs for the sample.

Thus, the classroom construction requirements projected in these simulations must be understood as a *minimum* estimate of the total capital costs these countries will likely need to incur in order to achieve fully functional school systems capable of realizing universal primary completion. More detailed, country-specific work is needed to estimate infrastructure and rehabilitation needs more precisely. It can be assumed that in this set of countries these additional needs are significant.

System Financing

DOMESTIC RESOURCE MOBILIZATION

The financing block of the model estimates the domestic resource flows for primary education over the projection period. In 1999/2000, public spending on primary education ranged from 0.2 to 3.3 percent of GDP in the countries studied, a huge range. In this costing exercise, it is assumed that external financing will only be available to those

countries that show evidence of a strong domestic commitment to achieving universal primary completion by allocating a fair share of national resources to the goal.

But what constitutes a "fair share"? In order to ensure that our target parameters for domestic resource mobilization did not penalize the poorest countries with the most fragile tax bases, we decomposed the share of GDP spent on primary education into three underlying variables and set separate targets for each:

- The revenue-GDP ratio, reflecting differences in the overall size of the public sector and the national resource base
- The share of domestic revenues allocated to education, an indication of public priority given to education
- The share of the education budget allocated to primary education, an indication of specific commitment to universal primary completion.

Since the lowest-income countries typically have more difficulty mobilizing tax revenues than do wealthier countries, we staggered the target values for the revenue-GDP ratio in 2015—either 14 percent, 16 percent, or 18 percent of GDP, depending on the level of per capita GDP.

For the second variable—the share of government revenues devoted to education—we set a target of 20 percent, a round number reasonably close to the 18.2 percent average for the high-completion countries in our sample.

For the third variable—the primary education share of total education spending—we set a target of 50 percent for countries with a six-year primary cycle, again a round number slightly above but consistent with the reference countries. For countries with a five-year primary cycle, a pro-rated share of 42 percent was used.

Where countries' current values were lower than these targets, they were adjusted upward—in essence, asking the country to increase the domestic resources it is mobilizing for EFA. But there were several country cases where spending on one or more of these subcomponents currently exceeds the targets. While from the standpoint of an EFA costing exercise it is tempting to maintain these levels—which would unquestionably aid in reaching the goal—we were concerned that some of the spending patterns may not be sustainable over the medium term. And, if the higher levels of resource mobilization were retained, the external financing requirements estimated for these countries in the simulation would be correspondingly lower. This seemed a perverse outcome, effectively penalizing the countries with the highest domestic commitment to EFA attainment and rewarding those doing less.

Thus, we opted for a scenario (C2) that put all countries on an equal financial footing by instituting the target values, even when this forced an artificial decline in spending on primary education from current levels. However, because the overall financing estimates are so sensitive to these variables, and because one of these—the tax-GDP relationship—is exogenous to the education sector, we also ran two sensitivity analyses, in which countries' higher spending levels were assumed to persist. Under scenario C1, we allowed higher-than-target spending on education and primary education to be maintained. Under scenario C3, we retained higher-than-target tax-GDP ratios. The assumptions in each scenario are summarized in table 4.2. As expected, scenarios C1 and C3 did change the results for particular countries and lowered the size of the overall financing gap.

Table 4.2

Alternative Scenarios for Domestic Resource Mobilization

	Targets for 2015 under Three Alternative Scenarios		
Simulation Variable	**C1**	**C2**	**C3**
Government revenues as percentage of GDP	14/16/18[a]	14/16/18	14/16/18, but if current share exceeds 18% it stays unchanged
Public spending on education as percentage of government recurrent revenues, excluding grants	20–26[b]	20	20
Primary education spending as percentage of total public recurrent education spending[c]	If current share is higher than 50/42 it stays unchanged	50/42	50/42

a. Staggered targets proportional to per capita GDP.
b. Values below 20 percent are increased to a target of 20 percent by 2015. Values above 26 percent are reduced to a target of 26 percent by 2015. Values in the range of 20–26 percent remain unchanged.
c. The target is 50 percent for six-year primary systems and 42 percent for five-year systems.

PRIVATE ENROLLMENTS AS A SHARE OF TOTAL

The share of enrollments in privately financed schools has an important impact on public sector financing requirements. A target for the share of private enrollments was set at 10 percent in these simulations. This share is relatively close to the observed average for the high-completion group (7.3 percent) and for the sample (9.4 percent), but the rationale for this target was more conceptual than empirical.

The conceptual framework of this report is that attainment of universal primary completion is a responsibility of national governments and that the children in any country that are currently out of school are those least able to contribute to the costs of education. As countries progress toward universal primary completion, the target populations are increasingly poor, remote, and marginalized. Cost recovery and cost sharing are less appropriate financing strategies for these populations than for any other segment. Therefore, we assume that no user fees or other costs are imposed on public school students, and on top of this we make explicit provision for targeted subsidies to the most vulnerable groups.

Government responsibility to *finance* universal primary completion, however, does not imply that all schooling must or should be publicly *provided*. To the contrary, the target parameters we use are very consistent with service delivery arrangements that channel government financing to private providers, especially to NGO or community-run schools. For simplicity, enrollments in these alternative schools are classified as "public" in our simulations, since they are publicly funded.

However, we assume that in every country the uppermost income decile *does* have the capacity to contribute to the financing of primary education. In virtually all countries an elite private school sector exists, serving from 5 to 15 percent of primary students. To avoid having scarce public resources subsidize elite groups in a setting where EFA has not been achieved, we assume that 10 percent of primary enrollments in all countries modeled will be privately financed. In countries where the current share of enrollments in private schools is below this level, the increase to 10 percent in the simulation is a resource gain.

In many countries in the sample, the private share of primary enrollments is currently above 10 percent, usually reflecting the limited supply or poor quality of public schooling. Since our simulation exercise explicitly models a scenario of quality improvement and expansion in public primary education, it may be expected that some shift in enrollments back to public schooling would occur. However, an alternative scenario in which a significant number of students are served by private providers that are publicly subsidized is also consistent with the simulations. In the latter case, enrollments in for-profit private schools are assumed to be no more than 10 percent of all enrollments, but an unspecified number of children could be enrolled in nonprofit private schools, financed with public education resources.

Country-level Simulation Results

For each country in the exercise, the adjustment from initial parameters to the full set of target parameters effectively generates a threefold strategy of:

- Quality improvement
- Efficiency improvement
- Increased domestic resource mobilization.

The specific elements of the strategy in each of these three broad areas depend upon the country's initial conditions, the number of parameters that would require adjustment toward the benchmarks, and the direction of the adjustment required. It should be noted that the combined effect of the above strategies is the achievement of an equitable primary education system, implicit in the goal of universal primary completion.

In order to demonstrate in each country case the relative need for either quality improvement, efficiency improvement, or increased domestic resource mobilization, the model generates separate results in each area. For each country, these are summarized in an analytical table that shows the hypothetical financing gap under each of the three sets of policy measures. These disaggregated financing gaps are hypothetical because in reality it would be ill-advised as well as unrealistic to try to implement one or another of the scenarios in isolation. First, there are clear interaction effects among these different reforms which demand that, from a technical standpoint, actions be taken concurrently. For example, it would be very difficult to achieve reductions in the repetition rate (an efficiency reform) in the absence of actions to improve quality (lowering class size, increasing spending on textbooks and teacher training, and so forth). Second, from a financial standpoint it would be completely unsustainable to implement quality reforms that generate high incremental costs (such as an increase in average teacher salaries) without the

key counterbalancing efficiency reform of an increase in the pupil-teacher ratio, where that is below the target. Nonetheless, presenting the results in this format helps to clarify the impact of the various reforms needed in a specific country context. For each country, the "status quo" parameters are contrasted with:

Scenario A (quality reform): the change in parameters and resulting annual financing gap when *only quality* measures are implemented

Scenario A+B (quality plus efficiency reforms): the change in parameters and resulting annual financing gap when *both quality and efficiency* measures are implemented

Scenario A+B+C (quality, efficiency, and financing reforms): the change in parameters and resulting annual financing gap when *quality and efficiency and system financing* parameters are adjusted.

The model also generates a second analytical table for each country that compares the total cost estimates for reaching the MDG target for that country with the potential financing sources. Recurrent and capital costs are presented separately. Potential financing sources are also disaggregated, as follows:

- *Domestic resources:* recurrent, capital, and total
- *Gap for external financing:* recurrent, capital, and total.

The simulations assume that *all* of the recurrent costs in each country case will be covered as much as possible by domestic resources. Only if they exceed domestic financing are the remaining recurrent costs presented as part of the gap for external financing. This is in recognition of the fact that donor assistance is more often channeled to capital costs than to recurrent budget support. Finally, for the African countries, the special incremental costs that can be attributed to the impact of AIDS in these countries are presented as a separate line item. We were not able to obtain sufficient data to extend the AIDS analysis to all countries in the sample, but this could certainly be done in the future.

The full set of analytical tables for the 47 low-income countries modeled is presented in annex C. The results for four sample countries are discussed below in order to demonstrate how the financing estimates are generated, to show how the indicative framework can serve as a diagnostic tool for countries seeking to accelerate MDG progress, and to highlight some of the important limitations of this exercise.

INDIA

The largest country in the sample is India, with approximately 100 million children of primary school age. Although the officially reported gross enrollment ratio in 1999 was 100 percent, it is commonly estimated that 20–30 million primary-age children in India are not in school. By these estimates, India alone accounts for as much as one-quarter of the estimated 113 million children worldwide not attending primary school—or one-quarter of the global challenge of achieving Education for All. The proxy primary completion rate we estimated for India (76 percent in 1999) confirms that about 25 percent of children do not complete the five-year primary cycle. Current data on the schooling profile are not available, but a reasonable estimate is that roughly 5–10 percent of children never enter primary school (mainly rural children, scheduled tribes, scheduled castes, and girls),

and of those who enter school, about 20 percent drop out before completing, producing a primary completion rate on the order of 76 percent. This is broadly consistent with national survey data showing that about 20 percent of children aged 6–10 are not attending school (World Bank 2002e).

Survey data also suggest that either the official 100 percent GER estimate is overstated, or that primary school repetition is higher than officially reported and there are a significant number of overage children in the primary schools. For the purposes of our India simulation, we assumed the latter. There are clearly areas of classroom overcrowding in India and small population areas where schools are not available. However, overall it appears that the Indian government's policy commitment to site a school within one kilometer of every community with more than 300 people has achieved a very high degree of access to primary schooling. The greater issue is the high dropout rate before completion due to low schooling quality and high household demand for child labor.

Although a 76 percent completion rate was sufficient to place India among the Group 1 countries we used to estimate the target parameters (see chapter 3), it is clear that India, at the low end of that group, still has a substantial way to go to meet the MDG target of universal primary completion. The primary completion rate increased over the 1990s from an estimated 70 percent[3] to 76 percent, which is undeniable progress, but this trend rate (about 0.9 percentage point per year) would put India's PCR at only 90 percent in 2015. More encouraging are household survey data that indicate strong progress on gender equity, with the share of rural girls aged 6–10 enrolled in primary school increasing from 55 to 75 percent between 1993 and 1999, a truly remarkable achievement.

The continuing challenge for a very large, ethnically diverse, and federal country such as India is both to accelerate overall primary education progress and to ensure that gains are evenly distributed across a highly decentralized and, as of today, unequal education system. The service delivery and financing parameters we focus on vary considerably across different states and districts in India. Teacher salaries, for example, are negotiated at the state level in India, but are pegged to national benchmarks and vary widely in relation to state-level per capita GDP, a phenomenon that has led states such as Rajasthan and Bihar to introduce para-teachers at lower wages. Our simulation, which relies on a single target ratio of salary to per capita GDP, cannot capture the differing degrees of salary adjustment (either upward or downward) that may in fact be needed in many parts of India. Similarly, while the pupil-teacher ratio averaged nationally is 52:1, it ranges from below 30:1 in some states to 59:1 in others. This in effect results in an underestimate by the model of the true number of teachers that

3. Because of discrepancies in official enrollment data, we estimated the 1990 completion rate for India on the basis of data from the National Family Health Survey, rather than official enrollment statistics, as the latter produced a value that India experts considered artificially high. The 1999 completion rate is calculated according to our standard methodology.

would be required to achieve the target ratio of 40:1 in all parts of the country by 2015 if, in reality, teachers cannot be redeployed or students reassigned across states.

Tables 4.3 and 4.4 summarize the simulation results. Under the quality enhancement simulation generated for India (scenario A), the key actions would be the hiring of additional teachers to reduce the number of pupils per teacher from 52 to 40 by 2015; a slight increase in average teacher salaries, from 3.4 to 3.5 times per capita GDP; and a substantial increase in spending on inputs other than teacher salaries, which would increase from 23 to 33 percent of the recurrent primary budget (table 4.3). The combined effect of the three quality adjustments and the impact of growth on factor costs is that per-pupil spending almost triples over the period to 2015 in constant dollars (from $35 in 2000 to $101 in 2015), with a particularly large increase in spending on complementary inputs to improve school quality, such as books, materials and system management, and possibly demand-side subsidies to target populations.

Under the quality plus efficiency enhancement scenario (A+B), the major change would be policy actions to reduce repetition gradually over the period from the starting level, estimated at 20 percent based on data from states and districts, to the target of 10 percent. This improvement in system internal efficiency would "finance" some of the costs of quality improvement, reducing the estimated financing gap.

However, financing gap estimates generated by this model for India should be interpreted carefully and taken as an indicative exercise only. While it may give an overall sense of the broad policy priorities and the direction of change required, a modeling exercise based on national average indicators may significantly underestimate the true costs of attaining the indicative framework parameters, since in a decentralized education system, quality "surpluses" in some parts of the country that push up the national averages are not transferable to lower-quality states and districts. An excess of classrooms in Kerala in reality will not reduce the need to build more schools in Bihar, but in a simple simulation model such as the one we used, this is effectively what happens.

Virtually every country in the sample faces similar equity issues in service delivery and financing across different subregions, but in federal education systems these issues are harder to resolve both in principle and in practice. Although it may not be easy politically, in a unitary system disparities across regions in the pupil-teacher ratio or spending allocations can be managed with teacher redeployment and adjusted allocation rules. In federal systems, the scope for such administrative redeployment and/or fiscal redistribution typically does not exist, at least in the short term. Reforms of the "rules of the game" in these areas at the federal and state levels may take years to negotiate and enact.

Thus, the India simulation underestimates the true magnitude of reforms and new investments needed in some subnational entities in order to bring service delivery quality and efficiency in all parts of the country to our benchmarks. More precise estimates for India should be developed through modeling exercises at the subnational level and aggregation of these resource gaps.

Table 4.3

India: MDG-2015 Financing Gap under Alternative Policy Measures

		A: Quality Measures			B: Efficiency Measures	C: Financing Measures				
						Government Revenues[c]				
Policy Scenario[a]		Pupils per Teacher	Spending on Inputs Other than Teachers[b]	Average Annual Teacher Salary (as Multiple of Per Capita GDP)	Average Repetition Rate	As % of GDP	% for Education	Primary Education Recurrent Spending[d]	Private Enrollments (As % of Total)	Annual Financing Gap[e]
Status quo		52	23.2%	3.4	20.0%	21.2%	12.4%	32.1%	12.5%	146
A only		40	33.3%	3.5						2,470
A + B		40	33.3%	3.5	10.0%					1,782
"Best practice": A + B +	C1	40	33.3%	3.5	10.0%	16.0%	20.0%	42.0%	10.0%	67
	C2					16.0%	20.0%			67
	C3					21.2%	20.0%			28

Note: Shaded cells denote no change from values directly above.

a. Policy scenarios are: A for quality improvement, B for efficiency improvement, and three alternative resource mobilization scenarios (C1, C2, and C3). The combination of scenarios A+B+C is considered "best practice".

b. As a share of primary education recurrent spending.

c. Current revenues, excluding grants.

d. As a share of total education recurrent spending.

e. In millions of 2000 U.S. dollars. Calculated as the difference between the total cost of service delivery under the specific policy scenario and the total resources for primary education mobilized domestically.

A simulation exercise at the national level is, however, important on the resource mobilization side, given the crucial role of federal authorities in assuring fiscal equity across decentralized entities. In this case, it shows that India's fiscal parameters are quite far from the targets. While government revenues as a share of GDP (21.2 percent) exceed the 16 percent target we set for countries with its level of per capita GDP, spending on education is very low compared with the indicative benchmarks. The share of the consolidated state and federal recurrent budget spent on education in 1999, at 12.4 percent, is substantially below our target value of 20 percent. The share of education spending allocated to the primary level, 32.1 percent, is also low, compared to the target of 42 percent for a five-year primary system.[4] Thus, even though the tax-GDP ratio in India is quite high, the combined effect of low allocations for education in general and for primary education in particular is that public spending on primary education in India amounts to only 1.0 percent of GDP, compared to 1.7 percent of GDP for high-completion countries.

Thus, the indicative framework points to insufficient allocation of public resources as a root cause of India's incomplete primary education coverage and the quality problems that lead a relatively high share of children to drop out before completing primary school.

The United Nations/World Bank population projections for India show fertility declines after 2010 resulting in a stable primary school-age population between 2000 and 2015. This helps to ease the financing requirements for meeting the MDG substantially. But to lower the pupil:classroom ratio and improve school quality, the simulations indicate that India will need to spend at least $435 million per year on classroom construction. There may also be significant short-term needs for upgrading and rehabilitation of existing schools and core system infrastructure that are not captured in our simulations, for India or for any other country.

The simulation exercise also points to a need for increased recurrent expenditures to achieve universal primary completion—with considerably higher per-student spending on additional teachers, books, better system management, demand-side stipends, and other inputs. Under the quality and efficiency scenarios we model, these improvements in school quality and policy actions to reduce repetition effectively produce a steady improvement in the efficiency of student flows. The private share of enrollments also declines slightly, from 12.7 percent currently to 10 percent by 2015. Although the total financing needed over the period is close to $8 billion per year, the simulation indicates that if India's resource allocation for education and for primary education were to increase to the target values by 2015, domestic resources could cover the great bulk of these needs (table 4.4). However, a financing gap of between $200 and $500 million per year would remain, concentrated in the early years of the period (see annex table A.8). Annualized over the entire projection period, India's external gap would be $67 million per year.

4. In some states, the official primary cycle is still only four years, so this share could legitimately be slightly lower. However, since the government has established eight years as the official duration of compulsory schooling, it is reasonable to analyze system completion rates and costs through grade 5.

Table 4.4

India: MDG-2015 Cost Estimates and Sources of Financing under "Best Practice" Policies and Alternative Resource Mobilization Scenarios

(millions of 2000 constant U.S. dollars)

Cost Item	Period	Scenario	Domestic Resources Mobilized	Cost of MDG-2015			Financing Sources					
							Domestic Resources			Gap for External Financing		
				Recurrent	Capital	Total	Recurrent	Capital	Total	Recurrent	Capital	Total
Education service delivery	Cumulative, 2001–2015	C1	115,278	109,754	6,525	116,279	109,754	5,524	115,278	0	1,001	1,001
		C2	115,278	109,754	6,525	116,279	109,754	5,524	115,278	0	1,001	1,001
		C3	115,858	109,754	6,525	116,279	109,754	6,104	115,858	0	422	422
	Annual	C1	7,685	7,317	435	7,752	7,317	368	7,685	0	67	67
		C2	7,685	7,317	435	7,752	7,317	368	7,685	0	67	67
		C3	7,724	7,317	435	7,752	7,317	407	7,724	0	28	28
AIDS-related costs	Annual	C1		0		0	0		0	0		0
		C2		0		0	0		0	0		0
		C3		0		0	0		0	0		0
Both items	Annual	C1		7,317	435	7,752	7,317	368	7,685	0	67	67
		C2		7,317	435	7,752	7,317	368	7,685	0	67	67
		C3		7,317	435	7,752	7,317	407	7,724	0	28	28

Note: "Best practice" policies refer to the combination of scenarios A + B + C. Shaded cells denote no change from values directly above.

The model generates a single target for domestic revenue mobilization for primary education, but the financing of primary education in India is a concurrent central government and state responsibility, with only about 12 percent of total spending at the central government level. In a decentralized fiscal context such as this, the indicative framework financing targets can in effect only be achieved if: (a) states currently spending below the indicative targets are able to increase their spending; (b) the central government increases its spending on education and transfers the increment to the neediest states; or (c) states with higher fiscal capacity mobilize increased resources and the central government develops the fiscal intermediation capacity to equalize education resources across states.

Analyzing the fiscal and political feasibility of these or other options in the Indian context is beyond the scope of this study. But the case of Brazil may be instructive. After decades of severe disparities in education spending and quality in a context of decentralized education financing, Brazil made major national strides after a 1997 constitutional reform set an equal per-student funding floor for primary education across the country (box 2.2) and redistributed resources across states and municipalities accordingly. Our simulation for India points to reform of primary education finance as a key issue for the country in order to achieve the MDG by 2015.

Finally, it should be noted that our simulation results for India are significantly different from the estimates for India in an earlier World Bank financing gap calculation for the education MDG (Devarajan, Miller, and Swanson 2002). In that estimate, India accounts for more than $2 billion of an estimated global financing gap of $10 million to $15 million per year. But that estimate assumed no change in unit costs or system efficiency, and made no assumptions about the capacity for domestic resource mobilization The three hallmarks of our approach—adjusting for population trends, examining the potential for efficiency improvements, and, most importantly, establishing an expectation that scarce donor assistance will not substitute for an appropriate commitment of domestic resources to EFA—greatly affect the size of our estimated financing gap for India and a number of other countries in our sample.

PAKISTAN

As with India, official education statistics for Pakistan are limited and present internal inconsistencies. In Pakistan's case, though, it is clear that a significant share of children do not today have access to primary school: of the estimated 19.2 million children in the school-age population in 2000, only 12.5 million are enrolled, for a GER of 65 percent. Although data are sketchy, we estimate a completion rate in 2000 of around 59 percent. Pakistan also has a school-age population that is projected to continue to grow, and would be about 15 percent higher in 2015 than in 2000.

As table 4.5 shows, service delivery in the public system in Pakistan is currently far from our benchmarks. Although average teacher salaries, at 3.6 times per capita GDP, are relatively close to the target, spending on inputs other than teacher salaries, at 19 percent of recurrent spending, is well short of the 33.3 percent target. Teacher salaries would decline slightly and spending on other inputs would rise substantially under the quality improvement scenario for Pakistan.

Table 4.5

Pakistan: MDG-2015 Financing Gap under Alternative Policy Measures

Policy Scenario[a]		A: Quality Measures			B: Efficiency Measures	C: Financing Measures				
		Pupils per Teacher	Spending on Inputs Other than Teachers[b]	Average Annual Teacher Salary (as Multiple of Per Capita GDP)	Average Repetition Rate	Government Revenues[c]		Primary Education Recurrent Spending[d]	Private Enrollments (As % of Total)	Annual Financing Gap[e]
						As % of GDP	% for Education			
Status quo		32	19.3%	3.6	6.2%	16.7%	10.2%	51.8%	29.4%	285
A only		32	33.3%	3.5						450
A + B		40	33.3%	3.5	6.2%					261
"Best practice": A + B +	C1	40	33.3%	3.5	6.2%	16.0%	20.0%	42.0%	10.0%	204
	C2					16.0%	20.0%			204
	C3					16.7%	20.0%			173

Note: Shaded cells denote no change from values directly above.

a. Policy scenarios are: A for quality improvement, B for efficiency improvement, and three alternative resource mobilization scenarios (C1, C2, and C3). The combination of scenarios A + B + C is considered "best practice".

b. As a share of primary education recurrent spending.

c. Current revenues, excluding grants.

d. As a share of total education recurrent spending.

e. In millions of 2000 U.S. dollars. Calculated as the difference between the total cost of service delivery under the specific policy scenario and the total resources for primary education mobilized domestically.

The reported pupil-teacher ratio, at 32:1, is quite low compared to the benchmark of 40:1. It is unusual to see such a low pupil-teacher ratio in a country that has not reached universal primary coverage, but there has been a significant shift of enrollments to private schools in Pakistan in recent years, driven by the erosion of quality in the public system. While about 29 percent of total primary enrollments are now in fully private—that is, privately financed—schools, it appears that employment in the public schooling sector has not experienced any corresponding retrenchment. The share of privately financed primary enrollments in Pakistan today is quite extraordinary for a low-income country and means that the subsector is serving far more than the elite in Pakistan.

Under the quality plus efficiency (A + B) scenario, Pakistan would steadily increase the pupil-teacher ratio in the public system to 40:1 by 2015. This could in effect be accomplished in two very different ways. One route would be a substantial improvement in the management and quality of the public schools that would provoke a spontaneous shift of students back to the public system. But a second possible route would be a greater reliance on privately managed schools for service delivery, given evidence of these schools' higher efficiency.

Under the latter route, the government would transfer capitation grants to nonprofit private schools that serve low-income populations. Even though the services would remain privately managed, by our definition the enrollments in these schools would be "public." The rationale for public subsidization is that as Pakistan, like other countries in our sample, moves to increase its primary completion rate, it must reach increasingly poor, rural, and disenfranchised populations. Expecting these groups to finance the full cost of their primary education is not only inequitable, it would also, we know from research, impede the attainment of the goal. It is important to note that this assumes no subsidies for private schools serving the highest-income students, so there would still remain a fully private (that is, privately financed) sector accounting for 10 percent of total primary enrollments in 2015.

As table 4.5 shows, even under the status quo case, Pakistan would have a resource gap of $285 million annually, because of the projected increase in the school-age population and the fact that not all children are enrolled today. The table also shows that if Pakistan were to implement the quality measures only, this financing gap would swell to $450 million per year. However, if the complementary efficiency measure of an increase in the pupil-teacher ratio were also achieved, the gap would be lowered to $261 million per year.

On the resource mobilization side, Pakistan's ratio of government revenues to GDP is currently at the target value of 16 percent. However, the share of the budget going to education, about 10 percent, is far below the 20 percent target. And, even though spending on primary education—52 percent of the education budget in Pakistan—is above the target of 42 percent for a five-year primary system, the net effect of these patterns is a low ratio of education spending to GDP, at 0.9 percent currently.

Thus, when the indicative targets for domestic resource mobilization are introduced in the simulations, Pakistan's spending on primary education increases as a share of GDP. But an estimated financing gap of $204 million per year would

Table 4.6

Pakistan: MDG-2015 Cost Estimates and Sources of Financing under "Best Practice" Policies and Alternative Resource Mobilization Scenarios

(millions of 2000 constant U.S. dollars)

Cost Item	Period	Scenario	Domestic Resources Mobilized	Cost of MDG-2015			Financing Sources					
							Domestic Resources			Gap for External Financing		
				Recurrent	Capital	Total	Recurrent	Capital	Total	Recurrent	Capital	Total
Education service delivery	Cumulative, 2001–2015	C1	15,919	16,748	2,224	18,972	15,919	0	15,919	829	2,224	3,053
		C2	15,919	16,748	2,224	18,972	15,919	0	15,919	829	2,224	3,053
		C3	16,373	16,748	2,224	18,972	16,373	0	16,373	375	2,224	2,599
	Annual	C1	1,061	1,117	148	1,265	1,061	0	1,061	55	148	204
		C2	1,061	1,117	148	1,265	1,061	0	1,061	55	148	204
		C3	1,092	1,117	148	1,265	1,092	0	1,092	25	148	173
AIDS-related costs	Annual	C1		0		0	0		0	0		0
		C2		0		0	0		0	0		0
		C3		0		0	0		0	0		0
Both items	Annual	C1		1,117	148	1,265	1,061	0	1,061	55	148	204
		C2		1,117	148	1,265	1,061	0	1,061	55	148	204
		C3		1,117	148	1,265	1,092	0	1,092	25	148	173

Note: "Best practice" policies refer to the combination of scenarios A + B + C. Shaded cells denote no change from values directly above.

remain, with about three-quarters of this total needed for new classroom construction (table 4.6).

ARMENIA

Of the low-income countries in Europe and Central Asia in our starting sample, only three appear not to have achieved universal primary completion (through sixth grade)—Armenia, Georgia, and Moldova—although data for all countries in this region are considered problematic. According to official statistics, Armenia's gross enrollment ratio in the year 2000 was over 100 percent, but the completion rate through sixth grade was below 70 percent.[5]

The core service delivery parameters in Armenia, Georgia, and Moldova all deviate sharply from the benchmarks in a pattern that is common to ECA countries: the number of teachers employed (relative to the student population) is far higher than in other countries and the average teacher salary is far lower. In Armenia, the average teacher salary would increase dramatically, from 0.6 to 3.5 times per capita GDP, as a quality measure in the simulation. But as a corresponding efficiency measure, the current 13:1 pupil-teacher ratio would rise to 40:1, also a tremendous adjustment—even if phased in gradually over a 15-year period. Given no projected growth of the school-age population, the clear implication is that the number of teachers employed would decline gradually but significantly over the period.

Although this could probably be handled through attrition and selective retrenchment linked to the introduction of new certification or performance standards, the management challenge would be significant. The realism of such a dramatic increase in teacher salaries must be considered questionable as well, in a broader civil service context, and in light of current fiscal pressures in Armenia (recall, however, that our approach assumes that incremental external resources will finance any resulting gaps). But the simulation serves to illuminate the root causes of Armenia's key educational issues: excess staffing; inadequate salaries leading to low teacher motivation, absenteeism, and informal shifting of costs to families; and high operating and maintenance costs for an inefficient number of schools and classrooms, which divert resources from other needed areas such as modernization of curriculum and learning materials, teacher retraining, and system management.

On the resource mobilization side, the simulations show that in addition to an inefficient pattern of spending, Armenia's level of spending on primary education as a share of GDP is inadequate. Armenia's revenue-GDP ratio is close to the target, but the budget share for education, at 15 percent, is below the 20 percent benchmark. This is the principal financing variable that would adjust in the simulation, as the share of education spending going to the primary level is already at the target.

The upward adjustment in the budget share for education by 2015 generates significant additional resources. Nonetheless, given the magnitude of the spending increases required for increased teacher salaries, the model projects a financing gap

5. Armenia's primary cycle is officially three years, but for the purposes of this simulation, we adjusted values for all countries to the equivalent of a six-year primary system.

Table 4.7

Armenia: MDG-2015 Financing Gap under Alternative Policy Measures

		A: Quality Measures			B: Efficiency Measures	C: Financing Measures				
						Government Revenues[c]				
Policy Scenario[a]		Pupils per Teacher	Spending on Inputs Other than Teachers[b]	Average Annual Teacher Salary (as Multiple of Per Capita GDP)	Average Repetition Rate	As % of GDP	% for Education	Primary Education Recurrent Spending[d]	Private Enrollments (As % of Total)	Annual Financing Gap[e]
Status quo		13	52.9%	0.6	0.1%	15.8%	15.1%	51.3%	0.0%	0
A only		13	33.3%	3.5						61
A + B		40	33.3%	3.5	0.1%					12
"Best practice": A + B +	C1	40	33.3%	3.5	0.1%	16.0%	20.0%	50.0%	10.0%	15
	C2					16.0%	20.0%			15
	C3					16.0%	20.0%			15

Note: Shaded cells denote no change from values directly above.

a. Policy scenarios are: A for quality improvement, B for efficiency improvement, and three alternative resource mobilization scenarios (C1, C2, and C3). The combination of scenarios A + B + C is considered "best practice".

b. As a share of primary education recurrent spending.

c. Current revenues, excluding grants.

d. As a share of total education recurrent spending.

e. In millions of 2000 U.S. dollars. Calculated as the difference between the total cost of service delivery under the specific policy scenario and the total resources for primary education mobilized domestically.

of about $15 million per year over the period, notwithstanding efficiency gains from the huge increase in the pupil-teacher ratio that is assumed. All of the gap would be for recurrent financing, given the projected slow growth of the primary school-age population and—in relation to the simulation benchmarks—the tremendous scope for absorbing increased enrollments into the existing physical plant. Obviously, even where the numbers of students and classrooms appear theoretically in balance, there will still be infrastructure needs—for school consolidation, rehabilitation, and even additional classroom construction in response to migration. It is impossible to factor these into the relatively simple model we used. Nonetheless, a result such as this signals that the bulk of the incremental costs of reaching the MDG in Armenia will be of a recurrent nature, rather than costs for expansion. As in other countries, however, capital costs for system rehabilitation, which we could not capture, may be significant.

The year-by-year financing projections show that Armenia's needs for external financing would be heaviest in the first years of the simulation period and would decline to zero by about 2008, as the reforms to improve efficiency and to increase domestic financing take hold. Thus, although Armenia's financing gap does not appear large when averaged over the entire 2000–2015 period, for the initial five years the need for external financing would be significant, averaging about $40 million per year. This is because our simulation assumes that actions to improve the level and structure of teacher remuneration are introduced as early as possible, in order to maximize the potential impact on school quality and also to reduce teachers' informal demands on households for support, which may constrain student attendance. While the teacher compensation reform is assumed to be implemented quickly, however, achieving school consolidation and increases in average class size and mobilizing increased domestic financing for primary education would take longer.

As annex table A.8 shows, the simulations produce a similar pattern of relatively high needs for external financing in the initial years for the other two ECA countries in our sample, Georgia and Moldova. Georgia's gap averages about $35 million per year and Moldova's about $15 million per year up to 2005. In all cases, the gap begins to decline thereafter and is eliminated by 2009.

The simulations for the ECA countries in our sample provide a framework for identifying the key reform directions and tradeoffs facing these countries. They also indicate that the needs for external financing in this region are likely to be larger at the outset of the period than later. But the simulation benchmarks are so far from the institutional and political reality of these countries that the financing gap estimates for these countries should be interpreted as illustrative only. It should also be recalled that we modeled the costs of achieving universal primary completion through six grades of schooling, rather than the shorter cycle these countries actually have. More detailed modeling is needed to cost reform trajectories toward targets that are more realistic for these countries—such as average class size in the range of 25–30 and average teacher salaries in the range of 2–2.5 times per capita GDP, and three- or four-grade primary completion. And while, recalling box 3.1, these alternative parameters would have a neutral effect on the overall financing gap, they would lower the size of the gap in the initial years of the simulation.

Table 4.8

Armenia: MDG-2015 Cost Estimates and Sources of Financing under "Best Practice" Policies and Alternative Resource Mobilization Scenarios

(millions of 2000 constant U.S. dollars)

Cost Item	Period	Scenario	Domestic Resources Mobilized	Cost of MDG-2015			Financing Sources					
							Domestic Resources			Gap for External Financing		
				Recurrent	Capital	Total	Recurrent	Capital	Total	Recurrent	Capital	Total
Education service delivery	Cumulative, 2001–2015	C1	491	712	0	712	491	0	491	221	0	221
		C2	491	712	0	712	491	0	491	221	0	221
		C3	491	712	0	712	491	0	491	221	0	221
	Annual	C1	33	47	0	47	33	0	33	15	0	15
		C2	33	47	0	47	33	0	33	15	0	15
		C3	33	47	0	47	33	0	33	15	0	15
AIDS-related costs	Annual	C1		0		0	0		0	0		0
		C2		0		0	0		0	0		0
		C3		0		0	0		0	0		0
Both items	Annual	C1		47	0	47	33	0	33	15	0	15
		C2		47	0	47	33	0	33	15	0	15
		C3		47	0	47	33	0	33	15	0	15

Note: "Best practice" policies refer to the combination of scenarios A + B + C. Shaded cells denote no change from values directly above.

NIGER

The primary completion rate in Niger, at 20 percent in 2000, is one of the lowest in the world. Only one child in three in Niger is enrolled in primary school (GER 33 percent), and only one child in five completes it—and among girls the completion rate is one in 10. Niger, Mali, Chad, Ethiopia, and a handful of other Sub-Saharan African countries are unquestionably the setting for EFA's greatest challenges. For these countries to meet the MDG, education system expansion and simultaneous quality improvement will need to occur at a pace no country has ever seen. In the case of these very low completion countries, in fact, there is a clear question of the realism of our simulations, which model the resource requirements of a trajectory of system expansion leading by definition to 100 percent completion in 2015. Even if financing were unconstrained, this trajectory may simply be physically and institutionally impossible. But the simulation exercise serves to illuminate the issues that Niger, and several other African countries in our sample, must confront.

Niger's incipient education system is relatively close to the normative targets in a few areas: the pupil-teacher ratio is 37:1 instead of 40:1, and repetition averages 13 percent instead of 10 percent. Under the quality scenario, the share of recurrent spending on items other than teacher salaries would increase from 26 percent currently to the target of 33.3 percent (table 4.9).

The underlying driver of Niger's inability, in the 40 years since independence, to offer all children a primary education is found in the very high unit cost of public primary education, due to extraordinarily high average teacher salaries—9.6 times the per capita GDP, compared with the benchmark of 3.5 times per capita GDP. Recognizing this, the Ministry of Education launched a bold reform in 2000 to suspend the recruitment of civil service teachers and to establish a new cadre of contract teachers at a more sustainable salary rate. Since 2000, the pace of teacher recruitment and enrollment expansion has accelerated tremendously. Like Senegal and other countries that have adopted this approach, Niger has been able to recruit new teachers with the same level of formal qualification as the existing force, and in fact has had an excess supply of candidates. In the simulation, we model the expansion of the new teacher cadre at the target salary of 3.5 times per capita GDP, while providing for gradual attrition of the higher-paid teaching force. Reflecting this mix, by 2015 the average teacher salary in Niger declines to a value of 4.3.

The other issue for Niger can be seen from the resource mobilization targets. Unlike many countries in the sample, Niger is currently making a huge fiscal effort in support of primary education: the government allocates 31.5 percent of domestic resources to education and 62 percent of the education budget to primary education, both values well above the benchmarks. But Niger's slight resource base and undeveloped economy are clear in the very limited ability of the country to mobilize tax revenues—only 9.1 percent of GDP—compared with the target of 14 percent for Niger's level of GDP. Our simulations require that Niger gradually increase government revenues to reach 14 percent of GDP by 2015, which may be difficult to achieve. At the same time, though the country's strong fiscal commitment to EFA is laudable, the 31.5 percent budget share for education cannot be considered sustainable, and the 62 percent allocation to primary education will also need to

Table 4.9

Niger: MDG-2015 Financing Gap under Alternative Policy Measures

		A: Quality Measures			B: Efficiency Measures	C: Financing Measures				
Policy Scenario[a]		Pupils per Teacher	Spending on Inputs Other than Teachers[b]	Average Annual Teacher Salary (as Multiple of Per Capita GDP)	Average Repetition Rate	Government Revenues[c]		Primary Education Recurrent Spending[d]	Private Enrollments (As % of Total)	Annual Financing Gap[e]
						As % of GDP	% for Education			
Status quo		37	25.9%	9.6	13.0%	9.1%	31.5%	62.0%	4.0%	135
A only		37	33.3%	9.6						146
A + B		40	33.3%	4.3	10.0%					48
"Best practice": A + B +	C1	40	33.3%	4.3	10.0%	14.0%	26.0%	50.0%	10.0%	46
	C2					14.0%	20.0%			53
	C3					14.0%	20.0%			53

Note: Shaded cells denote no change from values directly above.

a. Policy scenarios are: A for quality improvement, B for efficiency improvement, and three alternative resource mobilization scenarios (C1, C2, and C3). The combination of scenarios A + B + C is considered "best practice".

b. As a share of primary education recurrent spending.

c. Current revenues, excluding grants.

d. As a share of total education recurrent spending.

e. In millions of 2000 U.S. dollars. Calculated as the difference between the total cost of service delivery under the specific policy scenario and the total resources for primary education mobilized domestically.

Table 4.10

Niger: MDG-2015 Cost Estimates and Sources of Financing under "Best Practice" Policies and Alternative Resource Mobilization Scenarios

(millions of 2000 constant U.S. dollars)

Cost Item	Period	Scenario	Domestic Resources Mobilized	Cost of MDG-2015			Financing Sources					
							Domestic Resources			Gap for External Financing		
				Recurrent	Capital	Total	Recurrent	Capital	Total	Recurrent	Capital	Total
Education service delivery	Cumulative, 2001–2015	C1	796	1,078	403	1,481	796	0	796	282	403	685
		C2	684	1,078	403	1,481	684	0	684	394	403	797
		C3	684	1,078	403	1,481	684	0	684	394	403	797
	Annual	C1	53	72	27	99	53	0	53	19	27	46
		C2	46	72	27	99	46	0	46	26	27	53
		C3	46	72	27	99	46	0	46	26	27	53
AIDS-related costs	Annual	C1		1		1	0		0	1		1
		C2		1		1	0		0	1		1
		C3		1		1	0		0	1		1
Both items	Annual	C1		73	27	100	53	0	53	20	27	47
		C2		73	27	100	46	0	46	28	27	54
		C3		73	27	100	46	0	46	28	27	54

Note: "Best practice" policies refer to the combination of scenarios A + B + C. Shaded cells denote no change from values directly above.

decline, as primary completion increases and a larger share of children reach secondary and tertiary levels.

Thus, about 50 percent of the $99 million annually that Niger would need to spend on the trajectory of accelerated progress we model would need to come from external financing sources. About $27 million of the total would be for school construction, which we assume could be completely financed by donors. But Niger would need an equal amount from the outside world in recurrent budget support (table 4.10).

Given Niger's relatively low HIV seroprevalence, the impacts on the system from HIV/AIDS (to replace sick teachers and provide support to maternal or double orphans) would add only an estimated $1 million per year to recurrent costs. But this amount would also need to be externally supported. In sum, Niger is a clear case of a country where, even with maximum domestic resource commitment and reform progress on the key issue of teacher salaries, a significant financing gap remains. The absence of external support would place a binding constraint on Niger's progress toward universal primary completion. The fact that the country has already started on the path of reform toward the indicative framework benchmarks suggests that Niger is a case of a country with a "credible plan" for EFA.

AFGHANISTAN

The reconstruction of primary education in Afghanistan will be a massive challenge for the country and international partners over the coming decade. It was impossible to obtain sufficient public finance data to carry out a full simulation for Afghanistan. Population, education enrollment, and service delivery data are also scarce, outdated, and inconsistent. Nonetheless, because Afghanistan's needs will clearly contribute to the global costs and external financing requirements of achieving EFA, we used the target parameters for service delivery to try to estimate what the order of magnitude of resource requirements for Afghanistan would be in the same framework.

The last population census for Afghanistan was conducted in 1978 and all published population statistics since then are extrapolations of these census data. However, these are based on a wide variety of assumptions and lead to population estimates between 20.6 and 26.9 million. We used an estimate at the midpoint of this range.

We estimated the total resource cost of achieving 100 percent completion in Afghanistan by 2015 based on the following assumptions:

- Repetition rate over the planning horizon is 10 percent (no baseline data available)
- In the absence of salary data, figures for average teacher salaries in Pakistan were used
- Construction costs for a fully equipped classroom are $6,500 (constant 2000 dollars), the average we used for other countries in South Asia
- Non-teacher-salary expenditures are 33 percent of recurrent expenditure on primary education
- The pupil-teacher ratio is 40:1.

Table 4.11

Possible Costs of Achieving UPC in Afghanistan, 2000–2015

(millions of 2000 constant U.S. dollars)

Period	Recurrent Costs	Capital Costs	Total
Cumulative	613	827	1,440
Annual	41	55	96

Under these assumptions, estimated resource requirements to rebuild and improve education service delivery in Afghanistan during 2000–2015 would be as shown in table 4.11.

In the absence of fiscal data, we made no assumptions about the scope for domestic resource mobilization and instead present these as the total requirements, which for the next several years at least may well need to be financed almost entirely from donor sources. Even with the need to reconstruct a largely defunct school system, however, it should be noted that about 40 percent of the requirements will be for recurrent budget support.

Aggregate Results

The simulation results were aggregated into an estimate of the average annual financing gap for this set of 47 low-income countries (table 4.12). Scenario C2 (the base case) shows the highest financing requirements, reflecting the reduction of higher spending levels we imposed for some countries on grounds of sustainability. Under this scenario, a total of $2.4 billion per year in external financing would be required to meet the MDG target by 2015 in only the 47 countries studied. If the resource requirements for Afghanistan, estimated using a different methodology, are included, the total for these 48 countries would be about $100 million per year higher. A discussion of how the aggregate results were constructed from the different policy scenarios follows.

Table 4.12 shows that under Scenario A, which introduces only quality improvement measures, a financing gap of about $7.5 billion per year is generated for the sample as a whole, close to $2 billion of which is for India. The reduction of this gap to $4.3 billion per year under Scenario A + B shows the impact of introducing efficiency measures, such as increasing class size where it is currently below 40 and reducing repetition where it is above 10 percent. When the target parameters for domestic financing are also introduced, the gap is cut roughly in half, to about $2.1 billion per year under scenario C2. Under scenario C1, which maintains higher spending shares for primary education in those countries currently spending more, the financing gap is slightly lower, about $2 billion per year.

The financing gap shrinks significantly under scenario C3 to less than $1.6 billion per year. Scenario C3 maintains higher overall government spending in those countries whose tax-GDP ratio currently exceeds our targets. Maintaining this level of domestic resource mobilization would clearly aid in reaching the

Table 4.12

All 47 Countries: MDG-2015 Financing Gap under Alternative Policy Measures

		A: Quality Measures			B: Efficiency Measures	C: Financing Measures				
Policy Scenario[a]		Pupils per Teacher	Spending on Inputs Other than Teachers[b]	Average Annual Teacher Salary (as Multiple of Per Capita GDP)	Average Repetition Rate	Government Revenues[c]		Primary Education Recurrent Spending[d]	Private Enrollments (As % of Total)	Annual Financing Gap[e]
						As % of GDP	% for Education			
Status quo		13–79	0.1–45	0.6–9.6	0–36%	8–56	1.4–32.6	26–66	0–77	
A only		36	33.7%	4.5						7,489
A + B		40	33.3%	3.8	8.2%					4,348
"Best practice": A + B +	C1	40	33.3%	3.7	8.2%	15.2%	21.1%	48.6%	10.0%	2,033
	C2					15.2%	20.0%			2,151
	C3					20.3%	20.0%			1,563

Note: Shaded cells denote no change from values directly above.

a. Policy scenarios are: A for quality improvement, B for efficiency improvement, and three alternative resource mobilization scenarios (C1, C2, and C3). The combination of scenarios A + B + C is considered "best practice".

b. As a share of primary education recurrent spending.

c. Current revenues, excluding grants.

d. As a share of total education recurrent spending.

e. In millions of 2000 U.S. dollars. Calculated as the difference between the total cost of service delivery under the specific policy scenario and the total resources for primary education mobilized domestically.

MDG, and in countries such as Angola, Nigeria, and the Republic of Yemen, where domestic revenue mobilization is currently in the range of 35–50 percent of GDP and greatly exceeds our 18 percent maximum target, scenario C3—or something closer to it—may be a more appropriate fiscal scenario than the C2 scenario. However, since even in these countries it is not clear that current levels of public revenue mobilization can be sustained over the long period we analyzed, we focus our discussion on the results under scenario C2.

Table 4.13 compares these cost estimates to potential sources of financing. As can be seen, under scenario C2 the total cost of achieving universal primary completion in these 47 countries would average about $16 billion per year over the period. About 90 percent of this cost ($14.8 billion per year) would be recurrent. Incremental school construction requirements for the sample would be about $1.5 billion per year.

Under the indicative parameters, these countries would increase their domestic resource mobilization for EFA from about $8 billion–$9 billion in 2000 to $23 billion per year by 2015. Averaged over the period, domestically mobilized primary education funding would total about $13.8 billion per year (under scenario C2). We assume that all of the domestic resources are applied first to the recurrent budget requirements. But approximately $1.1 billion per year in recurrent needs would remain uncovered. Since the countries' domestic resources are not adequate to cover their recurrent budget needs, virtually all of the incremental capital costs would need external financing, about another $1.1 billion. (About $0.4 billion of capital costs could be financed in part by a few countries in the sample.)

The special exercise we undertook to estimate the impact of HIV/AIDS on MDG attainment in Africa indicated that the additional costs for these education systems could be on the order of $286 million per year. These costs are all of a recurrent nature—for providing subsistence support to maternal and double orphans and for recruiting and training additional teachers. The Sub-Saharan African countries in our sample clearly will be ill prepared to bear these additional costs, so they are added to the gap for external financing. Thus, the total external financing gap for these 47 countries is estimated to average about $2.4 billion per year over the period. Including Afghanistan, it would average $2.5 billion per year.

An important finding is that about 55 percent of the external financing needed would be for recurrent budget support, and only about 45 percent for capital support (new classroom construction). Since construction investments are generally easiest for donors to mobilize, we assume that *all* of the new construction needed in these countries would be financed externally. But the simulations make clear that an even larger volume of external support would be needed for recurrent budget requirements. Under our target parameters, virtually all countries in the sample would increase their domestic financing for primary education, and would finance 85 percent of the total cost of achieving the MDG themselves. But the biggest constraint to achieving the goal will be the availability of external financing for recurrent expenses, not capital.

Figure 4.1 provides a graphic picture of these financing requirements to 2015 and their likely evolution thereafter. It should be remembered that underlying this evolution are substantial shifts in education system coverage and quality over the

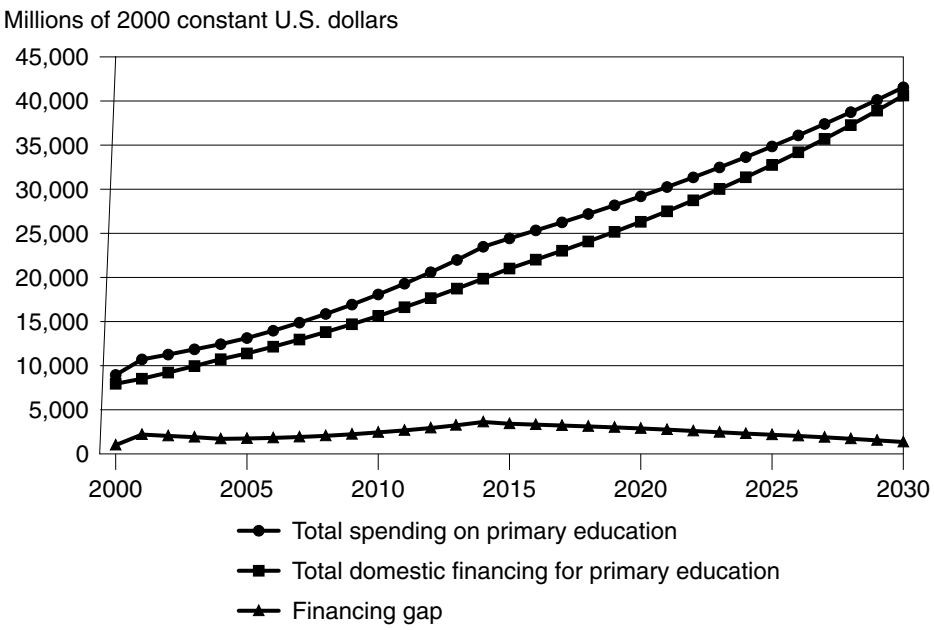
Table 4.13

All 47 Countries: MDG-2015 Cost Estimates and Sources of Financing under "Best Practice" Policies and Alternative Resource Mobilization Scenarios

Cost Item	Period	Scenario	Domestic Resources Mobilized	Cost of MDG-2015			Financing Sources					
							Domestic Resources			Gap for External Financing		
				Recurrent	Capital	Total	Recurrent	Capital	Total	Recurrent	Capital	Total
Education service delivery	Cumulative, 2001–2015	C1	214,897	222,665	22,728	245,393	208,811	6,085	214,896	13,853	16,643	30,496
		C2	213,124	222,665	22,728	245,393	207,109	6,014	213,123	15,556	16,714	32,270
		C3	234,632	222,665	22,728	245,393	212,430	9,521	221,951	10,234	13,208	23,442
	Annual	C1	14,326	14,844	1,515	16,360	13,921	406	14,326	924	1,110	2,033
		C2	14,208	14,844	1,515	16,360	13,807	401	14,208	1,037	1,114	2,151
		C3	15,642	14,844	1,515	16,360	14,162	635	14,797	682	881	1,563
AIDS-related costs	Annual	C1		286		286	0		0	286		286
		C2		286		286	0		0	285		286
		C3		286		286	63		63	223		286
Both items	Annual	C1		15,130	1,515	16,646	13,921	406	14,326	1,210	1,110	2,319
		C2		15,130	1,515	16,646	13,807	401	13,208	1,323	1,114	2,437
		C3		15,130	1,515	16,646	13,226	635	14,860	905	881	1,785

Note: "Best practice" policies refer to the combination of scenarios A + B + C. Shaded cells denote no change from values directly above.

FIGURE 4.1 **Domestic and External Financing Required to Achieve the Education MDG in 47 Countries, 2001–2030**



period. Under our scenario of MDG attainment, these 47 countries increase primary enrollments from 229 million children in 2000 to 301 million children in 2015. The increase is almost entirely driven by progress in Africa, where primary enrollments would almost double, from 71 million to 136 million children. This will be a huge management challenge for education systems that are perceived to be weakly managed today. In the other regions, where starting coverage is higher and the population of school-age children is projected to stabilize or decline, total primary enrollments will barely change, increasing from 159 million to 164 million by 2015.

Total expenditure on primary education in all 47 countries increases in our simulations to about $25 billion per year in 2015, or about $76 per child (in constant 2000 dollars). This compares to a starting level of about $32 per student. This increase in unit costs in real terms reflects both the impact of economic growth on factor costs, notably teacher salaries, and the increase in schooling quality required to achieve universal primary completion. Underpinning the increase in quality is an important shift in the composition of spending toward non-salary inputs. Per-student spending on inputs other than teacher salaries triples in real terms over the period.

Figure 4.1 shows very clearly that as primary education *costs* increase, due to expanding enrollments and improvements in quality, the indicative framework targets also require countries to increase their domestic *spending* on primary educa-

tion. These 47 countries' own financing for primary education increases from a base of about $8.5 billion in 2000 to about $21 billion in 2015. Notwithstanding this significant domestic effort, there is a financing gap over the period to 2015, and it reaches a peak in 2014, when total financing requirements approach $25 billion and the financing gap rises to $4 billion.

Figure 4.1 also shows that after 2014 the external financing gap will decline, for four main reasons: (a) construction needs will decline sharply from $1.5 billion per year to the lower pace of expansion required by natural growth of the school-age population; (b) the demographic transition expected in most of the countries will cause the share of children aged 7–12 in the population to drop, which, other things equal, will reduce the share of national resources needed to finance primary education; (c) continued GDP growth will boost the tax-GDP ratio for these countries to levels higher than the targets we assumed; and (d) the secular decline in the level of teacher salaries relative to per capita GDP observed with economic development and expansion of the formal labor market (recall figure 3.3) will set in. Indeed, these dynamic effects would in reality probably affect our target parameters before 2015.

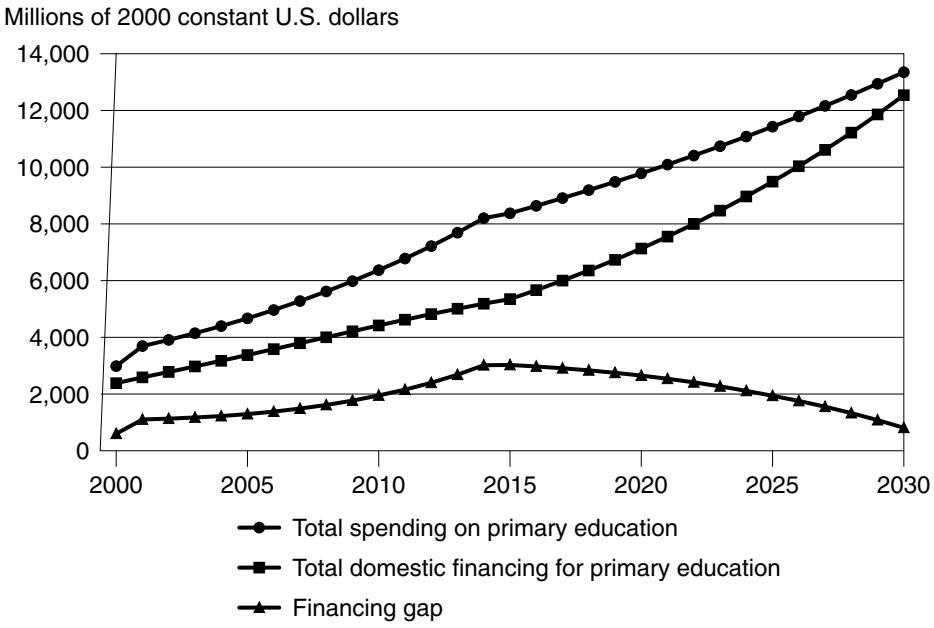
On the other hand, the figure shows that the financing gap for these very low income countries will not disappear entirely. By 2015, these countries—most of which are currently very far from the goal of universal primary education—will have achieved a transformation of their primary education systems in terms of quantity, quality, and efficiency. They will also have increased their own financing for primary education and will be on the road to sustainable and self-financing systems. After 2015, the dependence on foreign financing will gradually decline, from 15 percent of total expenditures to about 3–5 percent. However, it is sobering to realize that the primary education systems in these very low income countries will require some degree of external assistance for a long time to come.

The size of that assistance relative to domestic financing varies substantially across the countries in our sample—with the greatest needs, not surprisingly, in the poorest of the Sub-Saharan African countries. External financing needs as a share of total primary education expenditure for the African countries rise from 28 percent at the outset to a peak of 36 percent in 2014, before declining to 6 percent by 2030. This higher dependency reflects both the African countries' weaker economies and their greater distance from universal primary education coverage.

While the very high dependence of these 33 countries on external support for education over the period to 2015 is troubling, the projections clearly indicate a path toward self-sustaining education systems thereafter (figure 4.2). It should also be recalled that some of these countries may have the capacity to contribute more domestic resources to the financing of primary education than we assumed under the C2 resource mobilization scenario profiled here. Under our alternative fiscal scenario C3, in which higher tax-GDP ratios are retained for countries that are in fact currently above our targets, the financing gap for the African countries is about 25 percent lower over the period, averaging $1.3 billion, rather than $1.8 billion per year. Under this scenario, in the peak year of 2014 the financing gap represents 26 percent of total primary education expenditure, rather than 36 percent under scenario C2.

The time profile of external financing requirements to attain the MDG merits further analysis. We modeled only one basic scenario, setting 2015 as the date for

FIGURE 4.2 **Domestic and External Financing Required to Achieve the Education MDG in Sub-Saharan Africa, 2001–2030**



achievement of universal primary completion in all countries in the sample, irrespective of their actual trends. For many countries, particularly in Africa, this was an ambitious target. But for some others, it actually forced a slowing of their trend rate of progress. An alternative scenario might set all countries on at least the trajectory of "maximum feasible" progress to the goal that has been observed empirically (about 3 percentage points per year increase in the primary completion rate). This would effectively shift forward some of the external financing gap to the years before 2015 and flatten the curve.

REQUIREMENTS BY REGION

The regional breakdown of the financing gap in table 4.14 shows that, including costs for the impact of AIDS, about 75 percent ($1.9 billion) of the external support would be needed for 33 countries in Sub-Saharan Africa. In South Asia, four countries (India, Pakistan, Bangladesh, and Nepal) would need $397 million per year in external funding. In Latin America and the Caribbean, three countries (Nicaragua, Honduras, and Haiti) would need $48 million per year. In East Asia and the Pacific, two countries (Lao PDR and Cambodia) would need $36 million per year. In the Middle East, one country (the Republic of Yemen) would need $70 million per year, and in Europe and Central Asia, three countries (Armenia, Georgia, and Moldova) would require about $34 million per year. Only one country in our sample (Mongolia) showed no financing gap in these simulations, largely

Table 4.14

Estimated Annual Financing Gap to Achieve the Education MDG, by Region (Scenario C2)

(millions of 2000 constant U.S. dollars)

Type of Financing	Africa	South Asia	Latin America and the Caribbean	East Asia and the Pacific	Middle East and North Africa	Europe and Central Asia	Total	Percentage of Total Financing Gap
Recurrent	1,127	97	14	30	21	34	1,323	55
Operation	841	97	14	30	21	34	1,037	43
AIDS	286	0	0	0	0	0	286	12
Capital	725	300	34	6	49	0	1,114	45
Total	1,852	397	48	36	70	34	2,437	100

Note: Numbers may not sum to totals because of rounding.

because the school-age population is not projected to increase and the baseline pupil-teacher ratio is far below the benchmark we used. All results for individual countries may be found in annex C, and the simulation model and baseline data for all countries may be found in the CD-ROM accompanying this book.

The financing gap estimated in this study must be understood as a lower-bound estimate of the global costs of attaining the education MDG, for several reasons. First and most crucially, these simulations estimated the incremental costs of *expanding* primary education systems from the baseline numbers of classrooms and teachers in each of the 47 countries in 2000 to the numbers that would be needed in order to reach the goal by 2015. But they did not capture the important needs—particularly in these very low income countries—for rehabilitation and upgrading of existing classrooms; expansion or upgrading of other system infrastructure such as teacher support centers, district offices, and teacher training institutes; key "software" investments such as curriculum design, management information systems, student assessment systems, textbooks, and so forth; and training and capacity building for teachers, school directors, and system administrators to bring all of them up to an adequate level of functioning. Our data set did not permit the detailed appraisal of existing school-level and system-level infrastructure or the adequacy of current system functioning that would be required to estimate the costs of needed upgrading, rehabilitation, and capacity building in each of these 47 countries, in order to complement the expansion costs we estimated. Given the precarious functioning of the education system in very many of the countries in our sample, it can be assumed that these needs are substantial. Because these investments are needed immediately, moreover, our simulation results for the first few years of the projection period particularly underestimate the true needs for external financing in these countries.

Second, although our 47-country sample includes all of the most populous low-income countries and accounts for 94 percent of all children without access to primary education in the low-income world, there are about 20 small low-income

countries and several conflict-affected countries that we could not analyze, for lack of data. Moreover, we also only estimated financing requirements through six grades of primary schooling for some countries whose official cycle is longer. A full costing of the external needs in low-income countries would have to include all of the countries and reflect the full length of the primary cycle in each.

Third, this costing exercise simulated a path to the MDG for each country that assumed that system reforms would be initiated immediately, and pursued steadily to 2015. In reality, there will be many cases where it is politically impossible to launch all needed reforms at the same time, where the pace of implementation will not always be linear, and where there is a need for the education system to deliver better service immediately, while key reforms—particularly on the resource mobilization side—may necessarily take longer to legislate and implement. To the extent that external assistance may facilitate such processes, transitional external financing requirements may be higher than the simulation estimates. However, the record on aid effectiveness also clearly points to the pitfalls of external assistance as a substitute for country commitment to needed reforms.

Finally, this costing exercise focused on the millennium education goal of universal primary completion by 2015, and not on the full set of Education for All goals established at the Dakar conference. Developing countries are committed to pursuing all six of the Dakar education goals, and the incremental costs to attain some of them—especially the elimination of gender disparities in secondary education, the achievement of a 50 percent improvement in adult literacy by 2015, and the expansion of early childhood care and education targeted to the most vulnerable children-will be significant. The financing framework introduced in this study provides for increased spending on *all* levels of education, not only primary education, and would provide some fiscal space for education systems to pursue the full set of Dakar goals. But parallel efforts to the current study, to research the "best practice" policies, service delivery parameters, and external financing needed for attainment of the other Dakar goals, are needed for a full costing of the Education for All agenda.

Estimating the Global Costs of Reaching the Education MDG

Despite these limitations, the current study does represent one of the most careful efforts to date to analyze and cost a strategy for attaining the education MDG. In a world where both developing and developed countries face competing priorities and budget constraints, we insist on the importance of a global strategy—such as the one outlined here—that seeks to achieve the goal at minimum adequate cost, rather than "at any cost." Current patterns of education spending, where they clearly are not producing results today, should not be the basis for MDG costing. "External financing gaps" should reflect a true residual need after sound national policies and resource commitments are in place, and should not substitute for these. Even the conservative estimate put forward here is many times higher than aid flows currently available for primary education; it will take strong effort and commitment from development partners to mobilize this incremental funding, and equal effort from developing countries to use it well.

Is it possible, then, to generate a plausible estimate of the likely costs of achieving the education MDG—through five or six years of schooling—in *all* developing and transition countries, building on the detailed analysis done here for 47 low-income countries?[6] We try in this section to do so. Since our cost estimates are for only 47 countries, and cover only expansion costs at the classroom level, "scaling up" our analysis to a truly global estimate requires four steps. (See table 4.15.)

First, we need to estimate the system rehabilitation needs for which we were unable to get country-by-country data, at both the classroom level and the system infrastructure level. We obtained more detailed data for a small subset of countries in our sample and found that, on average, about 30 percent of existing infrastructure was estimated in need of replacement or upgrading. The estimated annual cost of this rehabilitation—assumed to be carried out over a three year period—equaled roughly 50 percent of the total primary education recurrent budget over that period. On this basis, the total additional requirement for our 47 countries over the first three years would be slightly over $3.9 billion per year, or $11.6 billion in total. These are one-time expenditures, however. Averaged over our 15 year projection period, they add $0.8 billion per year, or 10 percent, to the estimated annual incremental cost to reach the MDG of $8 billion, and add 33 percent to our estimated annual financing gap.

The second step is to estimate infrastructure expansion needs at the system level, since our analysis focused on classroom expansion. We roughly estimate that system infrastructure (teacher resource centers, district offices, central ministry facilities, and so forth) should expand at an equal pace with classroom construction and in general should not exceed 20 percent of the costs of classroom expansion. This would add another $4.6 billion to the $23 billion in capital requirements we estimated for the period to 2015, or $0.3 billion per year. This represents an additional 12 percent increase in the estimated financing gap.

The third step is to extend this comprehensive estimate to countries we did not analyze. Our 47 countries account for about 94 percent of the out-of-school population in low-income countries. Scaling up our estimated incremental costs to cover the total needs for all low-income countries is relatively straightforward, as unit costs and appropriate system parameters are similar. Scaling up from the 47 countries we analyzed to the full group of 79 IDA countries would increase the incremental costs by an estimated $0.6 billion per year, or 7 percent. If we assume the same capacity for domestic resource mobilization in the low income countries as in our sample countries, our estimated financing gap would increase by a further $0.2 billion per year.

In sum, we estimate that the incremental cost of achieving the education MDG in all low-income countries, including all needs, would total about $9.7 billion per year over the period to 2015, of which about $3.7 billion per year would need to be financed externally. This is about 50 percent higher than the gap we estimated for the 47 countries in our sample.

6. We obtained detailed data on costs and parameters for five or six years of primary schooling in all countries in the sample, regardless of the official length of the primary cycle. The scaled-up costs estimated in this section similarly correspond to the equivalent of getting all children through five or six years of primary education in all countries. To the extent that countries actually have longer primary education cycles, these costs underestimate the true costs of reaching the education MDG.

The fourth and final step—projecting the likely costs and financing gaps for the 47 middle-income countries that have not yet reached the MDG—is more difficult. On the one hand, the middle-income countries are much closer to the goal, with an average primary completion rate of 87 percent (on a country-weighted basis), compared with 62 percent for the low-income countries. These more diversified economies also have more scope for domestic resource mobilization. With appropriate domestic commitment, the upper-middle-income countries in particular—with a tax-GDP ratio averaging 23 percent compared to 19 percent for our sample—should be able to finance a substantial part of the costs of universal primary education. Demographic factors are also more favorable: the school-age population is a lower, and typically declining, share of the overall population, which makes it easier for a fixed share of national income to cover education system needs.

On the other hand, there are several offsetting factors. The share of the overall education budget typically available for primary education is lower in middle-income countries, given higher enrollment ratios in secondary and tertiary education and funding pressures from these levels. Most importantly, the unit costs of primary education in middle-income countries are much higher in dollar terms, because of lower pupil-teacher ratios and the higher (dollar) costs of teacher salaries, construction, and other inputs.

Pupil-teacher ratios in middle-income countries tend to be lower than 30:1 and are often under pressure from teachers' unions to decline further. It would be difficult in most middle-income countries to establish 40:1 as an appropriate target, although high-performing education systems in Singapore and South Korea provide a clear example of how cost-effective such a policy can be. An even bigger factor is the average teacher salary: while teacher salaries in middle-income countries are lower in per capita GDP terms than in our sample countries, they are much higher in dollar terms. The dollar value of non-salary inputs and construction costs is also higher, reflecting the average level of incomes and prices in these more developed economies. Overall, primary education unit costs in middle-income countries are in the range of $180–220 per student, or 5–6 times the unit cost in our sample.

Table 4.15

A Global Estimate of the Annual Incremental Costs to Achieve the Education MDG and Likely Financing Gap

	ESTIMATED INCREMENTAL COST (ANNUAL AVERAGE)	ESTIMATED EXTERNAL GAP (ANNUAL AVERAGE)
Estimate for 47 countries	$8 billion	$2.4 billion
Rehabilitation	$0.8 billion	$0.8 billion
System expansion	$0.3 billion	$0.3 billion
Other low-income countries	$0.2 billion	$0.2 billion
All low-income countries	$9.7 billion	$3.7 billion
Middle-income countries	$23–28 billion	$1–$3 billion
All developing countries	$33–38 billion	$5–$7 billion

Based on current unit costs and enrollment data, but applying population and economic growth projections, we estimate that the incremental costs of reaching the education MDG in the middle income countries would be in the range of $23–28 billion, compared to spending on primary education estimated at about $80 billion in 2000.

However, this estimate is not strictly parallel to our estimate for the lower income countries, because it assumes no changes in service delivery efficiency or domestic financing. Without country-by-country analysis, it is impossible to say what the possible impact of appropriate policy reforms on these costs might be, nor to estimate the potential for increased domestic resource mobilization to contribute to their financing. The one study so far that has applied our methodology (with regionally appropriate benchmark parameters) to 10 middle-income countries in Latin America and the Caribbean found that the countries should be able to finance the limited amount of school-level expansion needed to reach the MDG, without an external gap, if they also adopt policies to improve the efficiency of student flows and devote reasonable domestic budget allocations to primary education (di Gropello, Dubey, and Winkler 2002). (The study did not evaluate rehabilitation needs or infrastructure expansion needs at the system level.)

Against this, one can set an earlier World Bank analysis of MDG attainment that assumed no change in unit costs, student flows, or domestic financing. In this analysis, the estimated financing gap for middle-income countries was in the range of $4 billion per year (Devarajan, Miller, and Swanson 2002). However, we believe that this overstates the likely financing gap because, just as in the countries we analyzed, there is clear scope in middle-income countries to increase resource mobilization and improve efficiency in service delivery.

The most that can be said without country-by-country analysis of the type we have done is that the incremental costs of reaching the education MDG in middle-income and transition countries are likely to be in the range of $23–28 billion per year. Of this, the need for external financing may be in the range of $1 billion per year, with appropriate policy reforms, to $3 billion per year.

Summing these estimates with our scaled up estimate of the incremental costs and financing gap for low-income countries results in a global estimate that roughly $33–38 billion per year in additional spending on primary education will be needed to reach the goal. It should be kept in mind that this is the annual average of a spending increase that would take place gradually over the period to 2015, from the roughly $90 billion that developing countries are spending today on primary education to a projected $160 billion in 2015. We estimate that between $5 and $7 billion per year of this total amount needed will not be able to be generated domestically by these countries and would need to come through external aid.

This range is fairly wide, but it is anchored in the most careful country-by-country analysis available. Our belief is that an extension of our methodology to the middle-income developing countries, with an explicit focus on achieving the MDG at minimum and sustainable global cost, would result in a global financing gap at the lower end of this range. It would also prompt a refocusing of external assistance for education on the lowest-income countries currently furthest from the goal of universal primary completion.