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Evaluation and Monitoring of Poverty Reduction Strategies – 2005

# Budgeting for Education: Bolivia, Honduras and Nicaragua

# Preface

The poverty reduction strategy responds to a legitimate concern for the problem of persistent and high poverty in many developing countries. The PRSPs intend to reduce poverty through a participatory, long-term, and result-oriented strategy that seeks to bring together both government and civil society in finding solutions to the country's poverty problems. The commitment of the donors is to support the strategy with resources and debt relief.

The Swedish International Development Cooperation Agency, Sida, has requested the Institute of Social Studies (ISS) in The Hague, to monitor and evaluate the PRSP processes in the three Latin America countries eligible for debt relief: Bolivia, Honduras and Nicaragua. The study will be carried out over a period of 5 years, beginning in 2003.

Each year five reports will be elaborated, including three country reports, one regional report and a thematic report. The country reports to be submitted in 2005 provide an update of the progress with the PRSP process in terms of strategy definition and implementation. This year specific attention is paid to the budgeting process in relation to poverty reduction policies and the problems countries are facing in making the budget process more transparent and more results-oriented. The analysis of the country reports is supported by a detailed and systematic stakeholder analysis, including the stock taking of local actors through visits to several municipalities in the three countries. A comparative analysis of the experience in the three countries is presented in the regional report, highlighting lessons to be learned for governments, civil society and the donor community. The thematic report for 2005 focuses on the potential of result-oriented budgeting in the case of primary education.

The five reports aim to make a contribution to existing evaluations of the PRSP process through the regional focus and an impartial assessment of the PRSP, resulting from the ISS's complete independency in the process of design, implementation and financing of the strategies.

All reports can be downloaded from the following website: http://www.iss.nl/prsp.

The present report was prepared by Niek de Jong, Arjun Bedi, Juan Ponce and Rob Vos. The authors acknowledge the valuable inputs from Cecilia Larrea and Juan Carlos Aguilar on the Bolivian experience and Mauricio León on the Honduran case.

Rob Vos
Project Coordinator
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Evaluation and Monitoring of Poverty Reduction Strategies – 2005

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## Abbreviations

| | |
|---|---|
| CEA | Cost-effectiveness analysis |
| CMA | Cost-minimization analysis |
| GDP | Gross Domestic Product |
| MDG | Millennium Development Goal |
| MTEF | Medium Term Expenditure Framework |
| PROGRESA | Programa de Educación, Salud y Alimentación (Education, Health and Nutrition Programme) |
| PRS | Poverty Reduction Strategy |
| PRSP | Poverty Reduction Strategy Paper |
| ROB | Result-Oriented Budgeting |
| UN | United Nations |

# 1. Introduction

In the context of the alignment of poverty reduction strategies with the Millennium Development Goals (MDG), there is a clear need for output-oriented budgets. Accordingly, many countries, including Bolivia, Honduras and Nicaragua, have taken steps to make their budgets more result-oriented. Moreover, there is now a broad consensus that policies aimed at reaching the MDG need to be designed and negotiated on the basis of a proper assessment of human, physical and financial resources. A needs assessment thus includes an estimation of the cost involved in achieving the MDG by 2015.

The current practice in Bolivia, Honduras and Nicaragua – as in many other countries – is that education budgets are still largely input-oriented, annual and of an incremental nature. Consequently, there is no clear link between educational plans and goals and the allocation of the budget. Only recently, have governments in these countries taken some limited steps to arrive at a more result-oriented budgeting (ROB) system, but not always successfully. In Bolivia, for instance, the health and education ministries have been asked by the ministry of finance to develop a system of performance indicators. Nicaragua recently revived its experience with ROB, labelled as programmatic budgeting, which was first tried in the 1980s. The general weakness in the PRS process to set priorities among policy actions and determine which actions seem most cost-effective to reach the poverty reduction goals also manifested itself in this renewed attempt at ROB. The government has now returned to a more traditional budgeting process that is de-linked from specific targets. What is clear is that the three countries studies do not yet apply the tool of cost-effectiveness analysis as presented here. In this context, the aim of this paper is to contribute to the knowledge on cost-effectiveness analysis in education and assess the feasibility of such an analysis in the case of primary education in these three countries.

The main findings of this report are that net primary school enrolment rates have increased in the three countries in the past decade, but that more progress needs to be made in raising the quality of education. Further, the cost-effectiveness analysis has shown that – within reasonable limits – it will apparently not be feasible to reach the MDG of 100% net primary enrolment in Bolivia, Honduras and Nicaragua, using only one or more of the education policy instruments considered in the enrolment models estimated for these countries. This suggests that

apparently one also has to look at demand-side variables – in particular the reduction of poverty – to reach the goal of universal primary education.

The paper is organised as follows. Section 2 discusses the literature on cost effectiveness analysis as a basis for result-oriented budgeting in the education sector. Section 3 presents the results of the three country case studies. Section 4 points out limitations of this approach to decision-making, while section 5 contains concluding remarks. Technical details are presented in appendices.

# 2. Cost-Effectiveness Analysis as a Basis for Result-Oriented Budgeting

Cost-effectiveness analysis constitutes an important building block for establishing a budgeting framework that is more result-oriented. Achieving the MDG is not simply a matter of increasing allocations to education, health and other social expenditures. In many cases it may be possible to allocated existing budgets more effectively to obtain improvements in social outcomes. In order to determine the extra costs of achieving goals in education, health and other goals, an assessment of needs, determinants of outcomes, identification of effective policy instruments and their costs is required.

This section provides an overview of issues discussed in the literature on this topic, with a special focus on the goal of achieving universal primary education by 2015. We will first discuss the issue of needs assessment in the context of poverty reduction strategies and the Millennium Development Goals, and then focus on MDG costing. This is followed by a brief discussion of cost-effectiveness analysis versus other forms of economic evaluation. Finally, we explain how cost-effectiveness analysis in education can be used as a tool to arrive at more result-oriented budgeting for the millennium development goal of achieving universal primary education.

**Poverty reduction, MDGs and needs assessment**

According to the UN Millennium Project (2004), governments of developing countries should follow a four-stage planning process to align the MDG with their poverty-reduction policies. They should first conduct a needs assessment to assess the gap between the targets and the current situation and to identify public policies to eliminate or reduce this gap. It should be noted "that a needs assessment is a key input to, rather than a substitute for, a policy plan with institutional design." (UN Millennium Project 2004:2). The second stage of the planning process, which builds on the needs assessment, is to elaborate a long-term framework for action to achieve the MDG, The third stage is to construct a medium-term poverty-reduction strategy (PRS), attached to a Medium Term Expenditure Framework (MTEF). The fourth stage consists of elaborating within the long-term framework and the medium-term PRS a public-sector management strategy that focuses on transparency and accountability and which is result-oriented. The message is that any existing medium-term PRS should be reformulated and embedded in long-term planning aimed at reaching the MDG. A requirement for plans and strategies to

become operational is that the link with the budget process is strengthened. There is also need for a system of monitoring and accountability.

The Millennium Project MDG needs assessment is done in five steps (see also UN Millennium Project 2005a: Box 17.2): (1) identifying all interventions and policies; (2) specifying quantitative targets for each set of interventions; (3) developing investment models and estimating resource needs; (4) estimating synergies across interventions; and (5) developing a financing strategy.[1] For this study we have elaborated an "investment model" for education, which is explained in Appendix 1.

### MDG costing

The MDG needs assessment is broader than MDG costing, as it does not exclusively focus on the financial costs of achieving the target defined for the MDG. As far as costing is concerned, there are several issues which need to be highlighted. First, there are several potential ways in which the stipulated targets may be reached. Hence, it is important to conduct a cost-effectiveness analysis to determine the "best" way of achieving the same result. Furthermore, it is important to stress that currently different methods are used and different assumptions made to generate the total cost of achieving the goals. Variations in the methods and assumptions result in a wide range of estimates (Bruns *et al.* 2003; Gurría and Gershberg 2005; UN Millennium Project 2005b) and disagreements about the most appropriate methods and assumptions. Keeping in mind these uncertainties, Vandemoortele and Roy (2004) point out the need for "flexibility, humility and learning". They also identify a number of weaknesses in the existing methodologies of MDG costing:

1. Costing exercises are typically based on one particular methodology. However, there is often a choice between different approaches, delivery mechanisms and policies to achieve the MDG, each with different unit costs and different cost functions, and it cannot be known ex ante what the optimal choice would be. A lot of qualitative judgement is involved in determining what a 'good' policy might be.
2. MDG cost estimates seldom allow for economies or diseconomies of scale and have no sound basis for specifying the form of the cost function (e.g., linear vs. non-linear, average vs. marginal).[2] In addition, a quantitative approach does not address qualitative and efficiency issues.
3. Costs may be over-estimated as they do not account for the 'positive externalities' that may arise as a consequence of simultaneously trying to achieve several MDG targets.
4. Limited absorptive capacity may lower the efficiency and effectiveness of reaching the MDG, and hence change the relationship between inputs and outputs.
5. The influence of other factors – such as conflict or natural disaster – on total costs cannot be quantified with any degree of certainty.[3]

[1] Steps 2 to 4 may form an iterative process to refine estimates. For interventions listed by MDG, see UN Millennium Project (2005a, Appendix II).

[2] Note that it may also be an explicit policy to reduce unit cost (see, for example, UN Millennium Project 2005b). See Harbison and Hanushek (1992) for a costing exercise in education that uses both average and marginal costs.

[3] See also the discussion in Gurria and Gershberg (2005).

Apart from methodological weaknesses, often, there are data limitations which hamper the MDG costing exercise and add to the unreliability of the estimates. For these reasons, it is better to express the cost estimates as a range, rather than a single figure.

Finally, although it is useful to simulate the effect of changes in inputs on the target of interest for the entire period until 2015 and to estimate the associated costs, it should be kept in mind that the estimated costs will be less reliable as soon as one moves beyond a short time horizon. For this reason it is important to emphasize that there is likely to be a margin of error in the estimates.

#### Cost-effectiveness analysis versus other types of economic evaluation

In order to meet the MDG or targets laid down in PRSPs in a cost-effective manner, a comparison of the alternative ways in which the same results may be achieved is needed. A cost-effective method delivers the largest gain at the lowest cost. Cost-effectiveness analysis is one type of economic evaluation which involves, "the comparative analysis of alternative courses of action in terms of both their costs and consequences" (Drummond et al. 1997). The type of evaluation depends on answers to the two following questions: (1) is there a comparison of two or more alternatives; and (2) are both costs (inputs) and consequences (outputs) of an intervention examined (see Table 1).

If only one alternative is considered, there is only a description of inputs or outputs of an intervention – or of both inputs and outputs. If there is a comparison of two or more alternatives, the evaluation is still partial if either consequences or costs are examined. Only if both consequences and costs of different alternatives are examined can we speak of a full economic evaluation. *Cost-effectiveness analysis* (CEA) is an example of a full economic evaluation a it involves a comparison of costs and consequences and evaluates different interventions in terms of their cost per unit of effect on the outcome. A special case of cost-effectiveness analysis is *cost-minimization analysis* (CMA), in which costs are compared across interventions as it is assumed (or it is true) that all the interventions have the same effect on the outcome. If the outcomes of different interventions are not comparable (or if there are multiple outcomes) it will not be possible to conduct a meaningful cost-effectiveness comparison. In that case, an option may be to express the outcomes in monetary value, in order to make them comparable, giving rise to *cost-benefit analysis*. Finally, if monetary valuation of outcomes is not feasible or desirable, they could be expressed in terms of utility, which is a more subjective valuation. In this case the evaluation is termed a *cost-utility analysis*. The type of economic evaluation applied in this report is cost-effectiveness analysis (or the special case of CMA). To be more precise, it is *ex ante* evaluation, because it analyzes the costs and consequences of possible interventions, and not of programmes that have already been implemented.

**Table 1: A Typology of Economic Evaluations**

| | | Are both costs (inputs) and consequences (outputs) examined? | | |
|---|---|---|---|---|
| | | NO | | YES |
| | | Examines only consequences | Examines only costs | |
| Comparison of two or more alternative? | NO | PARTIAL EVALUATION | | PARTIAL EVALUATION |
| | | Outcome description | Cost description | Cost-outcome description |
| | YES | PARTIAL EVALUATION | | FULL ECONOMIC EVALUATION |
| | | Efficacy or effectiveness evaluation | Cost analysis | Cost-effectiveness analysis<br>Cost-minimization analysis<br>Cost-benefit analysis<br>Cost-utility analysis |

Source: Drummond et al. (1997)

### Cost-effectiveness analysis as a basis for ROB in education

Numerous studies have applied cost-effectiveness analysis to the education sector. Some examples are Harbison and Hanushek (1992), who provide a CEA of primary education in Brazil. Glewwe and Jacoby (1994), who provide a CEA of school achievement in Ghana, and Bedi *et al.* (2004), who examine the relative cost-effectiveness of increasing enrolment in primary education in Kenya. Another example is the study of Coady and Parker (2004), in which the relative cost-effectiveness of demand-side subsidies to improve access to secondary schooling and of supply-side expansions is analyzed for the case of PROGRESA in Mexico.[4] The authors estimate the cost of increasing enrolment, and hence years of education, through provision of education grants in terms of the cost of providing the grants per extra year of schooling. They also estimate the cost per extra year of schooling generated through supply-side expansions, where they include infrastructure and equipment cost, as well as personnel and operating cost. Finally, Glick and Sahn (2006) carry out a CEA of primary education in rural Madagasgar. Their analysis takes into account the presence of private schools and focuses on the budgetary implications of reducing multi-grade teaching in public schools.

While the papers mentioned above conduct a CEA, they do not – or at least not directly – link the cost-effectiveness analysis to achievement of the education MDG. Such an exercise is conducted by Vos and Ponce (2004). In their study, Vos and Ponce (2004) use data from Ecuador to carry out a CEA and explicitly link their estimates to the achievement of the MDG and the costs associated with reaching the MDG. For both urban and rural areas, they simulate the annual budgetary implications of raising net enrolment rates at the primary and secondary level in the period 2003–2007 through provision of a demand subsidy, a reduction of the share of untrained teachers, or a combination of these two interventions, assuming a fixed student-teacher ratio. For rural areas they allow for an increase in school infrastructure such that there is no negative effect of the increase in student/classroom ratio on enrolment. The additional budget requirements are expressed both in absolute terms (*i.e.* millions of US dollars) and in relative terms (as a percentage of the overall education budget and as a percentage of GDP). Their analysis

[4] PROGRESA, now renamed into *Oportunidades*, is the Mexican government's conditional cash transfer programme covering interventions in education, health and nutrition.

shows that, in the case of Ecuador, substantial progress towards achieving the education MDG can be made without substantial budget increases. A reallocation of resources to programs and schooling inputs which have the largest impact on enrolment would allow the country to achieve xx percent of its education goals. Vos and Ponce's (2004) paper illustrates the manner in which cost-effectiveness analysis may be used as a basis for result-oriented budgeting.

**Description of the methodology used in the case studies in this report**

The case studies on cost-effectiveness analysis and result-oriented budgeting presented in this report build on the methods and framework developed by Gertler and Van Der Gaag (1988), Gertler and Glewwe (1990) and applied, among others by Bedi and Marshall (1999), Bedi et al. (2004) and Vos and Ponce (2004). Based on a theoretical model which emphasises a comparison of the expected benefits of education versus the monetary and opportunity costs of attending school, we derive an empirical specification which treats school enrolment as a function of educational costs and of various schooling inputs. Household survey data and appropriate econometric methods are used to estimate the empirical model and to identify the effect of school costs and of schooling inputs (such as availability of books, qualification of teachers, school infrastructure) on enrolment. In our work we estimate the elasticity, that is the percentage change in enrolment for a one percent change in costs/inputs. Separate estimates are obtained for urban and rural areas (see Appendix 1 for the details). The estimated elasticities are subsequently used in a simulation model to (i) study the impact of changes in policy relevant variables (educational subsidies and changes in various schooling inputs) on net enrolment rates and (ii) to estimate the effect of the policies on educational budgets, A base line scenario is created which estimates the budget required to maintain the base-year net enrolment rates. The results of each alternative scenario are then compared with the budget according to the base line, so as to yield the additional budgetary requirements of raising enrolment rates. The details of the simulation methodology and the main assumptions underlying the analysis are specified in Appendix 2.

# 3. Summaries of the Case Studies

This section discusses various educational indicators and describes the achievements of the education sector in Bolivia, Honduras and Nicaragua. It also presents the results of a cost-effectiveness analysis conducted in each of the three countries. The analyses concentrate on primary education.[5] A summary table with comparative indicators for the three countries is presented in Appendix 3. The cost effectiveness analysis is based on estimation of probit models of the determinants of school enrolment. For each of the three countries, the sub-section on cost-effectiveness analysis starts with a description of the characteristics of the primary-school age population.

## 3.1 Bolivia

### Education indicators

Bolivia has displayed important achievements in education in the last few decades, partly as a result of the various reforms – in particular the Education Reform implemented since 1994. For example, the average years of schooling among the population aged 19 and older increased from 6.1 years in 1992 to 7.7 years in 2001. However, such benefits are not equally distributed among the different population groups. Indigenous people, the inhabitants of rural areas, and the poor have modest improvements and education gaps persist.

Between 1992 and 2001, the school age population grew at 2.4% per year, while the number of children enrolled at primary level grew at 4.2% per year, giving rise to an important increase in the enrolment rate at primary level. However, important disparities still remain. According to data of the 2001 Census, the rates were 82, 90 and 87 for rural areas, urban areas and the national level respectively. Household survey estimates for 2002 are slightly higher (see Table A.2)

Internal efficiency of the education system improved during the 1990s. Drop-out rates decreased at the national level. However, they remain higher among the poor, the inhabitants of the rural areas, and indigenous children. Gross primary school completion rates improved during the 1990s, increasing from 55.4% in 1992 to 71.5% in 2001, although disparities still remain. For example, in rural areas the gross primary school completion rate was 49.1% in 2001, compared to 84.9% in urban areas.

[5] Note that primary education in Bolivia comprises eight grades, compared to six grades in the other two countries.

The quality of education also improved. Bolivia carried out tests of cognitive achievements in language and mathematics in 1997, 1998 and 2000. During 1997 and 2000 tests were applied to children in third grade of education at primary level. The improvements were larger for language than for mathematics. However, the results for mathematics and language were still very weak in 2000. Only 14% of the children in third grade had a desired level of comprehension of mathematics, compared to nearly 20% in the case of language.

The cognitive achievements were somewhat higher for children attending schools that applied the transformation programme of the educational reform strategy. Results for 1997 show better performance for children from urban than rural areas, and from private than public schools. Finally, girls have better results than boys.

Bolivia also displays important improvements in the supply of educational services. For instance, between 1997 and 2002, 941 school buildings were constructed, most of them (84%) in rural areas. Nevertheless, Bolivia continues to face a deficit in education supply – especially in rural areas there is a shortage of primary schools (which offer all eight grades) – and most school buildings (around 60%) do not have access to basic services such as water, electricity and sewerage system.

Public expenditure on education increased from 3.4% to 6.1% of GDP between 1990 and 2002. Similarly, education spending as a percentage of the total budget grew from 9.6% in 1990 to 19.2% in 2002. As in many other countries, most of the education spending (around 80%) is used to pay teacher salaries. In Bolivia, approximately half of the total education spending is directed to the primary level.

### Cost-effectiveness analysis

The analysis of the determinants of school enrolment uses the Living Standards Measurements Survey of Bolivia for the year 2002, as well as data from the Ministry of Education. The demand side variables used in the analysis are: sex, age, area of residence, poverty status, education expenditures and the years of schooling of parents (see also Table A.1 in Appendix 1). The expenditures on education were computed using only the following components: fees and uniforms. Based on the available observations the paper imputes the median expenditure on education at municipal level for all observations in the sample. The supply side variables are the students per classroom and the students per teacher ratios, the proportion of teachers without pedagogical diploma, and the proportion of incomplete schools.[6] These supply side variables do not vary within municipalities. Descriptive statistics for all the variables are presented in Table 2. The table shows that the mean enrolment rate was 7 percentage points higher in urban areas than in the countryside. At the same time, poverty was lower than in rural areas, and parental schooling higher. Finally, in rural areas there are relatively more untrained teachers, whereas the student per classroom ratio is only little over half the ratio observed for urban areas.

[6] Incomplete primary schools are defined as those that do not offer all eight grades.

**Table 2: Descriptive statistics of the primary-school age population – Bolivia 2002**

| | Urban | | Rural | |
|---|---|---|---|---|
| | Mean | S.E. | Mean | S.E. |
| Enrolment rate | 0.91 | 0.01 | 0.84 | 0.01 |
| Education spending (tuition fee and uniforms) in Bolivianos. | 6.84 | 0.37 | 6.16 | 0.30 |
| Sex (1 = male) | 0.53 | 0.01 | 0.50 | 0.01 |
| Age | 9.44 | 0.04 | 9.42 | 0.05 |
| Mother's schooling | 6.66 | 0.40 | 2.70 | 0.14 |
| Father's schooling | 7.02 | 0.24 | 4.13 | 0.17 |
| Poverty (1 = poor) | 0.63 | 0.04 | 0.89 | 0.01 |
| Proportion of teachers without academic diploma | 0.16 | 0.02 | 0.26 | 0.02 |
| Students per classroom | 31.37 | 1.39 | 16.70 | 0.54 |
| Proportion of incomplete schools | – | – | 0.73 | 0.01 |
| Number of observations | | 2933 | | 2490 |
| Number of clusters | | 99 | | 178 |

Source: De Jong, Larrea and Aguilar (2005).

Note: Calculated for population of 6–13 years based on 2002 LSMS, excluding cases where per capita household income was not reported in the 2002 LSMS. Standard errors corrected for intra-cluster correlation.

The results of the econometric analysis are shown in Table 3. One clear result is that the schooling level of parents increases the probability of enrolment. The latter also increases with the age of the child, although the relationship is non-linear. In contrast, being poor has a negative impact on enrolment. The cost of education also has a negative relation with enrolment, although the relationship is not statistically significant.[7] Regarding the supply side variables, the proportion of teachers without pedagogical diploma has a negative effect on enrolment. In rural areas, the results suggest that there is furthermore a negative impact of the ratio of students per classroom and the proportion of incomplete primary schools and the probability of school enrolment.

**Table 3: Results of a Probit Model of Primary School Enrolment – Bolivia**

| | Elasticities | | Marginal effects | |
|---|---|---|---|---|
| | Urban | Rural | Urban | Rural |
| Demand side variables | | | | |
| Education spending (tuition fee and uniforms) | -0.0219 | -0.0315 | -0.0030 | -0.0045 |
| Sex (1 = male) | -0.0040 | 0.0178*** | -0.0072 | 0.0315*** |
| Age | 2.3674* | 4.6794* | 0.2375* | 0.4382* |
| Age squared | -1.1825* | -2.3216* | -0.0119* | -0.0218* |
| Mother's schooling | 0.0245** | 0.0096 | 0.0035** | 0.0031 |
| Father's schooling | 0.0290* | 0.0361* | 0.0039* | 0.0077* |
| Poverty (1 = poor) | -0.0093* | -0.1034* | -0.0135* | -0.0804* |
| Supply side variables | | | | |
| Proportion of teachers without academic diploma | -0.0014 | -0.0237 | -0.0081 | -0.0796 |
| Students per classroom | | -0.0556** | | -0.0029*** |

[7] Imputed median municipal education expenditures were used in the model instead of actual expenditures to avoid problems of endogeneity. Because imputed rather than actual educational expenditures were used, it was expected that these would not be (closely) correlated with the poverty status variable. Excluding the latter from the model hardly affects the magnitude and level of statistical significance of the educational expenditure variable.

| | Elasticities | | Marginal effects | |
|---|---|---|---|---|
| | Urban | Rural | Urban | Rural |
| Proportion of incomplete schools | | -0.0149 | | -0.0180 |
| | | | | |
| Number of observations | 2933 | 2490 | | |
| Wald chi2(8) | 750.41 | 248.76 | | |
| Prob > chi2 | 0.000 | 0.000 | | |
| Pseudo R2 | 0.1987 | 0.1887 | | |
| | | | | |
| Log pseudo-likelihood | -706.00 | -889.06 | | |
| y = Pr(enrolment) predicted | 0.9475 | 0.8819 | | |

Source: De Jong, Larrea and Aguilar (2005).

*Significant at 99%, ** Significant at 95%, ***Significant at 90%. Estimations corrected by heteroscedasticity and errors autocorrelation at intra-municipal level.

These regression results are used to carry out budget simulations to evaluate the cost and the impact of various policies. The base-line shows that the education budget required to maintain the enrolment rate at the same level between 2002 and 2015 will be nearly 3% of GDP every year (see Table 4).

Gradually reducing the rate of teachers without pedagogical diploma – to nearly zero in 2015 – will increase the enrolment rate in the rural areas from 84% in 2002 to 90% in 2015, and the additional budget required for such a policy will increase to 0.2% of GDP in the last year. The use of this instrument in isolation will not be sufficient to raise the net enrolment rate to 100%. Neither will such a goal be reached with a more radical policy in which the proportion of untrained teachers immediately declines to zero in the first year of the simulation.

Increasing the number of classrooms every year in rural areas at a rate 1% higher than the number of students will increase the enrolment rate only marginally from 88% in 2002 to 89% in 2015, and the additional cost of such a policy will be less than 0.1% of GDP per year. A faster reduction in the rural student per classroom ratio would help, but even with a faster rate of increase in classrooms, it would not be possible to achieve the net enrolment goal of 100%.

Reducing the proportion of incomplete schools in the rural area by 3 percentage points every year – resulting in their virtual disappearance in 2015 – will increase the enrolment rate in rural areas from 84% in 2002 to 85% in 2015, and the additional budget required will be less than 0.1% of GDP per year. A radical policy of starting to offer all grades in rural areas would somewhat raise the enrolment rate in the first year of the simulation period (with relatively large budgetary implications in 2003), but the rate would remain constant in subsequent years.

Finally, increasing the school subsidy by 100% in real terms between 2003 and 2004 will increase the enrolment rate at national level from 88% in 2002 to 93% in 2015, and the additional cost of such policy would amount to 1.9% of GDP.

A combination of the four policies will increase the enrolment rate from 88% in 2002 to 96% in 2015, and the cost of such policies would be about 1.9% of GDP in 2005 and increase to 2.3% of GDP in the final year of the simulation period. In this scenario the net enrolment rate in rural areas will be higher than in urban areas, due to the effect of the policy of increasing the proportion of rural school that offer all eight grades.

Still, none of the abovementioned four policies, neither their combination, would be sufficient to reach the MDG of 100% net primary school enrolment. To reach this goal with subsidies alone, the level of the urban subsidy would also have to be doubled in 2005 and 2006 and raised further by about 30% in 2007, whereas the rural subsidy would furthermore have to be doubled in 2005, 2006 and 2007, before being increased by another 70% in 2008. After the increases, the annual subsidies would then have to remain at respectively some 21 and 53 times the base year level, obviously with enormous budgetary implications. As of 2008, the required budget would then be around 22% of GDP, compared to 2.8–2.9% according to the baseline scenario. On average, each percentage point increase in the net enrolment rate would cost almost 2% of GDP. In combination with the policies of scenarios 1, 2 and 3, it would be sufficient to nearly double the rural subsidy in 2005, but the urban subsidy would still have to doubled in 2005 and 2006 (and only marginally raised in 2007) to reach the MDG in 2015. The required budget would in this scenario increase to around 11% of GDP, which is much less than the 22% in the scenario in which the subsidy is the only policy instrument. A combination of policies would thus be more cost-effective. Nevertheless, such a cash transfer programme in combination with other policies would not be feasible.

As a final remark, it should be born in mind that here the point of departure is a programme to which no conditions are attached. In other words, a *conditional* cash transfer programme, in which households receive a transfer if they send their children to school, might be more cost-effective. For instance, the evaluation of PROGRESA in Mexico has shown that the conditional cash transfer programme is relatively cost-effective (see Coady and Parker 2004).

**Table 4: Budget Simulations – Bolivia**

| | Year | 2002 | 2005 | 2010 | 2015 |
|---|---|---|---|---|---|
| Base-line | | | | | |
| Enrolment rate | Total | 0.88 | 0.88 | 0.88 | 0.89 |
| | Urban | 0.91 | 0.91 | 0.91 | 0.91 |
| | Rural | 0.84 | 0.84 | 0.84 | 0.84 |
| Budget (% of GDP) | | 3.0% | 2.8% | 2.9% | 2.9% |
| S1 – Reducing the percentage of teachers without academia diploma (urban: 1 percent point; rural 2 percent points per year) | | | | | |
| Enrolment rate | Total | 0.88 | 0.88 | 0.89 | 0.91 |
| | Urban | 0.91 | 0.91 | 0.91 | 0.91 |
| | Rural | 0.84 | 0.84 | 0.86 | 0.90 |
| Budget (% of GDP) | | 3.0% | 2.9% | 3.0% | 3.1% |
| Additional budget (% of GDP) | | 0.0% | 0.0% | 0.1% | 0.2% |
| S2 – Increasing the number of classrooms in rural areas. One percent higher than the rate of growth of students | | | | | |
| Enrolment rate | Total | 0.88 | 0.88 | 0.89 | 0.89 |
| | Urban | 0.91 | 0.91 | 0.91 | 0.91 |
| | Rural | 0.84 | 0.84 | 0.84 | 0.84 |
| Budget (% of GDP) | | 3.0% | 2.8% | 2.9% | 2.9% |
| Additional budget (% of GDP) | | 0.0% | 0.0% | 0.0% | 0.0% |
| S3 – Reducing the proportion of incomplete schools in rural areas (3% points every year) | | | | | |
| Enrolment rate | Total | 0.88 | 0.88 | 0.89 | 0.89 |
| | Urban | 0.91 | 0.91 | 0.91 | 0.91 |
| | Rural | 0.84 | 0.84 | 0.84 | 0.85 |
| Budget (% of GDP) | | 3.0% | 2.8% | 2.9% | 2.9% |
| Additional budget (% of GDP) | | 0.0% | 0.0% | 0.0% | 0.0% |

| | Year | 2002 | 2005 | 2010 | 2015 |
|---|---|---|---|---|---|
| S4 – Increasing school subsidy in 100% in real terms in 2003 and 2004 | | | | | |
| Enrolment rate | Total | 0.88 | 0.93 | 0.93 | 0.93 |
| | Urban | 0.91 | 0.95 | 0.95 | 0.95 |
| | Rural | 0.84 | 0.89 | 0.89 | 0.89 |
| Budget (% of GDP) | | 3.0% | 4.7% | 4.8% | 4.8% |
| Additional budget (% of GDP) | | 0.0% | 1.9% | 1.9% | 1.9% |
| **S1&2 – Reducing the rate of teachers without diploma and the students per classroom ratio in rural areas** | | | | | |
| Enrolment rate | Total | 0.88 | 0.89 | 0.89 | 0.91 |
| | Urban | 0.91 | 0.91 | 0.91 | 0.91 |
| | Rural | 0.84 | 0.84 | 0.86 | 0.90 |
| Budget (% of GDP) | | 3.0% | 2.9% | 3.0% | 3.2% |
| Additional budget (% of GDP) | | 0.0% | 0.1% | 0.1% | 0.3% |
| **S1&3 – Reducing the rate of teachers without diploma and the number of incomplete schools in rural areas** | | | | | |
| Enrolment rate | Total | 0.88 | 0.89 | 0.89 | 0.91 |
| | Urban | 0.91 | 0.91 | 0.91 | 0.91 |
| | Rural | 0.84 | 0.85 | 0.86 | 0.91 |
| Budget (% of GDP) | | 3.0% | 2.9% | 3.0% | 3.1% |
| Additional budget (% of GDP) | | 0.0% | 0.1% | 0.1% | 0.2% |

Table 4: Budget Simulations – Bolivia (continued)

| | | | | | |
|---|---|---|---|---|---|
| S1&2&3 – Reducing the rate of teachers without diploma and the students per classroom ratio, and the proportion of incomplete schools in rural areas | | | | | |
| Enrolment rate | Total | 0.88 | 0.89 | 0.89 | 0.91 |
| | Urban | 0.91 | 0.91 | 0.91 | 0.91 |
| | Rural | 0.84 | 0.85 | 0.86 | 0.91 |
| Budget (% of GDP) | | 3.0% | 2.9% | 3.0% | 3.2% |
| Additional budget (% of GDP) | | 0.0% | 0.1% | 0.1% | 0.3% |
| **S1&2&3&4 – Reducing the rate of teachers without diploma, the students per classroom ratio, the proportion of incomplete schools in rural areas, and increasing school subsidy in 2003 y 2004** | | | | | |
| Enrolment rate | Total | 0.88 | 0.93 | 0.94 | 0.96 |
| | Urban | 0.91 | 0.95 | 0.95 | 0.95 |
| | Rural | 0.84 | 0.90 | 0.92 | 0.97 |
| Budget (% of GDP) | | 3.0% | 4.8% | 4.9% | 5.2% |
| Additional budget (% of GDP) | | 0.0% | 1.9% | 2.1% | 2.3% |

Source: De Jong, Larrea and Aguilar (2005).

## 3.2 Honduras

### Education indicators

Education indicators improved significantly in Honduras during the last decade. For instance, the years of schooling for the population aged 24 and above increased from 3.9 in 1990 to 5.1 in 2004. A similar advance is observed in access to education services. The net primary school enrolment rate increased from 75% to 89% during the same period.[8] The enrolment rates of the poor and the rural population were below average in 2004. However, the disparity between the urban and rural primary school enrolment rate was smaller than in 1990 (see Table A.2). Finally, both in 1990 and 2004, the net primary school enrolment rate was marginally higher for girls than for boys.

Internal efficiency of the education system showed substantial improvements during the 1990s. For example, the percentage of children that successfully finish the primary level without repeating grades increased from 50% in 1990 to 63% in 2000. Repetition rates decreased during the period.

[8] At the secondary level, the net enrolment rate increased from 19% to 38%.

Honduras applied cognitive tests in 1997 and 2002. Results show low education quality. Only 10% of students in third grade have proficiency in language, 16% in mathematics, and 15% in sciences.[9] For sixth grade, these shares are 10%, 8% and 17%, respectively.

In 2002, respectively 38, 43 and 41 percent of the children in third grade answered half of the questions correctly in the tests of language, mathematics and sciences. For sixth grade the percentages are 44, 39 and 45 percent respectively. Scores on cognitive tests improved between 1997 and 2002 in the case of mathematics, but were marginally worse for language.

Children in rural areas and those enrolled in public schools performed in general worse than those from urban areas and private schools in 2002. In addition, schools in areas with better socio-economic conditions score in general better. Finally, urban schools with two or more teachers perform slightly better than school with only one teacher, though the opposite is the case for rural areas

Public spending on education increased from US$195 to US$465 million between 1990 and 2002. As a percentage of the GDP, however, education spending fell from 6.8% in 1990 to 5.0% in 1997, to increase again to a level of 7.0% in 2002. As in Bolivia, the major part of expenditure is devoted to teacher salaries. The incidence of public spending is pro-poor for expenditures on primary education and progressive for spending on secondary education, but regressive for spending at the tertiary level.

Regarding school inputs, it can be observed that there is a reduction in the student/teacher ratio from 35 in 1990 to 32 in 1999. The decrease was more pronounced in urban areas (from 31 to 27) than in rural areas (from 38 to 36).

#### Cost-effectiveness analysis

The model used to analyze the determinants of school enrolment in Honduras is based on two sources of data: the Living Standards Measurement Survey (LSMS) of 2004 for data on household variables and access to education and administrative records of the Ministry of Education for supply-side information.

The demand side variables include: log of spending on education, sex of the child, schooling level of the head of the household, the number of children aged less than seven in the household, the number of children aged between 7 and 12 years in the household, and the number of children aged between 13 and 18 years in the household. The supply side variables include: student-teacher ratio, travel time to school, the percentage of children attending schools with two or more teachers, and the percentage of teachers with academic training (see Appendix 1 for a discussion).

According to the 2004 LSMS, the net primary-school enrolment rate was higher in rural areas than in urban areas. It was also higher for non-poor children than for poor children. Mean private expenditure on education was higher in urban than in rural areas. Expectedly, for poor children the mean expenditure was far below-average. Somewhat less than half the children in primary-school age were girls. The schooling of the head of the household was higher in urban areas and among the non-poor population. Rural households were in general larger than urban households, as evidenced by the number of children in the age groups 0–

[9] Proficiency means that at least 60% of the test questions were answered correctly.

6 years, 7–12 years and 13–18 years. In poor households there were on average more children in each of the three groups. The student-teacher ratio was higher in rural areas and for poor children. The average travelling time to school was the same in urban and rural areas. Finally, in rural areas, a smaller proportion of schools had more than one teacher. Finally, in urban and rural areas alike, around 87% of the teachers had an academic title, though the proportion was below-average for poor children.

Based on econometric tests, it was decided to estimate separate probit models for urban poor, urban non-poor, total urban, rural poor, rural non poor and total rural.

Results for the rural area show a statistically significant and negative relation between education costs and enrolment among the poor (Table 6). There is a positive association between the years of schooling of the head of the household and enrolment for both the poor and non-poor. The number of children aged less than seven is negatively associated with school enrolment among the poor. Among the supply side variables, the time taken to travel to school and the percentage of children attending schools with two or more teachers have a negative and positive association respectively with school enrolment.

**Table 5: Descriptive statistics of the primary-school age population – Honduras 2004**

| Variable | Rural | | Urban | |
|---|---|---|---|---|
| | Mean | S.E. | Mean | S.E. |
| Enrollment rate | 0.91 | 0.01 | 0.89 | 0.01 |
| Education spending | 44.38 | 4.16 | 189.67 | 13.40 |
| Sex (1=female) | 0.49 | 0.01 | 0.47 | 0.01 |
| Age | | | | |
| Schooling of the head of household | 2.88 | 0.12 | 6.20 | 0.16 |
| Children aged less than 7 in the household | 1.40 | 0.04 | 0.96 | 0.03 |
| Children aged from 7 to 12 in the household | 2.06 | 0.04 | 1.80 | 0.03 |
| Children aged 13 to 18 in the household | 1.03 | 0.03 | 0.89 | 0.03 |
| Proportion living in Tegucigalpa | | | 0.25 | 0.01 |
| Proportion living in San Pedro Sula | | | 0.15 | 0.01 |
| Proportion living in medium-size cities | | | 0.31 | 0.01 |
| Proportion living in small cities | | | 0.29 | 0.01 |
| Proportion of children in multi-grade schools | | | | |
| Student-teacher ratio | 30.10 | 0.43 | 25.86 | 0.24 |
| Time to travel to school | 12.85 | 0.65 | 12.81 | 0.17 |
| % children in schools with more than one teacher | 0.82 | 0.02 | 0.97 | 0.01 |
| % teachers with diploma | 0.88 | 0.00 | 0.87 | 0.00 |
| Number of observations | 2245 | | 3396 | |

Source: León (2005)

Results are very similar for the urban area. In this case there is also a negative relation between enrolment and education costs among the poor. The years of schooling of the head of household has a positive relation with enrolment for both the poor and non-poor. The number of children aged less than seven has a negative association with school enrolment among the poor. Among the supply side variables, just the percentage of children attending schools with two or more teachers is positively associated with school enrolment.

Given the regression results, several policies that have a positive impact on school enrolment may be identified. For example, a programme of school subsidies targeted to the poor in both urban and rural areas. Improving adults' schooling is another and would have a positive effect on enrolment among the poor in urban and rural areas, and among the non-poor in urban areas. In a similar fashion, improving access to school through the reduction of time taken to travel to school would increase school enrolment among the inhabitants of the rural areas. Finally, transforming schools with just one teacher into schools with two or more teachers would also increase enrolment among the poor.

**Table 6: Results of a Probit Model of Primary School Enrolment – Honduras**

| | Rural | | | Urban | | |
|---|---|---|---|---|---|---|
| | Poor | Non-poor | Total | Poor | Non-poor | Total |
| Marginal effects | | | | | | |
| Demand side variables | | | | | | |
| Log education spending | -0.0540* | -0.0076 | -0.0418* | -0.1755* | -0.0312* | -0.0491* |
| Dummy sex (1=female) | 0.0066 | 0.0078 | 0.0053 | 0.0302 | -0.0131 | 0.0037 |
| Schooling of the head of the household | 0.0152* | 0.0076** | 0.0134* | 0.0094** | -0.0006 | 0.0053* |
| Children aged less than 7 in the household | -0.0127** | -0.0034 | -0.0109** | -0.0248** | 0.0076 | -0.0196* |
| Children aged from 7 to 12 in the household | -0.0040 | -0.0029 | -0.0046 | 0.0188 | 0.0030 | 0.0023 |
| Children aged 13 to 18 in the household | 0.0002 | 0.0030 | 0.0005 | -0.0095 | -0.0017 | -0.0089 |
| Dummy Tegucigalpa | ... | ... | ... | 0.0424 | 0.0063 | 0.0132 |
| Dummy San Pedro Sula | ... | ... | ... | -0.0395 | -0.0040 | -0.0040 |
| Dummy medium-size cities | ... | ... | ... | -0.0029 | -0.0086 | -0.0131 |
| Supply side variables | | | | | | |
| Student-teacher ratio | -0.0010 | -0.0018 | -0.0009 | -0.0032 | 0.0019 | 0.0005 |
| Time to travel to school | -0.0013* | -0.0031* | -0.0016* | ... | ... | ... |
| % children in schools with more than one teacher | 0.0621** | -0.0285 | 0.0560** | 0.1283* | -0.2278 | -0.0020 |
| % teachers with diploma | -0.0019 | 0.0012 | -0.0016 | -0.0008 | -0.0020 | -0.0020 |
| | | | | | | |
| Elasticities | | | | | | |
| Log education spending | -0.0585 | n.s. | -0.0450 | -0.1975 | -0.0338 | -0.0547 |
| Student-teacher ratio | n.s. | n.s. | n.s. | n.s. | n.s. | n.s. |
| Time to travel to school | -0.0173 | -0.0426 | -0.0225 | ... | ... | ... |
| % children in schools with more than one teacher | 0.0529 | n.s. | 0.0496 | 0.1366 | n.s. | 0.0867 |
| % teachers with diploma | n.s. | n.s. | n.s. | n.s. | n.s. | n.s. |
| | | | | | | |
| Number of cases | 1754 | 491 | 2245 | 982 | 2414 | 3396 |

Source: León (2005)

* Significant at 99%, ** Significant at 95%, *** Significant at 90%, n.s.=not statistically significant. Estimations corrected by heteroscedasticity and errors autocorrelation at intra-municipal level.

A number of simulations to evaluate the costs of different policies and their impact on enrolment were conducted (see Table 7). The first policy simulation is the expansion of the conditional cash transfer programme (The Family Allowance Programme) to cover the poor in urban and rural areas. This policy would increase school enrolment from 84% in 2004 to 94% in 2015 among the urban poor, and from 90% to 93% in the same period among the rural poor. The additional cost would be 0.5% of GDP in 2015.

The second policy simulation is a one point yearly increase in the percentage of schools with two or more teachers (*"pluridocentes"*).[10] In this case the enrolment rate would increase from 84% in 2004 to 85% in 2015 among the urban poor, and form 90% to 91% among the rural poor. The cost of this programme will represent 0.01% of GDP per year.

The third policy simulated is the combination of the former policies. In this case, the enrolment rate would increase from 84% in 2004 to 95% in 2015 among the urban poor, and form 90% to 94% in the same period among the rural poor. Given the minimal cost of scenario 2, the cost in this scenario of a combination of the policies of transfers to households and the increase in the proportion of multi-teacher schools would be very similar to that of scenario 1.

**Table 7:Budget Simulations – Honduras**

| | Year | 2004 | 2005 | 2010 | 2015 |
|---|---|---|---|---|---|
| Base-line | | | | | |
| Enrolment rate | Total | 0.90 | 0.90 | 0.90 | 0.90 |
| | Urban | 0.89 | 0.89 | 0.89 | 0.89 |
| | Urban poor | 0.84 | 0.84 | 0.84 | 0.84 |
| | Urban non-poor | 0.91 | 0.91 | 0.91 | 0.91 |
| | Rural | 0.91 | 0.91 | 0.91 | 0.91 |
| | Rural poor | 0.90 | 0.90 | 0.90 | 0.90 |
| | Rural non poor | 0.93 | 0.93 | 0.93 | 0.93 |
| Budget (% of GDP) | | 3.2% | 3.4% | 3.9% | 4.2% |
| Scenario 1: Increasing subsidies 10% annually | | | | | |
| Enrolment rate | Total | 0.90 | 0.90 | 0.91 | 0.93 |
| | Urban | 0.89 | 0.89 | 0.90 | 0.92 |
| | Urban poor | 0.84 | 0.84 | 0.88 | 0.94 |
| | Urban non-poor | 0.91 | 0.91 | 0.91 | 0.91 |
| | Rural | 0.91 | 0.91 | 0.92 | 0.93 |
| | Rural poor | 0.90 | 0.90 | 0.91 | 0.93 |
| | Rural non poor | 0.93 | 0.93 | 0.93 | 0.93 |
| Budget (% of GDP) | | 3.2% | 3.5% | 4.1% | 4.7% |
| Additional budget (% of GDP) | | 0.0% | 0.0% | 0.2% | 0.5% |
| Scenario 2: Increasing 1 percentage point the proportion of multi-teacher schools | | | | | |
| Enrolment rate | Total | 0.90 | 0.90 | 0.90 | 0.90 |
| | Urban | 0.89 | 0.89 | 0.89 | 0.89 |
| | Urban poor | 0.84 | 0.84 | 0.85 | 0.85 |
| | Urban non-poor | 0.91 | 0.91 | 0.91 | 0.91 |
| | Rural | 0.91 | 0.91 | 0.91 | 0.91 |
| | Rural poor | 0.90 | 0.90 | 0.90 | 0.91 |
| | Rural non poor | 0.93 | 0.93 | 0.93 | 0.93 |
| Budget (% of GDP) | | 3.2% | 3.4% | 3.9% | 4.2% |
| Additional budget (% of GDP) | | 0.01% | 0.01% | 0.01% | 0.01% |
| Scenario 3: Combination of scenarios 1 and 2 | | | | | |
| Enrolment rate | Total | 0.90 | 0.90 | 0.91 | 0.93 |
| | Urban | 0.89 | 0.89 | 0.90 | 0.93 |
| | Urban poor | 0.84 | 0.85 | 0.89 | 0.95 |
| | Urban non-poor | 0.91 | 0.91 | 0.91 | 0.91 |
| | Rural | 0.91 | 0.91 | 0.92 | 0.94 |
| | Rural poor | 0.90 | 0.90 | 0.92 | 0.94 |
| | Rural non poor | 0.93 | 0.93 | 0.93 | 0.93 |
| Budget (% of GDP) | | 3.2% | 3.4% | 4.1% | 4.7% |
| Additional budget (% of GDP) | | 0.0% | 0.0% | 0.2% | 0.5% |

Source: León (2005)

[10] The effect of a one point increase of the percentage of schools with two or more teachers was simulated, because the percentage was already rather high in the base year.

Finally, we simulated the cost of a combination of the above-mentioned policies, though with higher transfers to households, such that all the primary school enrolment rates would increase to (nearly) 100% – with the exception of rural non-poor children, for whom the coefficient on the education expenditure variable was not statistically significant. The additional budget required for this scenario would be 1.4% of GDP in 2005 and increase to 2.4% in 2015. Universalizing primary education (except for rural non-poor children) would require a slightly higher additional budget. Nevertheless, the cost would be much lower than in the case of Bolivia. Notwithstanding this finding, it is not considered an optimal scenario to provide subsidies to the non-poor to stimulate them to send their children to school.

## 3.3 Nicaragua

### Education indicators

Nicaragua has made substantial improvements in school enrolment during the decade of 1990s, as well as during the first years of the new millennium. In 2004, net enrolment rates for pre-school, primary and secondary level were around 31%, 83%, and 40% respectively. In spite of such important achievements, the indicators for Nicaragua are still below those of most of the other Central American countries. In addition, using data for 2001, strong inequalities in enrolment may be observed. For instance, the net enrolment rates of the poor, indigenous people, and the inhabitants of rural areas are well below the national average. Remarkably, the gender gap appears to have largely been closed. Only at the primary level, the rate is still a bit higher for boys than for girls. On the contrary, the enrolment rate is higher for girls than for boys in pre-primary and secondary education. Finally, most of the students at the primary as well as at the secondary level attend public schools (90%, and 83% respectively).

In terms of efficiency indicators, repetition and drop out rates decreased during the 1990s. For example, the repetition rate for first grade diminished from around 30% in 1990 to 15% in 2001. A similar trend was observed in drop out rates. However, internal efficiency as measured by the survival rate in the fifth grade of primary education is lower in Nicaragua than in other Central American countries.

Nicaragua applied tests of cognitive achievements on both language and mathematics in 2002. Results show that only 8% and 14% of the students of third grade are proficient in language and mathematics respectively. The percentages for sixth grade are 5% and 1% respectively. The majority of students had just basic performance in both language and mathematics. Performance also varies across groups of students. For instance, students from rural areas and those attending public schools performed worse.

Public spending in education increased during the second half of the 1990s. The education budget increased from US$106 million (or 3.2% of GDP) in 1997 to US$160 million (or 3.9% of GDP) in 2003. On the other hand, the total spending per student varies considerably among education levels. In 2003 the corresponding amounts were 99, 66 and 929 dollars per student per year for primary, secondary and tertiary level respectively. In terms of the distributive impact of education spending it is found that spending for primary level is pro-poor, while spending directed to secondary and tertiary level is progressive.

**Cost-effectiveness analysis**

The model used to analyze the determinants of school enrolment in Nicaragua is based on two sources of data: the Living Standards Measurement Survey (LSMS) of 2001 for data on household variables and access to education and administrative records of the Ministry of Education for supply-side information.

As shown in Table 8, the primary school enrolment rate was much higher in urban than in rural areas. Education spending was also higher (and more variable) in the cities than in the countryside. On the contrary, the proportion of boys and the mean age of the primary-school age population hardly differed between urban and rural areas. Neither was there much difference in the number of students per classroom. Further, the head of the household had on average more schooling in urban areas than in rural areas. Finally, in rural areas, a higher proportion of the children lived in poverty, more children went to multi-grade schools and also a higher proportion received the school bag than in urban areas.

**Table 8: Descriptive statistics of the primary-school age population – Nicaragua 2001**

| Variable | Rural | | Urban | |
|---|---|---|---|---|
| | Mean | S.E. | Mean | S.E. |
| Enrolment rate | 0.77 | 0.02 | 0.93 | 0.01 |
| Education spending (córdovas) | 26.54 | 2.05 | 80.27 | 8.23 |
| Sex (1=male) | 0.49 | 0.01 | 0.50 | 0.02 |
| Age | 9.4 | 0.03 | 9.5 | 0.04 |
| Schooling of the head of household | 2.3 | 0.13 | 5.3 | 0.21 |
| Poverty (1=poor) | 0.77 | 0.02 | 0.51 | 0.03 |
| Proportion of children in multi-grade schools | 0.32 | 0.03 | 0.14 | 0.01 |
| Students per classroom | 36.7 | 5.46 | 38.6 | 1.39 |
| Proportion of children that receive school bag | 0.22 | 0.02 | 0.10 | 0.02 |
| | | | | |
| Number of observations | | 1937 | | 2014 |

Source: Ponce (2005).

Models were estimated separately for urban and rural areas. For the rural areas, models were estimated for the poor, the non-poor and the total population. For urban areas, only a model for the poor population was estimated. The estimation results are presented in Table 9.

In rural areas, the cost of education has a statistically significant and negative effect on school enrolment among the poor. In this sense, decreasing school costs by 10% would raise enrolment by 0.7 points. Schooling of the head of household has a positive and significant impact on enrolment for both poor and non-poor. The number of children in the household aged less than seven has a negative effect on enrolment among the poor. Living in the central region has a negative association with access to school. In relation to the supply side variables, the following variables have an impact on enrolment among the poor – the school feeding programme has a statistically significant and positive impact, time to reach school has a negative relation with enrolment, and the students per classroom ratio has a negative effect on enrolment.

In urban areas, schooling of the head of household and the school bag programme ("mochila escolar" programme) have a positive effect among

the poor.[11] Further, as may be inferred from the effect of educational costs on enrolment, a Conditional Cash Transfer (CCT) programme directed to the poor from both urban and rural areas would be an effective policy. Improving schooling of adults would also be effective in achieving higher enrolment rates. This policy would at the same time have important effects on reducing inter-generational poverty.

**Table 9: Results of a Probit Model of Primary School Enrolment – Nicaragua**

| | Rural | | | Urban |
|---|---|---|---|---|
| | Poor | Non-poor | Total | Poor |
| Marginal effects | | | | |
| Demand side variables | | | | |
| Log education spending | -0.0752* | 0.0012 | -0.0405* | -0.0033 |
| Dummy sex (1=female) | -0.0333 | -0.0057* | -0.0418* | -0.0008 |
| Schooling of the head of the household | 0.0341* | 0.0007*** | 0.0225* | 0.0019* |
| Children aged from 7 to 12 in the household | -0.0128 | -0.0013 | -0.0146 | -0.0036** |
| Children aged less than 7 in the household | -0.0227*** | -0.0016 | -0.0210* | 0.0009 |
| Dummy Atlantic region | -0.1807* | -0.0112 | -0.1360* | 0.0005 |
| Dummy Central region | -0.2333* | -0.0155* | -0.1910* | -0.0128 |
| Dummy Managua | …. | …. | …. | 0.748 |
| Supply side variables | | | | |
| % children in schools with just one teacher | 0.2035 | -0.0169** | 0.0604 | -0.0176 |
| % children attended by school meal programme | 1.4605* | 0.1136 | 1.2603* | -0.0970 |
| % children that receive school bag | -0.1110 | 0.0824 | 0.0619 | 0.5004* |
| Time to travel to school | -0.0051** | 0.0000 | -0.0028*** | -0.0001 |
| Students per classroom | -0.0006** | 0.0001 | -0.0002 | 0.00001 |
| % teachers with diploma | 0.0942 | 0.0155 | 0.0937 | -0.0038 |
| | | | | |
| Elasticities | | | | |
| Log of education spending | -0.0917* | n.s. | n.s. | n-s- |
| % of children in school with just one teacher | n.s. | -0.0042* | n.s. | n.s. |
| % children attended by school meal programme | 0.0675* | n.s. | 0.0487* | n.s. |
| % children that receive school bag | n.s. | n.s. | n.s. | 0.0095* |
| Time to travel to school | -0.1186** | n.s. | -0.0605*** | n.s. |
| Students per classroom | -0.0610** | n.s. | n.s. | n.s. |
| | | | | |
| Observed value | 0.77 | 0.86 | 0.80 | 0.89 |
| Predicted value | 0.82 | 1.00 | 0.87 | 0.99 |
| Number of observations | 1392 | 448 | 1840 | 936 |

Source: Ponce (2005)

* Significant at 99%, ** Significant at 95%, *** Significant at 90%, n.s.=not statistically significant. Estimations corrected by heteroscedasticity and errors autocorrelation at intra-municipal level.

At the regional level, special policies directed to stimulate enrolment among children from the Atlantic and Central regions are required. Children from those regions have lower probability of attending schools.

Regarding supply-side policies, it is found that constructing classrooms, as well as reducing travel time to school and expanding the school bag programme would have an important effect on primary school enrolment among the rural poor. In the urban areas, except for the school bag

[11] The school bag contains books and teaching materials.

programme, supply-side policies do not seem to have an influence on enrolment.

Budget simulations are carried out to evaluate the cost as well as the impact of some specific policies directed to increasing school enrolment (see Table 10).

Since student-teacher and student-classroom ratios are very high in Nicaragua (34 and 40 respectively), the baseline includes the cost of reducing such ratios to internationally acceptable levels (30 and 36 respectively). In addition, the normal growth of enrolment due to population growth is also taken into account. Finally, all costs are corrected for inflation. In order to reduce the student-teacher, and student-classroom ratios, the education budget for primary level has to increase from 1.8% to 3.2% (as percentage of the GDP).[12]

**Table 10: Budget Simulations – Nicaragua**

| | Year | 2003 | 2005 | 2010 | 2015 |
|---|---|---|---|---|---|
| Base-line | | | | | |
| Enrolment rate | Total | 0.87 | 0.87 | 0.87 | 0.87 |
| | Urban | 0.93 | 0.93 | 0.93 | 0.93 |
| | Urban poor | 0.89 | 0.89 | 0.89 | 0.89 |
| | Urban non-poor | 0.95 | 0.95 | 0.95 | 0.95 |
| | Rural | 0.81 | 0.81 | 0.81 | 0.81 |
| | Rural poor | 0.79 | 0.79 | 0.79 | 0.80 |
| | Rural non poor | 0.86 | 0.86 | 0.86 | 0.86 |
| Budget (% of GDP) | | 1.8% | 2.0% | 2.6% | 3.2% |
| Expanding the CCT programme | | | | | |
| Enrolment rate | Total | 0.87 | 0.88 | 0.88 | 0.89 |
| | Urban | 0.93 | 0.93 | 0.93 | 0.93 |
| | Urban poor | 0.89 | 0.89 | 0.89 | 0.89 |
| | Urban non-poor | 0.95 | 0.95 | 0.95 | 0.95 |
| | Rural | 0.81 | 0.82 | 0.84 | 0.86 |
| | Rural poor | 0.79 | 0.80 | 0.83 | 0.85 |
| | Rural non poor | 0.86 | 0.86 | 0.86 | 0.86 |
| Budget (% of GDP) | | 2.4% | 2.6% | 3.1% | 3.8% |
| Additional budget (% of GDP) | | 0.6% | 0.6% | 0.5% | 0.6% |
| Expanding the CCT programme, improving student per classroom ratio, and expanding school bag programme | | | | | |
| Enrolment rate | Total | 0.87 | 0.88 | 0.88 | 0.89 |
| | Urban | 0.93 | 0.93 | 0.93 | 0.93 |
| | Urban poor | 0.89 | 0.89 | 0.89 | 0.89 |
| | Urban non-poor | 0.95 | 0.95 | 0.95 | 0.95 |
| | Rural | 0.81 | 0.82 | 0.84 | 0.86 |
| | Rural poor | 0.79 | 0.80 | 0.83 | 0.85 |
| | Rural non poor | 0.86 | 0.86 | 0.86 | 0.86 |
| Budget (% of GDP) | | 2.4% | 2.6% | 3.2% | 3.9% |
| Additional budget (% of GDP) | | 0.6% | 0.6% | 0.6% | 0.7% |

Source: Ponce (2005)

The effect on the enrolment rate and the additional cost of expanding the CCT programme are simulated. In this scenario, the education budget would have to increase from 2.4% in 2003 to 3.8% in 2015 (as percentage of the GDP), and the enrolment rate of the poor from rural

[12] Although the paper does not find any significant effect of the reduction in student-teacher, and student-classroom ratios on enrolment, it is likely that school quality would be improved.

areas would increase from 80% in 2003 to 86% in 2015. Annually, the additional budget requirements (as compared to the budget according to the baseline scenario) are about 0.6% of GDP per year. The expansion of the CCT programme would result in an increase in the rate of enrolment from 87% to 89% at the national level. Although in this case the MDG would not be achieved, there would be a reduction in the enrolment rate gap between the poor and non-poor in rural areas.

In addition, a combined policy was simulated. The expansion of the CCT programme, the reduction in the student per teacher, and student per classroom ratios (from 36 to 30), as well as the expansion of school bag programme would imply an increase in the budget from 2.4% in 2003 to 3.9% in 2015 (as percentage of the GDP). However, the results on enrolment rate would be the same as in the previous scenario.[13] Nevertheless, it is expected that the additional policies would have effects on students' cognitive achievements.

Finally, it is found that it is not feasible to reach the MDG of universal primary education with the education policy instruments considered in the simulation model.

[13] At the national level the coefficient of the school bag programme is not statistically significant and the elasticity is close to zero.

# 4. Limitations of the Analyses

Based on the analysis presented in the previous section it appears that reaching the millennium development goal of 100 percent net enrolment by 2015 is impossible. However, it should be noted that the results presented here *do not imply* that the goal cannot be achieved but that given the available policy relevant variables in the data sets and their estimated impact on enrolment it would be difficult to reach the required goal. The results suggest that alternative policies and programs which target specific groups may be needed in order for Honduras, Nicaragua and Bolivia to reach their education enrolment goals.

We would also like to point out that the analysis presented here is subject to various limitations. Without trying to provide an exhaustive list, the following points may be noted:

- The absence of a consistent data base with sufficient detail on planned and actual education expenditure and reliable information on unit costs makes it difficult to simulate the required increase in primary education budgets.
- The variables capturing education supply are municipal level means and are not measured at the school level. This reduces sample variation, especially in urban areas where the municipalities are larger than in rural areas, and makes it difficult to accurately estimate the effect of school costs and inputs on enrolment.
- There is a high level of aggregation in the simulation model. Simulating the mean effects on the enrolment rate and the budget for urban and rural areas, without taking into account the possibly different effects for different population groups within these geographical areas, may reduce the quality of the simulation. For example, the effects on enrolment of boys and girls were not simulated separately.
- The possible longer-run effect of investment in human capital on the growth rate of GDP is not taken into consideration.
- Measuring the effect on enrolment of raising the level of the subsidy to households assumes that in the base year there is already a subsidy programme in place which has full coverage. Of course, one could simulate the effect on enrolment of introducing a new subsidy, using the marginal effects estimated with the econometric models, but – at least in the case of Bolivia – this did not yield reliable results.

- In the case of Bolivia, the analysis did not take into account the effects on enrolment of the transformation programme in the framework of the Education Reform, i.e., a complete pedagogical and curriculum reform. It would be interesting to include a variable in the model that indicates whether or not a school has implemented the transformation programme up to, for instance, the sixth grade.
- Other factors that have not been taken into consideration include:
  - Number of (effective) teaching hours.
  - The quality of the supply of education in terms of cognitive achievements.
  - A possible role for private education, because of the lack of information broken down by public versus private for each of the variables used in the simulation model.

The outcomes of the analyses carried out for the three country cases have to be interpreted in the light of these limitations. The results should be interpreted cautiously, given the data limitations and weaknesses of the regression models.

# 5. Conclusions

Some of the conclusions of the analysis carried out in this study may be summarized as follows:

- The CEA has shown that – within reasonable limits – it will apparently not be feasible to reach the MDG of 100% net primary enrolment in Bolivia, Honduras and Nicaragua, using only one or more of the education policy instruments considered in the enrolment models.
- The determinants of access to schooling are context-specific as shown by the three cases; hence, these exercises have to be conducted in-depth for each country and cannot be generalized across countries, as for instance the millennium project has done to some considerable extent.
- A subsidy programme to improve access to primary education would help to raise the enrolment rate, but is a costly instrument (and hence less cost effective). The budgetary implications of achieving a major effect on the enrolment rate would be large. The cost-effectiveness would be higher if the policy would be concentrated in rural areas.[14]
- A relatively more cost-effective instrument appears to be the reduction of the proportion of teachers without pedagogical diploma. In Bolivia, this instrument would be more effective in the rural areas than in the cities and would result in an elimination of the urban-rural gap in the enrolment rate in 2015.
- At least for Bolivia, the simulation results of the budgetary implications are not basically different if we change the assumptions regarding unit costs of the teachers and of starting to offer all eight grades in rural schools that until now do not offer complete primary education.
- The simulation results suggest that apparently one also has to look at demand-side variables – in particular the reduction of poverty – to reach the goal of universal primary education.
- However, the results of the simulation exercises have to be interpreted carefully. There are still huge gaps and inconsistencies in the available information to conduct analyses with more robust results. More consistent and more detailed databases are required to carry out this type of analysis. Hence, the analyses presented in this report have to be seen as an exercise and an illustration of how their results might be used in trying to establish more result-oriented policies.

[14] Note however that a *conditional cash transfer programme* is also likely to be more cost-effective than a general transfer programme to stimulate households to send their children to school to which no conditions are attached.

– It cannot be known ex ante what the optimal choice would be between different approaches, delivery mechanisms and policies to achieve the MDGs, each with different unit costs and different cost functions. Therefore, a lot of qualitative judgement is involved in determining what a 'good' policy might be. Nevertheless, the tool of cost-effectiveness analysis presented and applied in this report can help to gain insight into the effectiveness and budgetary implications of various policy alternatives, and is seen as an important input into policy formulation.
– Finally, it is important to warn against a technocratic approach to result-oriented budgeting, as the latter is, or should be, rather the outcome of a negotiation process which not only considers the (expected) impact of policies and budgetary implications, but also takes due account of political-economy and institutional factors. Institutional weaknesses, lack of coordination between institutions (within the central government and between central and local governments) and political pressures to alter agreed budgets are likely to hamper a move towards ROB, so ways should be found to strengthen institutions and improve coordination between them, as well as to reduce the above-mentioned political pressures.

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# Appendix 1
## Enrolment model and specification

**Theoretical model**

The empirical model used to estimate the effect of school costs and educational inputs on enrolment is based on theoretical models developed by Gertler and Van Der Gaag (1988) and Gertler and Glewwe (1990). The theoretical model treats household decision making as a function of the expected benefits of education versus the monetary and opportunity costs of attending school. Based on their evaluation of the current costs of attending school versus the expected benefits, households/parents determine the school enrolment status of their children. Factors that reduce the cost of attending school or increase the expected benefits of attending school may be expected to increase enrolment.

More formally, consider a household facing the following utility function conditional on school enrolment:

$$U_1 = U(b, c_1) \qquad (1)$$

where $U_1$ denotes household utility conditional on school enrolment (denoted by subscript 1), $b$ is a vector of benefits associated with attending school, and $c_1$ is household consumption conditional on enrolment.

The expected benefits associated with schooling, $b$, are treated as a function of various characteristics and may be represented by:

$$b = B(h, w, z) \qquad (2)$$

where $h$ is a vector of individual child characteristics, $w$ is a vector of households characteristics, and $z$ is a vector of school characteristics (including quality of school inputs).

The household maximizes utility subject to the following budget constraint:

$$y = c_1 + p \qquad (3)$$

where $y$ is household income, and $p$ represents the total cost (direct and opportunity) associated with enrolment. The utility function associated with not attending school may be written as:

$$U_0 = U(c_0) \tag{4}$$

The budget constraint is $y = c_0$. The household will choose the option associated with the highest possible utility, i.e.:

$$U^* = \max(U_1, U_0) \tag{5}$$

where $U^*$ is the maximum utility. In this case the solution to the maximization problem is the probability that an alternative is chosen.

#### Empirical Specification

In order to operationalize the model, the utility associated with attending school is treated as linear function of costs and benefits, that is,:

$$U_1 = \beta_1 b + \beta_2 c_1 + \varepsilon_1 \tag{6}$$

where the 's are the coefficients to be estimated and $_1$ is assumed to be a zero mean, normally distributed error term. Using equation 3, the utility function can be rewritten as follows:

$$U_1 = \beta_1 b + \beta_2 (y - p) + \varepsilon_1 \tag{7}$$

The utility associated with not being enrolled in school is:

$$U_0 = \beta_2 y + \varepsilon_0 \tag{8}$$

Thus, a child will be observed in school if the utility associated with school enrolment is higher than that of not attending. In other words, an individual attends school if $U_1$-$U_0$ is positive or,

$$\beta_1 b - \beta_2 p + \varepsilon_1 - \varepsilon_0 > 0 \tag{9}$$

The chances of attending school may then be expressed as a function of socio-demographic, individual and household characteristics, the quality of school inputs and the direct and indirect cost of school enrolment. In terms of a linear probability model this functional relationship may be written (after using equation 2) as:

$$\Pr[a = 1] = \Pr[\beta_1 B(h, w, z) - \beta_2 p + \varepsilon_a > 0] \tag{10}$$

where $a$ is a binomial variable that takes the value of 1 for a child which is enrolled in primary and a 0 for a child which is not enrolled.

The exposition provided here is based on treating utility as a linear function of benefits, costs and consumption. While this is a widely used specification there are limitations. As shown in equation (10) consumption or household income does not play a role in influencing enrolment decisions as it has been differenced out of the model. Alternative empirical specifications which treat utility as a non-linear (quadratic function of consumption, log consumption) may be considered (see Gertler and Glewwe, 1990). While such specifications allow consumption/income to influence enrolment, due to the non-linear functional form the effects are not easily interpretable. In our work, although we use a linear functional

form, we include several variables such as parental schooling which are highly correlated with consumption/income. Additionally, we experimented with other functional forms and for the most part the results are similar to the estimates presented in the paper.

**Data and econometric issues**

Although the basic framework for estimation is the same for all the countries, the specific model estimated for each country is tailored to the context of the country and to the available data. Table A.1 provides an overview of the explanatory variables included in the models that were estimated for each of the countries.

A key issue that arises while estimating such models is that information on school costs is only observed for those students who are actually enrolled in school. Treating school enrolment as a function of actual expenditure would be incorrect as households may determine how much to spend on education and thus educational spending may be endogenous and lead to biased estimates of the school enrolment equation. To surmount this problem, as far as possible we use those components of educational expenditure which are less likely to be controlled by the household (for example tuition fees and the cost of uniforms). Additionally, we impute median municipal education expenditures and treat school enrolment as a function of these median educational expenditures rather than actual expenditures.[15] Thus, our estimates rely on inter-municipal variation in educational costs to obtain the link between enrolment and school costs.

**Table A.1: Explanatory variables in the Probit Models of Primary School Enrolment***

| Explanatory variable | Expected sign of the impact on enrolment | | |
|---|---|---|---|
| | Bolivia | Honduras | Nicaragua |
| Demand side variables | | | |
| Education spending (tuition fee and uniforms) | – | – | – |
| Sex (1 = male) | + | + | + |
| Age | + | … | … |
| Age squared | – | … | … |
| Mother's schooling | + | … | … |
| Father's schooling | + | … | … |
| Schooling of the head of the household | … | + | + |
| Poverty (1 = poor) | – | … | … |
| Children aged less than 7 in the household | … | – | – |
| Children aged from 7 to 12 in the household | … | – | – |
| Children aged 13 to 18 in the household | … | – | … |
| Supply side variables | | | |
| Students per classroom ratio | – | … | – |
| Students per teacher ratio | … | – | … |
| Proportion of teachers without academic diploma | – | – | – |
| Proportion of schools not offering all grades | – | … | … |
| % children in multi-grade classrooms | … | – | – |
| % children attended by school meal programme | … | … | + |
| % children that receive school bag | … | … | + |
| Time to travel to school | … | … | – |

* Regional dummy variables not included

[15] The treatment was however slightly different in the models for Honduras and Nicaragua.

# Appendix 2
## Simulation methodology

**Scope of the simulation analysis**

The simulation analysis of the enrolment rates is carried out by using the econometrically estimated elasticities of these enrolment rates with respect to changes in one or more of the schooling variables included in the models of the determinants of primary schooling. The analysis is conducted separately for urban and rural areas. Area-specific unit costs are used in the simulation model, to estimate the budget required in the base year and to simulate the budgetary effects of raising the enrolment rates by means of (a combination of) various education policies. The horizon of the simulation analysis is the period up to 2015. The required annual budgets in each policy scenario – either or not expressed as a percentage of GDP – are compared with the required budgets according to a base line scenario in which the school inputs do not vary and, hence, the enrolment rate remains at its base year level.

The rest of this appendix explains some details of the different scenarios considered and points out the main assumptions underlying the simulation analysis.

**Scenarios**

With some variation between the tree country case studies, the simulation analyses consider the effects on primary school enrolment rates and the required budgets of the following scenarios:

- The proportion of untrained teachers is each year reduced with a given fraction, possibly with some differentiation between urban and rural areas, as the problem of the lack of trained teachers is more sever in the countryside than in the cities.
- Annually, there is a small reduction in the number of students per classroom.
- The proportion of incomplete primary school in rural areas is reduced gradually over time.
- Increases in existing subsidies to households to stimulate parents to send their children to school.
- Providing school materials to the children in all the schools.
- Combinations of two or more of the above-mentioned scenarios.

### Main assumptions of the simulations

The main assumptions made in the simulation analysis are:

- The growth rates of the population in primary school age in urban and rural areas are the same as the ones observed between the last two censuses conducted in the three countries under analysis. It is possible that for this reason the cost of raising the enrolment rate is over-estimated, because the population growth rates tend to decline over time.
- The scenario analysis not only consider the cost of the specific interventions, but also "endogenize" under certain assumptions the costs of other schooling inputs, such as teachers, in line with the rise in simulated schooling demand. More in particular, the student-teacher ratio remains fixed over time (in some of the case studies after having been reduced to an internationally accepted level of 30 students per teacher).
- The unit cost of teachers and classrooms remains fixed in real terms alter 2005. However, a sensitivity analysis is carried out in which increases in the real teacher salaries are taken into account.
- The growth rate of the number of schools is assumed to be the same as the growth rate of the number of classrooms.
- The ratio of gross enrolment to net enrolment does not change over time. In other words, there are no improvements in the internal efficiency of the education system.
- Depreciation of the schools is not accounted for. The investment is equal to the change in the "stock" of schools. In principle one could estimate the annual cost of the investment. However, it the annual capital expenditure is taken instead, as the interest is in knowing the effect on the annual budget.
- The annual cost per student of equipment, materials, texts, etc. is maintained fixed in real terms.
- Assumptions are made about real GDP growth in the period 2005–2015. To the extent available, a pessimistic growth scenario is assumed, in order to arrive at conservative estimates of the cost involved in raising the enrolment rates.

# Appendix 3
## Overview Table

**Table A.2: Education Indicators of Bolivia, Honduras and Nicaragua**

| | Bolivia | | Honduras | | Nicaragua | |
|---|---|---|---|---|---|---|
| | 1990 | 2002 | 1990 | 2002 | 1997 | 2003 |
| Education spending (% of GDP) | 3.4 | 6.1 | 6.8 | 7.0 | 3.2 | 3.9 |
| Education spending (% of Total public expenditure) | 9.6 | 19.2 | n.a. | 27.4 | n.a. | n.a. |
| | 1992 | 2001 | 1990 | 2004 | 1990 | 2004 |
| Years of schooling | 6.11 | 7.71 | 3.92 | 5.12 | n.a. | n.a. |
| Net primary school enrolment rate (%) | n.a. | 883 | 75 | 89 | 75 | 83 |
| – urban areas | n.a. | 913 | 82 | 92 | n.a. | 874 |
| – rural areas | n.a. | 843 | 71 | 87 | n.a. | 794 |
| Gross primary school completion rate | 55 | 71 | n.a. | n.a. | n.a. | n.a. |
| – urban areas | n.a. | 85 | n.a. | n.a. | n.a. | n.a. |
| – rural areas | n.a. | 49 | n.a. | n.a. | n.a. | n.a. |
| Net primary school completion rate | n.a. | 27 | 50 | 635 | n.a. | n.a. |
| Cognitive achievements: | | | | | | |
| 3rd Grade | | | | | | |
| – proficiency language* | n.a. | n.a. | n.a. | 103 | n.a. | 83 |
| – proficiency mathematics* | n.a. | n.a. | n.a. | 163 | n.a. | 143 |
| 6th Grade | | | | | | |
| – proficiency language* | n.a. | n.a. | n.a. | 103 | n.a. | 53 |
| – proficiency mathematics* | n.a. | n.a. | n.a. | 83 | n.a. | 13 |
| Duration of primary level (years) | | 8 | | 6 | | 6 |

Notes: 1 19+ population; 2 24+ population; 3 2002; 4 2001; 5 2000

* 50% of the test questions answered correctly.

Sources: see tables in main text

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