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Achieving Universal Primary Education: Can Kenya Afford it?

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Abstract

Kenya has experienced a rapid expansion of the education system partly due to high government expenditure on education. Despite the high level of expenditure on education, primary school enrolment has been declining since early 1990s and until 2003 when gross primary school enrolment increased to 104 percent after the introduction of free primary education. However, with an estimated net primary school enrolment rate of 77 percent, the country is far from achieving universal primary education. The worrying scenario is that the allocations of resources within the education sector seems to be ineffective as the increasing expenditure on education goes to recurrent expenditure (to pay teachers salaries). Kenya's Poverty Reduction Strategy Paper (PRSP) and the Economic Recovery Strategy for wealth and Employment Creation (ERS) outlines education targets of reaching universal primary education by 2015. The Government is faced with budget constrains and therefore the available resources need to be allocated efficiently in order to realize the education targets. The paper uses Budget Negotiation Framework (BNF) to analyze the cost effective ways of resource allocation in the primary education sector to achieve universal primary education and other education targets. Budget Negotiation Framework is a tool that aims at achieving equity and efficiency in resource allocation. Results from the analysis shows that universal primary education by the year 2015 is a feasible target for Kenya. The results also show that with a more cost- effective spending of education resources - increased trained teachers, enhanced textbook supplies and subsidies targeting the poor - the country could realize higher enrolment rates than what has been achieved with free primary education.

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1. Introduction

Education can be looked at as an investment in human skills. Investment in education can help to foster economic growth, enhance productivity, contribute to national and social development, and reduce social inequality (Council of African Ministers of Education, 2000).

Since Independence, Kenya has given education a very high social priority. Expenditure on the education system averages between 5 and 7 percent of GDP between 1991/92 and 2002/03 fiscal years. The level of educational expenditures declined in real terms during the early 1990s, but recovered to previous levels thereafter (see Kimalu et al. 2001). According to Deolalikar (1998), Kenya appears to be spending significantly more on education compared with other African countries. Kenya's expenditure on education was 6.7 percent of the GNP in 1995 compared to 5.1, 4.7, 4.0 and 2.6 percent for Burundi, Egypt, Ethiopia and Uganda respectively (Kimalu et al 2001). At its level of expenditure on education, the country should be enjoying a gross primary school enrolment rate of about 110 percent and gross secondary enrolment of about 45 percent (Government of Kenya, 1998). Despite the high education expenditure, the gross primary and secondary school enrolment rates in Kenya have been declining in the 1990s. Gross primary enrolment declined from 98.2 per cent in 1989 to 88.67 percent in 2002, while the secondary school enrolment rate dropped from 29.4 to 23 percent during the same period.

The government has since independence committed itself to providing universal education to all primary school going age children. This initially took the form of free primary education, which was provided in the second decade after independence. Having existed for more than 10 years, free primary education was later abolished under the Structural Adjustment Programs (SAPs). These meant that parents had to contribute more towards the education of their children through the cost-sharing programme. Evidence from recent research (Bedi et al. 2002 and Kimalu et al. 2001) shows one of the consequences of cost-sharing has been decline in school attendance and enrolment, since all parents were required to cover full costs of their children's education. These costs include uniforms, textbooks and other instructional material. Also, the parents were to contribute to school construction and maintenance costs. Further, the inadequate provision of complementary inputs like

textbooks means that the effectiveness of teachers in delivering quality education is reduced significantly.

Although the cost of primary education was borne by the government and households- before the re-introduction of free primary education in 2003- the share of public expenditure in total education budget is still large, and is an issue of policy concern. As of 1987, more than 35% of the total public sector recurrent budget went to education sector, compared to 15% in the 1960s and 30% in 1980. The government currently spends more than 50% of its education expenditure on primary level education. Teachers' salaries take about 96% of the fiscal resources allocated to primary education and this may be partly attributed to the rapid expansion of primary education since Independence, which required more teachers due to increased pupil enrolment. These expenditure figures show the need for efficiency enhancing measures in the education sector.

Before the introduction of free primary education in 2003, most of the resources allocated to the education sector were consumed by teachers wage bill. More than 75% of the education budget used to go to teachers salaries. Within the primary and secondary school budgets, teachers' salaries accounted for 95 – 97 percent of recurrent expenditure. As a result, there were hardly any public resources left for other school requirements such as learning materials and textbooks.

The Kenya Poverty Reduction Strategy Paper (PRSP) and the Economic Recovery Strategy (ERS) for Wealth and Employment Creation have spelled out education targets for the country. These targets are in line with the Millennium Development Goals of universal primary education by the year 2015[1]. Given that the Government is faced by financial constraints there is need to allocate the available resources more efficiently in order to achieve the targets. This paper focuses on the cost-effective ways of achieving primary education targets.

2. Free primary education

[1] Kenya has her Universal Primary Education target of 2005

The Kenyan government first expressed its intention to offer free primary education almost three decades ago. Education was declared free for children in standards one to four in 1974 and for the entire primary cycle in 1978. Following the implementation of Structural Adjustment Programmes (SAPs) in the 1980s, the government reneged on the reforms, requiring that parents and communities contribute to their children's schooling. Cost sharing in education was introduced in the mid- 1980s. Parents continued paying tuition, buying books and desks because the government didn't have adequate resources.

One of the NARC government's pre–election pledge in 2002 was the delivery of free and compulsory primary education. The government moved with speed to fulfill its election promise - provision of free primary education. The government policy on free primary education is in line with the Millennium Development Goals, Poverty Reduction Strategy Paper (PRSP) and the Economic Recovery Strategy (ERS) for Wealth and Employment Creation goal of achieving universal primary education by 2015. Since the introduction of the programme an estimated 1.5 million children, who were previously out-of-school, have enrolled for primary education.

The Government with assistance of development partners have availed resources to finance free primary education programme. During the 2003/2004 financial year, about Kshs. 9 billion additional resources were allocated to the programme. The additional resources catered for provision of textbooks, stationary, science kits and other instructional materials to primary schools. The allocation of funds is based on the total number of students in a school.

The new government's policy on free education is laudable. However, its implementation is besieged with a multitude of challenges, which include the unavailability of physical facilities, school furniture, equipment and teachers among others. This has resulted to overcrowding in classes and overburdening of teachers and this may have a negative effect on the quality of education.

Although the introduction of the new policy has resulted in about 1.5 million children joining primary school, there are still many school going age children who are out of school. The gross primary enrolment rate was 104 percent in 2003, the net primary enrolment rate

was estimated at 77 percent. The 1999 population projections (GOK, 2002), show that the primary school going age population will be 7.02 million in 2004 and 7.09 in 2005. Therefore a national net enrolment rate of 77 percent translates to 1.6 million children out of school. A combination of factors including poverty, social problems, child labour, displacement, and lack of schools and teachers may have contributed to the low enrolment rate. The large gap between gross and net enrolment may be explained by enrolment of tens of thousands of "over-age" children - including street children, or those who dropped out of school to work and have rejoined school. For instance in the Mukuru slum area of Nairobi, only about 500 of the 5,000 new students (10%) who enrolled in schools since the beginning of the year, were of "normal" school-going age. (IRIN, 2003).

A recent Oxfam survey (Oxfam 2003) revealed that 37.3% of children in Kibera are still out of school and the majority of those in school (70%) are attending non-formal schools. This problem has been compounded by the fact that almost no new building of schools has taken place in slum areas for the last 15 years although large populations of the city live in slum areas.

The Kenyan government plans to finance most of the core costs of free primary education out of its own resources. According to Oxfam (2003), the country needs an additional $137million between now and 2015 to make education for all a reality. This money would enable the government to provide extra help to the poorest children - including those in slums and those affected by HIV-AIDS.

Abolishing school fees is the first step to achieving universal primary education, but as Kenya and Uganda's experience shows, it is fraught with difficulty. There are other issues, which need to be addressed including child labour. According to the 1998/99 child labour survey, about 30.1 percent of the parents released their children to work in order to help family business whilst 27.5 percent indicated that earnings from their children's work augmented the household income. Only a 0.3 percent of the parents reported that they released their children for work because they thought their education or training environment was not suitable, implying that the child's schooling was not considered

relevant. Other challenges for the government include distributing teachers more evenly among the country's schools and ensuring that implementing the "free education" policy does not affect quality standards.

3. Educational problems and targets

There has been a mismatch between education expenditure and school enrolment in Kenya. Despite Kenya's high level of expenditures on education, school enrolment has been declining until 2003 when free primary education was introduced. However, the government's poverty reduction strategy aims at reaching universal primary education and increasing primary school enrolment by 15% between 1999 and 2005. These goals are important as confirmed by the following:

- Education is the main single factor associated with the probability of being poor, hence improving educational performance should form a core element in the poverty reduction strategy (see, Alemayehu et al. 2001).
- Educational performance is most strongly associated with factors that determine the access to the educational system. That is, while issues of internal efficiency of education are also important, the more critical issue is to make sure children enter the schooling system in the first place (see, Bedi et al. 2002).

In the context of PRSP and ERS, the emphasis on primary school enrolment targets thus appears to be fully justified. More typically, one would use multiple indicators to assess the performance of the educational system, such as its internal efficiency as measured, for instance, by dropout rates, its quality as measured by test scores, and its external efficiency as measured by social rates of return (see, Vos 1996). Such indicators will remain important as part of the evaluation of the overall performance of the educational system and indeed are also considered in the budget allocation criteria as spelt out below. Primary school enrolment is, however, used as the prime target.

Before the operationalization of the budgeting process within the Medium-Term Expenditure Framework (MTEF), each sector's resource allocation system was based upon a

line item incremental system of budgeting. This budget preparation was principally concerned with adding to the previous-year estimates involving incremental increases to each line item. This resulted to lack of scrutiny of the purpose of each expenditure item and put more emphasis on inputs as opposed to outcomes. According to the Master Plan for Education and Training 1997-2010, this type of budgeting means that unit costs per pupil or student tended to be residual as they were not planned, but merely happened without giving due consideration to the educational outputs and outcomes.

The Government is facing financial constraints and therefore a need arises to allocate the available resources more efficiently. According to the Republic of Kenya (1998b), the allocation of educational resources should be based on systematically worked out strategic priorities. Given the current economic and fiscal situation, there is a need to strengthen the linkages between costing policies and programmes, planning and resourcing, budgeting, implementation and monitoring. This will ensure efficiency and effectiveness in the use of the resources availed to education.

In the MTEF budgeting process, budget ceilings are set and each sector has a resource envelope. Ministries in each sector bid for the resources after the constitutional budget obligations are met.

Now that the budget process is more result oriented the next question is what budget resources then are needed to achieve the key educational target(s) when used in the most cost-effective way? What implications does this have for the allocation of resources within the education budget? Can Kenya afford to meet the Millennium Development Goal of universal primary education for all by the year 2015?

This policy paper tries to give some practical answers to these questions. In doing so, we will focus on the issue of cost-effective ways to achieve the primary schooling targets. This is the problem of *intra-sectoral efficiency* of public spending on primary education.[2] Subsequently we check to what extent the resource requirement to reach educational targets

remain within the overall macroeconomic budget constraints of the Kenyan government using projections of the KIPPRA-Treasury Macro Model (KTMM) for the Kenyan economy (see Huizinga et al. 2001 and Alemayehu, Ndung'u et al. 2001). This paper shows that reaching the primary education for all is affordable for Kenya, but given the budget constraints, this will require a reallocation of the government budget or borrowing from development partners.

The findings in this paper are indicative of a result-based budget planning. They are only indicative and not definitive, as one has to consider some limitations of the analysis underpinning the efficiency analysis. Furthermore, issues of implementation or *operational efficiency* will need to be considered. The best budget from an economist's point of view may not be executable, e.g. because of a lack of adequate administrative capacity. Even though the emphasis in this policy paper is on the efficiency criteria for budget allocation, we will address the possible limitations towards the end.

4. What resources are needed to meet educational targets?

A study on the demand for primary schooling in Kenya concludes that there are a number of public policy interventions, which have an important impact on the decision to enroll in school (Bedi et al. 2002). The type of effective interventions bear a relationship with the policy changes that were introduced in 1984/5 and 1988 and have been important factors behind the observed decline in school enrolment since. The new educational structure and curriculum introduced in 1984/5 led to additional educational costs for parents and increased the burden to teachers and set higher demands on their qualifications. In 1988 a system of cost-sharing was formalized requiring parents to cover all costs for school uniforms, textbooks and other instruction materials, as well as to contribute to school construction and maintenance costs. While such cost-sharing already existed informally before 1988, the real change was the re-introduction of school levies that had been abolished in previous years.

[2] We will not address here the issue of the *allocative efficiency* of spending within the education sector looking at priorities for primary, secondary and higher education. However, see Kulundu, Mwabu and

The study uses temporal and cross-section data to examine various factors that may be responsible for the decline in primary school enrolment. The factors used in the estimation model include household expenditure on education, household and individual characteristics, test scores, pupil teacher ratio and teachers qualifications among others. After controlling for a variety of individual and family characteristics and for differences in school inputs, the school demand analysis finds that two factors exercise the strongest influence on the probability of being in (or having attended) school[3] (see, Bedi et al. 2002).

- The direct cost of school enrolment
- The availability of trained (qualified) teachers

The size of the impact of changes in these variables (elasticities) are summarized in Table 1 in the Appendix and are specified both for the effect on total enrolment and on enrolment by income groups. The translation of those elasticities into unit cost budget parameters can be spelled out as follows.

An increase of 26 per cent in schooling costs (such as fees) would reduce overall primary school enrolment by 1 per cent (1/0.039 = 26). Those costs are on average about 110 shillings per month.[4] This implies that for school enrolment to increase by one per cent, an average subsidy of 28 shillings per pupil per month would be needed. However, the impact of rising costs on school enrolment differs according to the welfare level of the household. A 26 per cent rise in schooling costs would lead to a fall in school enrolment of the poorest (first quintile) by 3 per cent, as they are more sensitive to rising private educational costs. Thus, in order to achieve a 1 per cent increase in school enrolment for the poorest households a subsidy of only 10 shillings per pupil would be needed. The effectiveness of subsidies on private schooling costs decreases the richer the household. For the richest quintile, price increases have no impact on the school enrolment decision while at all other quintiles there is a statistically significant effect.

Kimenyi (2002) for an assessment of educational rates of return and human capital externalities in Kenya.

[3] Other variables that were tested and that can be influenced directly by educational policies included school input variables such as the pupil-teacher ratio. This variable did not prove to exercise any significant influence. Other variables that do appear to have a significant influence have to do with family characteristics (such as education of parents and wealth status), individual characteristics of the child (age and sex) and geographic location. See Bedi et al. (2002).

More qualified teachers may be expected to provide better teaching, as well as to better administer and manage schools. This expectation appears to influence school enrolment directly. However, the school demand analysis also shows that there is an indirect effect through higher expected test scores (KCPE), which in turn influence school enrolment positively. We consider the joint direct and indirect effect. To achieve a 1 per cent increase in primary school enrolment, the share of skilled teachers at level 2 (P1) would need to increase by 2.6 percentage points (=1/0.381), implying an increase of 11,827 teachers at that level (6.5%) in the year the policy change becomes effective.[5] Average salary costs of a level 2 teacher in 2002 are about 12,120 shillings per month, implying additional budget costs of 588 shillings per additional pupil per month, if no other changes would take place. Cost could be saved if the new, trained teachers replace untrained teachers. Yet, if we assume that the overall pupil-teacher ratio is to remain constant and given that due to the policy change the school enrolment rate increases, the number of teachers will have to increase even after taking into account that untrained teachers are replaced.[6] The net increase in the required total number of teachers would be 6,944 (or 3.8%), implying an additional cost of 345 shillings per month per additional enrollee.

These basic parameters were introduced in the Budget Negotiation Framework, a basic tool developed to aid the budget allocation process (see ISS-KIPPRA 2001). For the purposes of this discussion we will first provide a number of scenarios for the educational budget, estimating the required resources to meet the education targets as spelled out in the Poverty Reduction Strategy. As indicated earlier, these targets are:

- Reaching universal primary education by 2015
- Increase net primary enrolment by 15% between 1999 and 2005

[4] The cost estimate is a projection at 2002 prices of the observed costs households paid per child enrolled in school in 1994 using the WMS. The survey estimate of mean school costs is Kshs. 82 per month in 1994.
[5] The latter estimate not only considers the effect of increasing the share of level 2 teachers, but also the overall increase in the demand for teachers as school enrolment increases while keeping the pupil-teacher ratio constant at 33.
[6] In this scenario we let the share of level 2 teachers increase by 3% (or about 2 percentage points), while keeping the share for level 1 and level 3 teachers constant and using that for untrained teachers as a residual.

The first, long-term target we interpret as the objective to have reached a net enrolment rate of 100% by the year 2015. Based on available information we estimate the net enrolment rate at 79% in 2001. Assuming a gradual increase in net enrolment between 2001 and 2015, this would imply that by 2005 the rate should have reached 85%. This is more or less consistent with the intermediate target of increasing primary school enrolment by 15% between 1999 and 2005, which would – at the estimated base year enrolment rate and given population projections – translate to a net enrolment rate of 83% by 2005. For purposes of this budget scenario analysis, which runs projections up to the fiscal year 2005/6, we use 85% net primary school enrolment by 2005 as the basic target. We will also show what the budget implications would be if the government was to speed up the process to reach universal primary education target (100% net enrolment) by 2005/6.

5. Budget allocation 2002/2003

Poverty Reduction Strategy Paper, 2001–2004, has set targets and goals for primary education. Some of these targets include; increase enrolment rates by 2.5 percentage points per year; reduction of drop out rates by 2% annually; provision of 2 million textbooks, covering 7 subjects each year; and provision of subsidies and establishment of school feeding programmes. These education targets are to be achieved through various strategies. The increased enrolment rates are to be achieved by reducing the burden of user charges on parents. A pro-poor textbook policy, removal of user charges on coaching and assessment and reduction of user charges on activity and maintenance are some of the strategies of reducing burden on parents. Reducing user charges and supplying more textbooks are policy choices, which are consistent with the findings of the decline of school enrolment study (Bedi et al. 2002).

In this section, we use the 2002/3 budget allocations to the Ministry of Education Science and Technology, primary level and analyze possible impact on primary school enrolment. Primary education was allocated Kshs 470 million for teaching materials, textbooks and curriculum development. This was higher than the 2001/02 allocation of Kshs 458 million. Assuming a constant unit cost of Kshs. 200, the volume of textbooks purchased per year -

using this teaching materials allocation - could thus increase from 2,030,00 in 2001/02 to 2,125,994 in 2002/03 financial year – an increase of 4.7%.

Allocation for primary school subsidies increased from Kshs 166 million in 2001/02 to Kshs 171 million in 2002/03, implying an increase per pupil by 1% from Kshs. 27.53 to Kshs 27.80. The subsidies include resources for the school milk and feeding programme and boarding expenses for boarding primary schools.

During the 2002/2003 financial year, the government employed 5,000 primary and secondary school teachers. A total of 2,866 primary school teachers were hired. Assuming that all the hired primary school teachers were of level 2 or P1 category, then total number of teachers in this level increased by 2.2%.

To analyze the impact of the budget on net enrolment, we run a first budget simulation using the changes in subsidies, share of level 2 or P1 teachers and volume of textbooks for the 2002/2003 financial year. We subsequently assume that during the four-year period up to 2005/6 the three budget items continue to increase at a constant rate and that the education budget is automatically adjusted for inflation. We assume further that the government would maintain a fixed primary pupil-teacher ratio of 33.

The budget implications are reported in Table 2. The nominal budget for primary education has to increase by 33% over the four-year period, but would remain constant as a percentage of nominal GDP at 3.0%.[7] Per pupil public expenditures would increase by 14% in real terms.

Due to these budget changes – an annual increase in the volume of textbooks by 4.7%, increase in the share of P1 teachers by 2.2% and increase of subsidies by 1% – the nation-wide net primary school enrolment is expected to increase from 79% in 2001/2 to 80% in

[7] GDP estimates for 2002-2005 are derived from the KTMM model projections (Version 2, 13 February 2003, mid-scenario of the Economic Recovery Program assumptions). Under this scenario GDP growth is projected at 1.7% in FY 2002/3, 3.0% in 2003/4, 4.4% in FY 2004/5 and 5.8% in 2005/6. Improved educational investment and outcomes are not incorporated in these growth projections.

2002/3, and further to 84% in 2005/6.[8] For the poorest quintile, enrolment will go up from 72 to 73% in 2002/3 and to 78% by 2005/6. For all other household groups enrolment would increase to over 80% with the fourth quintile achieving 88% by 2005/6 – the highest. As the simulation results show, the largest improvements in enrolment would be for the first two quintiles where enrolment grows by at least 5 percentage points. (see Appendix Table 2). However, the simulated increase in the enrolment rate is clearly less than the target of 2.5 percentage points per year. The budget simulation would increase the enrolment rate by 5 points over the entire four-year period.

In other words, under the scenario of sustaining the 2002/2003-budget allocation over a four-year period the education target of the PRSP will not be reached. The scenario does come fairly close to the intermediate MDG target of a net enrolment rate of 85% by 2005/6 as defined above. The additional education cost would run over the projected government budget constraint under the baseline scenario of the KTMM model (see Table 2).[9] Therefore, we will run a number of alternative budget simulations to identify the requirements to meet the PRSP and MDG targets in the most cost-effective way.

6. Meeting educational targets: Alternative budget simulations

6.1 Baseline assumptions

First we define a **baseline scenario** for which we assume the following:

- The 2002/3 budget allocation as discussed above is taken as given, but no further adjustments are introduced in subsequent years with respect to the shares of trained versus untrained teachers, textbook supplies or reduction of direct school costs through subsidies or fellowships.
- The pupil-teacher ratio remains constant at 33. (This implies that with no changes in net school enrolment, the required number of teachers will rise, despite the absence of policy change. Under these assumptions, the number of pupils is projected to increase with the growth of the school-going age population.)

[8] Note that this further increase is caused by the assumption in this scenario that the three budget inputs are increased at the constant rate in the years 2003-5.

- Teacher salaries are adjusted for inflation. (The inflation rate is estimated based on the KTMM-Macro Model projections – model version 2, mid-scenario of ERP projections, 13 February, 2003.)
- There is sufficient capacity in terms of school infrastructure (school buildings, classrooms). The budget for this (and maintenance) is allowed to increase only with average cost (inflation).
- The existing entry for 'school subsidies' is, as indicated, rather low in the base year, that is Kshs. 28 per pupil per year. Actual school costs for families are much higher at Kshs. 115 per pupil *per month* or Kshs. 1,385 *per year*![10] Hence, it would be unreasonable to assume that any increase of school subsidies at the margin of their initial level would have a significant effect on school enrolment. That is, a 1% increase in the current level would give a benefit of Kshs. 0.28 per year, which unlikely would constitute an incentive to send children to school. Hence, we assume the incentive to families to send or keep children in school will rise with the importance of the subsidy to actual schooling costs. That is, the response (elasticity) to an increase in the demand subsidy is made proportional to the share of the subsidy in actual schooling costs.
- The budget allocation for 2002/3 is taken as given. In the scenario analysis policy changes are introduced from 2003/4 onwards.

We consider the following five scenarios:

I. The share of level 2 teachers is increased to the extent it achieves the intermediate MDG target of at least 85% net primary school enrolment for all income groups in 2005/6.

II. The supply of textbooks is increased to stimulate enrolment and reaching the 85% net enrolment target by 2005/6 for all income groups.

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[9] It should be noted though than under that scenario the government would generate a budget surplus for 2002-5.

[10] Based on WMS 1994 observed average private expenditures for primary education per pupil. At 1994 prices these monthly schooling cost were Kshs. 82. The figures in the text are at 2002 prices. These expenditures include total cost, including school fees, uniforms, textbooks, school uniforms, and '*harambee*' contributions. To stay in school, not all expenditures are required. Leaving out the 'discretionary' element, Bedi et al. (2002) estimate the minimum required expenses to stay in school at Kshs. 52 per pupil per month at 1994 prices (Kshs. 73 at 2002 prices).

III. A program of primary school subsidies or fellowships is introduced targeted such that all income groups reach 85% net school enrolment by 2005.

IV. A combination of scenarios I, II, and III such that the given target of 85% enrolment for all is reached by 2005.

V. The same as scenario III, but setting the target at 100% net primary school enrolment by 2005 for the poorest 2 quintiles (instead of 2015).

VI. A program aimed at providing free primary education where the Government covers all school costs to households (subsidies) and provision of teaching materials.

VII. Stimulate enrolment through the additional budget allocation for primary education ranging from Kshs billion 8.9 to Kshs 13 billion between 2003/4 to 2005/6 fiscal year (The Daily Nation, 25th March 2003).

VIII. A policy mix of textbooks provision, subsidies and increased share of trained teachers aimed at cost effective spending of the resources used for scenario VI.

The basic data for the baseline scenario are presented in Table 3, while the policy changes of each scenario is presented in Tables 4a and 4b. A comparison of the simulation results can be found in Figures 1-6.

6.2. Scenario analysis

In the **baseline scenario**, the only policy change is taking into account the effect of the 2002/3 budget allocation described above and the assumption that the pupil-teacher ratio will be kept constant at 33. As there is a 'natural' growth in enrolment linked to population growth, the latter assumption implies that the budget needs to expand to pay for the additional required teachers. The educational expenditures are also adjusted for expected inflation. As a result, the nominal budget for primary education would have to increase by 27% between 2001/2 and 2005/6 financial year. Public spending on primary education would fall slightly as a share of GDP from 3.0% to 2.9% due to the projected acceleration of economic growth under the ERP scenario. Due to the policy change in 2002/3, net enrolment would increase slightly from 79 to 80%.

Scenario I assumes an annual increase in the share of level 2 (P1) primary school teachers of 10 percentage points during 2003-5; the increase that is required to reach 85% total net

primary school enrolment by FY 2005/6. In part (see above), these replaces untrained teachers. Although the overall target of net enrolment rate of 85 percent is achieved by 2005/6, there are variations across the quintiles. Through this simulation, the share of P1 teachers increases from 73% in 2002 to 83% in 2005 and there would be no more untrained teachers. The overall net enrolment increases to 85%, but the poorest quintile would not have reached the target attaining a net enrolment rate of 80%. The primary education budget would have to rise by 36% between 2002 and 2005, implying an average annual increase of about 0.1% of projected GDP. This would lead to a budget overrun against the macro-economic budget constraint of the same magnitude, hence requiring a redefinition of budget priorities.

Scenario II has the volume of primary school textbooks increased by almost 500 percent during the period 2003-5. In doing so, by 2005/6 two pupils would share one (new) textbook, well beyond the PRSP target of 2.5 pupils per textbook.[11] The outcome is that by 2005/6 the target of an overall net enrolment rate of 85 percent is reached. However, only the two richest quintiles would have reached the goal, leaving the poorer segments still off the PRSP target. Nonetheless, this policy option is more expensive than scenario I, as by 2005/6 the primary education budget would have to be increased by 41% as compared to the 2001/2 budget – the base year. The average additional cost per year amounts to 0.2% of GDP. Hence, also the violation of the macroeconomic budget constraint will be more severe.

Under **scenario III** the amount of subsidies per pupil would have to increase substantially, in order to reach the target level of 85% school enrolment. In this scenario, we exclude the richest quintile from the benefits of the subsidy. We first bring the subsidy to a level where families may be expected to respond to some visible degree to the subsidy (see above under assumptions). For the poorest two quintiles we let the subsidy increase to Kshs. 667 per annum and the third and fourth quintile get half of that. Introduction of these subsidies raises overall net school enrolment from 79 percent to 85 per cent in 2005. The resultant net enrolment in 2005 for all quintiles is at least 85%. This scenario is somewhat more expensive

[11] This probably is more than adequate to effectively have one textbook per pupil, since the simulated increase refers to new textbooks which may be re-used in a number of years.

than the previous two, reaching a budget level in 2005/6, which is 45% above the 2002/3 budget for primary education. The required budget increase is equivalent to 0.2% of GDP on average per year for the period 2002-5. While more expensive, it is more equitable and effective than the previous two scenarios reaching the intermediate PRSP target for all income groups.

However, to enhance both access to and the quality of primary education it would probably be unwise to rely on one policy instrument only to reach the given target. Hence, under **Scenario IV** the three policy instruments are combined. The share of trained teachers (P1) is increased by 5 percentage points over the period. The volume of textbooks is increased by 39% over the period reaching a ratio of 8.5 pupils per textbook (hence still off the PRSP target). The government subsidy is increased to Kshs. 334 per pupil per year for the poorest two quintiles only. There is no subsidy increase for the richest three quintiles. This combination of the three policy changes reaches the education target of 85 percent net primary school enrolment for all by 2005. The implied additional cost are the same as under scenario II, but at greater benefit, and cheaper than scenario III for an even slightly larger overall outcome and equally equitable. The budget for primary education would have increased by 41% by 2005/6 and the additional cost to reach the education target would be 0.14% of GDP per annum.

6.3. Can Kenya afford the intermediate target of 85% net enrolment by 2005?

Overall, the four scenarios imply additional budget allocations for primary education but at no apparent large overall economic cost of between 0.1 and 0.2% of GDP. Yet the way this amount is spent has important implications in terms of equity. The target of 85% net enrolment is reached in each scenario, but not all income groups would have reached the intermediate MDG. Improving teacher quality would be the least expensive scenario (I), but less beneficial to the poor. Focusing on just improving textbook supplies (scenario II) would be the more expensive, but equally children from poor families would fail to reach the enrolment target. Reducing schooling costs is more equitable but also much more costly than the previous two scenarios, unless targeted. We have not considered the possible cost related to the targeting scheme (e.g. means testing) that would need to go with such a policy. Most sensibly, the government would combine the three policy instruments (scenario IV).

The results show that at an annual cost of about 0.1% of GDP, Kenya could well afford getting on track by 2005/6 in reaching the primary-education-for-all target. However, the additional cost would be beyond the limits of fiscal constraints for 2003-5, hence requiring adjustment in budget priorities in order to reach the goal.

6.4. Universal primary education for the poorest 2 quintiles by 2005?

Under ***scenario V***, simulated policy changes are designed such that, under the given educational model assumptions, net primary school enrolment would reach 100% for the two poorest quintiles as early as 2005/6. One possible set of policy combinations to achieve this target is to raise, first, the share of level 2 teachers from 73 to 85% between 2002/3 and 2005/6 and, second, quadruple the volume of textbooks over the same period nearing the PRSP target of 2.5 pupils per textbook. Further, demand subsidies be raised to Kshs. 500 per pupil per year for the first three quintiles. Clearly, additional resource demands for primary education will be substantially higher under this scenario. In nominal terms the budget would have to increase by about 67% over the period, requiring some Kshs. 45 billion more than the 2002/3 budget and some Kshs. 10.6 billion more than under the baseline scenario (see Figure 7). The annual additional cost amounts to about 0.5% of GDP. The overall number of primary school teachers would have to increase by 28% (about 50,000 teachers) as shown by Table 6 and Figure 8. Total net enrolment would be expected to reach 95%. Only the first two quintiles are targeted to reach 100% access to primary education.

Resource-wise this scenario could still be feasible, but require a much stronger political priority for primary education. There would likely be implementation problems to hiring that many trained teachers in just three years (2003-5) and increasing textbook supply by that much. Also, this scenario (as well as all previous ones) may underestimate actual cost of increasing access to primary education and assuring adequate quality at the same time. At least two types of costs have not been fully accounted for in scenarios I-V. First, textbook supply is based on initial estimates of textbooks covering one subject only rather than the 6 core subjects taught. Second, cost of maintenance and improvements of school buildings and infrastructure have not been accounted for. Targeting the poor is a complicated issue, which also involves administrative costs. Hence, the above cost estimates for reaching the PRSP targets are conservative ones. In the next section, we do correct for the first

component, i.e. full costing of textbook supplies under the education for all programme scenarios.

6.5. Free primary education for all?

Scenarios VI, VII and VIII simulate the budget implications of providing free primary education for all, as suggested by the new government under alternative scenario assumptions. In *scenario VI* we assume that the government will cover **all** school cost to households, hence requiring a subsidy of Kshs. 73 (2002 prices) per pupil *per month* to be adjusted for inflation each year.[12] In addition, the scenario further assumes that the government will expand subsidies for curriculum support, including free delivery of textbooks (*for all 6 subjects*) reaching an average target of 2.5 textbooks per pupil.[13] In addition, as proposed by the new government additional support would be supplied in the form of free access to exercise books, training materials for teachers, free supply of pencils, pens, rulers, and geometry materials for pupils, free supply of boxes of chalk and equipment for physical education. As summarized in Table 5, the estimated cost of subsidizing these educational inputs amount to about Kshs. 1,167 per pupil per year (at 2002/3 prices). Currently, the cost of textbooks, exercise books and writing materials, and so on, typically are paid for by the families of school-going children. Hence, the free provisioning of these inputs will reduce schooling costs to families. We assume the cost of such free provisioning of inputs is included in the demand subsidy of Kshs. 73 per pupil per month. Deducting this amount from the total cost of educational inputs, a residual cost for other curriculum support (teacher guides etc.) of Kshs. 71 per pupil per year is left to be included in the budget estimations. In this scenario we assume that all pupils in primary education, whether rich or poor, benefit from the subsidy.

In *scenario VII* the starting point is the announced additional budget allocation for primary education of respectively Kshs. 7.9 billion for 2003/4, Kshs. 10.5 billion for 2004/5 and Kshs. 13 billion in 2005/6 (*The Nation*, 25 March 2003). Under this scenario we assume these

[12] We consider only the minimum required expenses to stay in school (see footnote 8).
[13] This target would allow for effectively having one textbook per pupil, assuming textbooks can be reused for at least two or three years.

resources are used to enhance textbook supply and other curriculum support and what is left to provide untargeted demand subsidies.

Scenario VIII, proposes an alternative, more cost-effective spending of the resources also used for scenario VI, using a policy mix alike that of scenarios IV and V, with increases in trained teachers, enhanced textbook supplies and both demand subsidies and curriculum support expenses benefiting the poorest three quintiles. In all scenarios we maintain the assumption of a constant pupil-teacher ratio of 33.

The cost implications of the free primary education for all under scenario (VI) are vast of course. In nominal terms the annual budget would have to increase by about 91% over the period, requiring by FY 2005/6 some Kshs. 23 billion more than the 2002/3 budget and some Kshs. 17 billion more than under the baseline scenario (see Table 6 and Figure 7). The annual additional cost would amount to about 0.8% of projected GDP (see Table 6). At a fixed pupil-teacher ratio, the overall number of primary school teachers would have to increase by almost 27% (about 49,000 teachers) as shown by Figure 8. Total net enrolment would reach 94%. Clearly, this (untargeted) policy scenario is relatively expensive and except for the poorest quintile none of the income groups would reach 100% net enrolment under the given assumptions.

The announced budget allocation for the free primary education programme will not be sufficient to actually reach the target of complete enrolment by 2005/6 under the assumptions of *scenario VII*. The additional annual cost amounts to 0.4% of GDP (close to that of scenario V), but the untargeted subsidy increase would only yield an increase of net enrolment to 86% by 2005/6, and the poorest quintile (Q1) would not even reach the intermediate PRSP target of 85%.

The alternative spending of the estimated additional budget cost under the assumptions of *scenario VIII*, would lead to a net enrolment rate of 97%, with the poorest three quintiles all reaching 100% net enrolment (Note that the amount of additional resources in this scenario

is the same as under scenario VI (0.8% of GDP)[14]. The reason that this scenario is more expensive than scenario V, is due to the fact that under scenario V we did not fully account for the cost of textbook supplies for all 6 subjects and other curriculum support. Clearly, the more targeted allocation of the budget is much more effective than scenario VI. Further investment in teacher quality (either in public or private schools) might be needed to also reach 100% net enrolment for the richer two quintiles. Assuming such families can afford greater contributions, we could argue that the marginal social cost of achieving universal primary education for all is in the order of 0.8% of GDP.[15]

7. Macro constraints and educational resource requirements

The education sector and the economy as a whole has been facing financial constraints in the last two decades. Given the tight budgetary situation in Kenya, it is worthwhile to adopt a cost-effectiveness approach in allocating resources. The Ministry of Education, Science and Technology (MoEST) has had an inherent problem in its allocation of resource to programmes and projects due to many on-going projects and budget ceilings from treasury. The Ministry has not been able to allocate resources based on policy decision, to the extend that over 95% of primary education recurrent budget goes to payment of teachers salaries (Kimalu et al, 2001).

The scenario analysis conducted in this paper has shown that educational targets can be reached at an affordable cost. Keeping the time horizon for the goal of universal primary education for all at 2015, an additional, cost-effective allocation of between 0.1 and 0.2% of GDP would be required. A fast track achievement of this goal by 2005/6 could amount to 0.8% of GDP. The budgetary space for this would have to come by resetting budget priorities. It would, however, also be conceivable that it makes economic sense to increase borrowing for such an increase in social investment. Studies for Kenya estimate the private returns to primary education at 5% or more (Manda, Mwabu and Kimenyi 2002) and, to the extent this would reflect enhanced labour productivity, this should yield enough additional economic growth to cover the cost of borrowing.

[14] Although Scenario VI and VIII uses the same amount of additional resources, scenario outcomes (net enrolments) are different as the additional resources are spent differently.

8. Conclusion

Kenya has made enormous progress in education since independence in terms of increased number of schools and pupils enrolment. Due to the continuous expansion of the education system, the share of public expenditure on education has been raising over the years. However, the main concern has been lack of cost-effectiveness in resource allocation in the education sector. In our analysis, we have used Budget Negotiation Framework (BNF) to find the cost-effective ways of resource allocation to achieve education targets.

In the analysis, we have only emphasized the resource implications of trying to reach the targets of universal primary education based on an economic model of determinants of school attendance. This of course only provides one ingredient to the decision-making process. The underlying policy implications will have to be assessed further in terms of the existing capacity to implement these within the suggested timeframe. Hiring of better-trained teachers may take time and equally it may be difficult to step up textbook supplies in large quantities. Further, if policies would move further in that direction, the precise mechanisms and their feasibility of targeting school subsidies (or reduction of school charges) will need to be analysed. Subsequently, also the behavioural response of families to enhanced demand subsidies will have to be closely monitored.

Table 6 summarizes the main results of the scenario analysis conducted in this paper. Education policy in Kenya is already moving in the indicated direction as reflected, among other things, in the PRSP. What we have tried to show in this paper is that, first, existing efforts would have to be stepped up to actually achieve the education target, and, second, to explicitly link the policy changes to their budget implications.

From our analysis reaching universal primary education by 2015 seems a feasible target for Kenya. If the primary education budget is used in a cost-effective way, an additional resource allocation of 0.2% of GDP is required in order to reach the intermediate target of 85% net

[15] Please note that this estimate excludes cost of maintenance and improvement of school buildings.

enrolment by 2005/6. Assuming a continued, essentially public provided primary education system, by 2015 the additional cost may increase to 0.5% of GDP, most of which would be needed to pay for the additional cost of teachers required to train the increasing pupil numbers. The key ingredients to reach the given goals would be the improvement of teacher quality (more trained teachers), greater supplies of textbooks and (targeted) subsidies for poor families to enhance their access to the educational system. However, the actual cost in this scenario could underestimate the true cost of expanding the educational system assuring quality. Adding additional cost for adequate textbook supply (for all 6 subjects) and other curriculum support (chalks, writing materials, etc.) would lead to a marginal cost of 0.8% of GDP. To this one would have to add the cost of maintenance and improvement of school buildings.

Kenya's free public primary education program, which is now being implemented, has led to improved enrolment rates. However, scenario VI on free primary education seems like a much more costly option with less medium-term effect on net enrolment rates compared to Scenario VIII, which uses the same amount of resources. If one should interpret such a move - free primary education - as the government subsidizing all school cost of families, ensuring free supply of basic teaching materials and not jeopardizing quality (such as keeping class size at a reasonable level), could imply an additional annual cost as high as 0.8% of GDP but without reaching educational targets, as scenario VI suggested earlier.

But even if resources are spent in the most cost-effective way, the budget for primary education will have to be increased structurally. Given the existing budget constraints this will require resetting of budget priorities for which the benefits of greater investment in primary education will have to be weighed against other priorities. The general argument here is that, from a purely economic point of view, the private and social returns to education are high enough to warrant granting sufficient priority to primary education.

The present analysis on cost effectiveness in resource allocation – primary education - was based on the school enrolment behaviour as derived from the Welfare Monitoring Survey held in 1994 (Bedi et al. 2002). An update of that survey is badly needed to probe the validity of the basic assumptions for the budget scenario analysis and to monitor the impact of the

policy changes based thereupon. Despite these obvious limitations, the analysis shows the usefulness of having an education demand and cost model, as well as the Budget Negotiation Framework to think through the budget implications of adjusting education targets and the reallocation of various budget components.

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Appendix

Table 1 Point Elasticities of Demand for Schooling by Expenditure Quintiles

	Total	Quintile 1 (poorest)	Quintile 2	Quintile 3	Quintile 4	Quintile 5 (richest)
Teachers[1]						
Teacher-Skill Level 1 (S1)[2]	0.053	0.210	0.000*	0.135	-0.017*	-0.024*
Teacher-Skill Level 2 (P1)	0.381	0.661	0.688	0.252	0.456	0.177
KPCE score[1]	0.304	1.200	0.879	0.423	0.652	0.399
Pupil-teacher ratio	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
School costs (mean)	-0.039	-0.123	-0.066	-0.057	-0.039	-0.009*

Source: Bedi et al. (2002). Calculations of elasticities are based on quintile specific estimates. Point elasticities are calculated at the mean of the relevant characteristic.

Notes: n.s. or * = not significant.

1. Elasticity estimate refers to change in share of teachers by skill type. The indirect effect of more trained teachers on the KCPE score is included in the point elasticity for the teacher input.
2. Coefficients for teacher level 1 inputs were found to be insignificant for several quintiles. In the version of the BNF used for the budget projections reported in this paper, the elasticity estimates found insignificant were set to zero.

Table 2 Budget implications of 2002/3 allocation (and constant increase of specified inputs in subsequent years)

	Budget year	Budget projections				Increase over period 2001-2005
	2001/2	2002/3	2003/4	2004/5	2005/6	
Budget implications						
Primary education budget						
- mln Kshs	27,204	29,087	31,325	33,676	36,216	33%
- % of GDP(calender year)	*3.0%*	*3.0%*	*3.0%*	*3.0%*	*3.0%*	
Real spending per pupil (Kshs.)	4,389	4,517	4,657	4,838	5,020	14%
Macro_budget overrun						
- mln Kshs	0	1,693	1,553	267	-1,097	
- % of GDP(calender year)	*0.0%*	*0.2%*	*0.2%*	*0.0%*	*-0.1%*	
Change in education inputs						
Teachers						
- change share of P2 level teachers (in perc. points)		2.2%	2.2%	2.2%	2.2%	9.0%
- required overall increase number of teachers[1]		*3.7%*	*3.7%*	*3.6%*	*3.6%*	15%
Textbooks		4.7%	0.0%	0.0%	0.0%	4.7%
School subsidies						
Quintile 1 (poorest)		1.0%	1.0%	1.0%	1.0%	4.1%
Quintile 2		1.0%	1.0%	1.0%	1.0%	4.1%
Quintile 3		1.0%	1.0%	1.0%	1.0%	4.1%
Quintile 4		1.0%	1.0%	1.0%	1.0%	4.1%
Quintile 5 (richest)		1.0%	1.0%	1.0%	1.0%	4.1%
Educational outcome						
Net enrolment rate	0.79	0.80	0.82	0.83	0.84	6%
Quintile 1 (poorest)	0.72	0.73	0.75	0.77	0.78	9%
Quintile 2	0.80	0.81	0.82	0.82	0.83	9%
Quintile 3	0.80	0.81	0.82	0.82	0.83	3%
Quintile 4	0.83	0.84	0.85	0.87	0.88	6%
Quintile 5 (richest)	0.85	0.86	0.86	0.87	0.87	2%

Note: 1. Assuming a fixed pupil-teacher ratio of 33.

Table 3 BNF: Sectoral Budget Summary - Baseline Scenario Educational Policy

	Approved Budget	Budget Base year	Budget projections			
Base_SIM_0	**2000/1**	**2001/2**	**2002/3**	**2003/4**	**2004/5**	**2005/6**
Overall budget	**188,805**	**186,697**	**212,183**	**226,880**	**246,197**	**272,375**
Agr. & Rural Development	19,133	15,114	18,407	20,485	22,901	26,531
Physical Infrastructure	32,833	30,318	35,935	39,456	43,828	49,951
Human Resources	64,483	68,414	78,917	86,289	94,454	106,129
Trade & Industry	2,500	2,288	2,565	2,678	2,861	3,084
Public Adm.	34,910	33,326	33,650	34,619	36,575	38,699
Public Safety	15,450	16,746	18,779	19,269	20,252	21,457
Nat. Security	19,409	20,303	23,718	23,871	25,102	26,295
IT	89	188	212	213	222	230
Human resource budget						
Education	50,009	51,080	58,100	63,460	69,188	77,267
Health	12,448	13,272	15,819	17,366	19,202	21,927
Other human resource development	2,026	4,062	4,998	5,463	6,064	6,934
Shares: Education	77.6%	74.7%	73.6%	73.5%	73.3%	72.8%
Health	19.3%	19.4%	20.0%	20.1%	20.3%	20.7%
Other	3.1%	5.9%	6.3%	6.3%	6.4%	6.5%
Education budget						
Primary	26,966	27,204	29,087	30,858	32,692	34,657
Secundary	12,196	12,308	12,973	13,154	13,501	13,898
Higher	7,349	7,322	10,586	13,125	15,739	19,982
General adm.	3,497	4,245	5,454	6,323	7,257	8,731
Shares: Primary education	53.9%	53.3%	50.1%	48.6%	47.3%	44.9%
Secundary education	24.4%	24.1%	22.3%	20.7%	19.5%	18.0%
Higher education	14.7%	14.3%	18.2%	20.7%	22.7%	25.9%
General administration	7.0%	8.3%	9.4%	10.0%	10.5%	11.3%
Primary education outcomes						
Real expenditures per pupil (Kshs.)	4,584	4,389	4,517	4,644	4,811	4,977
Real expenditures per pupil (index)	100	96	99	101	105	109
Net School enrolment rate (total)		0.79	0.80	0.80	0.80	0.80
Quintile 1		0.72	0.73	0.73	0.73	0.73
Quintile 2		0.76	0.78	0.78	0.78	0.78
Quintile 3		0.80	0.81	0.81	0.81	0.81
Quintile 4		0.83	0.84	0.84	0.84	0.84
Quintile 5		0.85	0.86	0.86	0.86	0.86
Number of pupils		6,031,113	6,268,400	6,419,127	6,573,480	6,731,543
Growth of primary school enrolment			3.9%	2.4%	2.4%	2.4%
Teachers		180,860	187,544	192,053	196,671	201,400
Teacher-Skill Level 1(S1)		20,090	20,832	21,333	21,846	22,372
Teacher-Skill Level 2(P1)		127,538	136,465	139,747	143,107	146,548
Teacher-Skill Level 3(P2 & P3)		30,124	27,023	27,673	28,338	29,020

	Approved Budget	Budget Base year	Budget projections			
Base_SIM_0	**2000/1**	**2001/2**	**2002/3**	**2003/4**	**2004/5**	**2005/6**
Untrained teachers and level P4		3,108	3,223	3,300	3,380	3,461
Pupil-teacher ratio		33	33	33	33	33
Budget outcomes (% change, current prices)						
Total primary education expenditures			**7%**	**6%**	**6%**	**6%**
- Teacher salaries			7%	6%	6%	6%
- Teaching materials, texts, curriculum development			8%	4%	4%	4%
- Schools and other infrastructure			3%	4%	4%	4%
- Fellowships, school meals and other subsidies			5%	2%	2%	2%

Source: Budget Negotiation Framework (BNF).

Table 4a: Changes in policy instruments for Scenarios I, II, III and IV

	Base year values		Annual increments (%)							
	2001/2		2002/3		2003/4		2004/5		2005/6	
	Volume	*Unit cost*	*Volume*	*Unit costs*	*Volume*	*Unit costs*	*Volume*	*Unit costs*	*Volume*	*Unit costs*
Scenario I										
- Target shares teachers by level	100%									
Teacher-Skill Level 1(S1)	11%		0.00		0.00		0.00		0.00	
Teacher-Skill Level 2(P1)	71%		0.02		0.04		0.04		0.02	
Teacher-Skill Level 3(P2 & P3)	17%		*-0.02*		*-0.04*		*-0.03*		*-0.02*	*residual*
Untrained teachers and level P4	2%		0.00		0.00		-0.01		-0.01	
- Teaching materials, texts, curriculum development	603,646	200	0.05	0.03	0.00	0.04	0.00	0.04	0.00	0.04
- New schools and other infrastr.	881	1.0	0.00	0.03	0.00	0.04	0.00	0.04	0.00	0.04
Fellowships program and other demand subsidies (including school meals)	6,036,456	28	0.04		0.05		0.04		0.03	0.04
Targeted at quintile 1 (poorest)	1,044,045	28	1,093,685	0.01	1,160,579	0.00	1,229,317	0.00	1,279,429	0.00
Targeted at quintile 2	1,169,207	28	1,225,200	0.01	1,301,994	0.00	1,380,976	0.00	1,438,213	0.00
Targeted at quintile 3	1,226,368	28	1,266,777	0.01	1,315,162	0.00	1,364,426	0.00	1,405,931	0.00
Targeted at quintile 4	1,295,764	28	1,347,542	0.01	1,414,446	0.00	1,482,782	0.00	1,535,537	0.00
Targeted at quintile 5 (richest)	1,295,729	28	1,335,195	0.01	1,380,569	0.00	1,426,769	0.00	1,467,464	0.00
Pupil-teacher ratio assumption	**33**		**33**		**33**		**33**		**33**	
Scenario II										
- Target shares teachers by level	100%									
Teacher-Skill Level 1(S1)	11%		0.00		0.00		0.00		0.00	
Teacher-Skill Level 2(P1)	71%		0.02		0.00		0.00		0.00	
Teacher-Skill Level 3(P2 & P3)	17%		*-0.02*		*0.00*		*0.01*		*0.01*	*residual*
Untrained teachers and level P4	2%		0.00		0.00		-0.01		-0.01	
- Teaching materials, texts, curriculum development	603,646	200	0.05	0.03	1.50	0.04	0.50	0.04	0.50	0.04
- New schools and other infrastructure	881	1.0	0.00	0.03	0.00	0.04	0.00	0.04	0.00	0.04
Fellowships program and other demand subsidies (including school meals)	6,036,456	28	0.04		0.04		0.03		0.03	
Targeted at quintile 1 (poorest)	1,044,045	28	1,093,685	0.01	1,188,353	0.00	1,241,689	0.00	1,297,418	0.00
Targeted at quintile 2	1,169,207	28	1,225,200	0.01	1,310,764	0.00	1,362,288	0.00	1,415,838	0.00
Targeted at quintile 3	1,226,368	28	1,266,777	0.01	1,325,151	0.00	1,366,748	0.00	1,409,651	0.00
Targeted at quintile 4	1,295,764	28	1,347,542	0.01	1,425,710	0.00	1,476,132	0.00	1,528,337	0.00
Targeted at quintile 5 (richest)	1,295,729	28	1,335,195	0.01	1,395,048	0.00	1,438,257	0.00	1,482,803	0.00
Pupil-teacher ratio assumption	**33**		**33**		**33**		**33**		**33**	
Scenario III										
- Target shares teachers by level	100%									
Teacher-Skill Level 1(S1)	11%		0.00		0.00		0.00		0.00	
Teacher-Skill Level 2(P1)	71%		0.02		0.00		0.00		0.00	
Teacher-Skill Level 3(P2 & P3)	17%		*-0.02*		*0.00*		*0.00*		*0.00*	*residual*
Untrained teachers and level P4	2%		0.00		0.00		0.00		0.00	

	Base year values		Annual increments (%)							
	2001/2		2002/3		2003/4		2004/5		2005/6	
	Volume	*Unit cost*	*Volume*	*Unit costs*	*Volume*	*Unit costs*	*Volume*	*Unit costs*	*Volume*	*Unit costs*
- Teaching materials, texts, curriculum development	603,646	200	0.05	0.03	0.00	0.04	0.00	0.04	0.00	0.04
- New schools and other infrastructure	881	1.0	0.00	0.03	0.00	0.04	0.00	0.04	0.00	0.04
Fellowships program and other demand subsidies (including school meals)	6,036,456	28	0.04		0.06		0.04		0.04	
Targeted at quintile 1 (poorest)	1,044,045	28	1,093,685	0.01	1,197,859	5.00	1,259,616	1.00	1,356,800	1.00
Targeted at quintile 2	1,169,207	28	1,225,200	0.01	1,301,475	5.00	1,351,983	1.00	1,423,025	1.00
Targeted at quintile 3	1,226,368	28	1,266,777	0.01	1,339,036	5.00	1,388,305	1.00	1,421,688	0.00
Targeted at quintile 4	1,295,764	28	1,347,542	0.01	1,410,367	5.00	1,456,583	1.00	1,491,607	0.00
Targeted at quintile 5 (richest)	1,295,729	28	1,335,195	0.01	1,367,301	0.00	1,400,179	0.00	1,433,847	0.00
Pupil-teacher ratio assumption	**33**		**33**		**33**		**33**		**33**	
Scenario IV										
- Target shares teachers by level	100%									
Teacher-Skill Level 1(S1)	11%		0.00		0.02		0.00		0.00	
Teacher-Skill Level 2(P1)	71%		0.02		0.02		0.02		0.01	
Teacher-Skill Level 3(P2 & P3)	17%		*-0.02*		*-0.04*		*-0.01*		*0.00*	*residual*
Untrained teachers and level P4	2%		0.00		0.00		-0.01		-0.01	
- Teaching materials, texts, curriculum development	603,646	200	0.05	0.03	0.10	0.04	0.10	0.04	0.10	0.04
- New schools and other infrastructure	881	1.0	0.00	0.03	0.00	0.04	0.00	0.04	0.00	0.04
Fellowships program and other demand subsidies (including school meals)	6,036,456	28	0.04		0.05		0.04		0.04	
Targeted at quintile 1 (poorest)	1,044,045	28	1,093,685	0.01	1,202,651	2.00	1,274,843	1.00	1,355,871	1.00
Targeted at quintile 2	1,169,207	28	1,225,200	0.01	1,291,431	2.00	1,360,236	1.00	1,428,931	1.00
Targeted at quintile 3	1,226,368	28	1,266,777	0.01	1,339,510	0.00	1,382,910	0.00	1,422,831	0.00
Targeted at quintile 4	1,295,764	28	1,347,542	0.01	1,400,247	0.00	1,454,533	0.00	1,501,626	0.00
Targeted at quintile 5 (richest)	1,295,729	28	1,335,195	0.01	1,375,785	0.00	1,417,425	0.00	1,456,810	0.00
Pupil-teacher ratio assumption	**33**		**33**		**33**		**33**		**33**	

Note: Shaded areas refer to, either fixed values (base year) or estimations endogenous to simulated policy change.

Table 4b: Changes in policy instruments for Scenarios V, VI, VII and VIII

	Base year values		Annual increments (%)							
	2001/2		2002/3		2003/4		2004/5		2005/6	
	Volume	*Unit cost*	*Volume*	*Unit costs*	*Volume*	*Unit costs*	*Volume*	*Unit costs*	*Volume*	*Unit costs*
Scenario V										
- Target shares teachers by level	100%									
Teacher-Skill Level 1(S1)	11%		0.00		0.03		0.00		0.00	
Teacher-Skill Level 2(P1)	71%		0.02		0.05		0.05		0.03	
Teacher-Skill Level 3(P2 & P3)	17%		*-0.02*		*-0.08*		*-0.03*		*-0.03*	*residual*
Untrained teachers and level P4	2%		0.00		0.00		-0.02		0.00	
- Teaching materials, texts, curriculum development	603,646	200	0.05	0.03	1.00	0.04	0.50	0.04	0.40	0.04
- New schools and other infrastr.	881	1.0	0.00	0.03	0.00	0.04	0.00	0.04	0.00	0.04
Fellowships program and other demand subsidies (including school meals)	6,036,456	28	0.04		0.09		0.06		0.06	
Targeted at quintile 1 (poorest)	1,044,045	28	1,093,685	0.01	1,309,941	3.50	1,452,578	1.00	1,601,502	1.00
Targeted at quintile 2	1,169,207	28	1,225,200	0.01	1,375,790	3.50	1,520,561	1.50	1,686,663	1.50
Targeted at quintile 3	1,226,368	28	1,266,777	0.01	1,399,496	3.50	1,479,960	1.00	1,563,977	1.00
Targeted at quintile 4	1,295,764	28	1,347,542	0.01	1,453,577	0.00	1,548,503	0.00	1,623,281	0.00
Targeted at quintile 5 (richest)	1,295,729	28	1,335,195	0.01	1,402,383	0.00	1,462,116	0.00	1,513,997	0.00
Pupil-teacher ratio assumption	**33**		**33**		**33**		**33**		**33**	
Scenario VI										
- Target shares teachers by level	100%									
Teacher-Skill Level 1(S1)	11%		0.00		0.00		0.00		0.00	
Teacher-Skill Level 2(P1)	71%		0.02		0.00		0.00		0.00	
Teacher-Skill Level 3(P2 & P3)	17%		*-0.02*		*0.00*		*0.02*		*0.00*	*residual*
Untrained teachers and level P4	2%		0.00		0.00		-0.02		0.00	
- Teaching materials, texts, curriculum development	603,646	214	0.05	0.03	1.20	0.04	0.60	0.04	0.40	0.04
- Other curriculum support (Education for all programme, March 2003) *(Volume refers to estimated number of enrolled pupils)*	0	71	0.00	0.03	6,803,681	0.04	7,153,619	0.06	7,895,239	0.07
- New schools and other infrastructure	881	1.0	0.00	0.03	0.00	0.04	0.00	0.04	0.00	0.04
Fellowships program and other demand subsidies (including school meals)	6,036,456	28	0.04		0.07		0.04		0.10	
Targeted at quintile 1 (poorest)	1,044,045	28	1,093,685	0.01	1,252,538	5.00	1,348,419	1.00	1,603,944	1.92
Targeted at quintile 2	1,169,207	28	1,225,200	0.01	1,346,350	5.00	1,423,254	1.00	1,588,523	1.92
Targeted at quintile 3	1,226,368	28	1,266,777	0.01	1,361,363	5.00	1,423,451	1.00	1,564,230	1.92
Targeted at quintile 4	1,295,764	28	1,347,542	0.01	1,446,976	5.00	1,514,045	1.00	1,635,619	1.92
Targeted at quintile 5 (richest)	1,295,729	28	1,335,195	0.01	1,396,454	5.00	1,444,451	1.00	1,502,922	1.92
Pupil-teacher ratio assumption	**33**		**33**		**33**		**33**		**33**	

	Base year values		Annual increments (%)							
	2001/2		2002/3		2003/4		2004/5		2005/6	
	Volume	*Unit cost*	*Volume*	*Unit costs*	*Volume*	*Unit costs*	*Volume*	*Unit costs*	*Volume*	*Unit costs*
Scenario VII										
- Target shares teachers by level	100%									
Teacher-Skill Level 1(S1)	11%		0.00		0.00		0.00		0.00	
Teacher-Skill Level 2(P1)	71%		0.02		0.00		0.00		0.00	
Teacher-Skill Level 3(P2 & P3)	17%		*-0.02*		*0.00*		*0.02*		*0.00*	*residual*
Untrained teachers and level P4	2%		0.00		0.00		-0.02		0.00	
- Teaching materials, texts, curriculum development	603,646	214	0.05	0.03	1.20	0.04	0.15	0.04	0.15	0.04
- Other curriculum support (Education for all programme, March 2003) *(Volume refers to estimated number of enrolled pupils)*	0	71	0.00	0.03	6,803,681	0.04	6,992,089	0.06	7,185,730	0.07
- New schools and other infrastructure	881	1.0	0.00	0.03	0.00	0.04	0.00	0.04	0.00	0.04
Fellowships program and other demand subsidies (including school meals)	6,036,456	28	0.04		0.07		0.03		0.03	
Targeted at quintile 1 (poorest)	1,044,045	28	1,093,685	0.01	1,252,538	5.00	1,290,485	0.00	1,329,581	0.00
Targeted at quintile 2	1,169,207	28	1,225,200	0.01	1,346,350	5.00	1,384,888	0.00	1,424,530	0.00
Targeted at quintile 3	1,226,368	28	1,266,777	0.01	1,361,363	5.00	1,397,098	0.00	1,433,770	0.00
Targeted at quintile 4	1,295,764	28	1,347,542	0.01	1,446,976	5.00	1,486,683	0.00	1,527,480	0.00
Targeted at quintile 5 (richest)	1,295,729	28	1,335,195	0.01	1,396,454	5.00	1,432,935	0.00	1,470,368	0.00
Pupil-teacher ratio assumption	**33**		**33**		**33**		**33**		**33**	
Scenario VIII										
- Target shares teachers by level	100%									
Teacher-Skill Level 1(S1)	11%		0.00		0.01		0.01		0.00	
Teacher-Skill Level 2(P1)	71%		0.02		0.06		0.05		0.04	
Teacher-Skill Level 3(P2 & P3)	17%		*-0.02*		*-0.07*		*-0.04*		*-0.03*	*residual*
Untrained teachers and level P4	2%		0.00		0.00		-0.01		-0.01	
- Teaching materials, texts, curriculum development	603,646	214	0.05	0.03	1.00	0.04	0.80	0.04	0.41	0.04
- Other curriculum support (Education for all programme, March 2003) *(Volume refers to estimated number of enrolled pupils)*	0	71	0.00	0.03	2,789,308	0.04	3,004,365	0.06	8,129,935	0.07
- New schools and other infrastructure	881	1.0	0.00	0.03	0.00	0.04	0.00	0.04	0.00	0.04
Fellowships program and other demand subsidies (including school meals)	6,036,456	28	0.04		0.09		0.06		0.08	
Targeted at quintile 1 (poorest)	1,044,045	28	1,093,685	0.01	1,332,685	5.25	1,485,358	0.25	1,607,809	0.50
Targeted at quintile 2	1,169,207	28	1,225,200	0.01	1,414,231	5.25	1,553,787	0.75	1,675,825	0.60
Targeted at quintile 3	1,226,368	28	1,266,777	0.01	1,358,455	0.00	1,439,430	0.00	1,676,449	10.50
Targeted at quintile 4	1,295,764	28	1,347,542	0.01	1,462,200	0.00	1,562,740	0.00	1,645,406	0.00
Targeted at quintile 5 (richest)	1,295,729	28	1,335,195	0.01	1,405,700	0.00	1,469,596	0.00	1,524,445	0.00
Pupil-teacher ratio assumption	**33**		**33**		**33**		**33**		**33**	

Note: Shaded areas refer to, either fixed values (base year) or estimations endogenous to simulated policy change.

Table 5 Education for all programme: estimated cost of curriculum support

Curriculum support	Level	target	terms/year	quantity	unit cost	Cost 2003 (Mln Kshs.)

1	Textbooks	Upper primary (6 subjects)	1 tb / 2 pupils	year	10,950,000	240	2,628
		Lower primary (6 subjects)	1 tb / 3 pupils	year	7,300,000	200	1,460
2	Exercise books	Upper primary (6 subjects)	1 eb / 1 pupil	term	65,700,000	23	1,511
		Lower primary (6 subjects)	2 eb / 1 pupil	term	65,700,000	14	919
3	Pencils	Primary	1 pen/ 1 pupil	term	21,900,000	10	219
4	Rubbers	Primary	2 rub / 1 pupil	term	43,800,000	10	438
5	Pens	Primary	1 pen / 2 pupils	term	10,950,000	50	547
6	Chalks	Primary	1 box / class	year	196,935	100	20
7	Teacher guides	Primary (6 subjects)	1 guide /class	year	196,935	230	45
8	Teacher preparation books	Primary	1 pb / teacher?	year	172,406	200	34
9	Geometry sets	Primary (upper)	1 set / 1 pupil	year	3,650,000	100	365
10	Assessment cards	Primary	1 card / 1 pupil	year	7,300,000	15	110
11	Rulers	Primary (upper)	1 ruler / 1 pupil	year	3,650,000	10	37
12	Registers	Primary	1 reg / class	year	196,935	45	9
13	Creative arts & PE	Primary	1 eq / school	year	17,754	10000	178
	Total						***8,520***
	Average cost per pupil (Kshs./year)						***1,167***

Source: Adjusted cost estimates, based on newspaper report, The Nation, 25 March 2003.

Table 6 Summary of Scenario analysis: Budget implications and educational outcomes

		Scenario							
	Baseline	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**
Budget implications									
Required primary education budget increase									
- mln Kshs.s (2005/6 budget compared to 2002/3)	5,569	7,880	9,326	10,269	9,239	16,210	22,890	11,212	18,831
- average additional cost 2002-5 (as % of GDP)	*-0.1%*	*0.1%*	*0.1%*	*0.2%*	*0.1%*	*0.5%*	*0.8%*	*0.4%*	*0.7%*
Real spending per pupil (Kshs.s.) by 2005/6	4,977	5,052	5,377	5,333	5,219	5,673	6,528	5,523	5,914
Change in education inputs									
Teachers									
- change share of P2 level teachers (percentage points)	2%	12%	2%	2%	7%	15%	2%	2%	16%
- required overall increase number of teachers (growth rate)	11%	17%	15%	18%	18%	28%	27%	17%	30%
- required overall increase number of teachers (abs. Number)	20,540	30,792	26,351	32,572	32,151	50,066	49,424	30,201	53,495
Textbooks (growth rate for period)	5%	5%	489%	5%	39%	340%	416%	205%	431%
Other spending on curriculum support (Kshs. per pupil per year) by 2005	-	-	-	-	-	-	86	86	86
School subsidies (Kshs.s. per pupil per year by 2005/6)									
- Quintile 1	28	28	28	667	334	500	974	167	487
- Quintile 2	28	28	28	667	334	782	974	167	487
- Quintile 3	28	28	28	334	28	500	974	167	320
- Quintile 4	28	28	28	334	28	28	974	167	28
- Quintile 5	28	28	28	28	28	28	974	167	28
Educational outcomes (by 2005/6)									
Pupils per textbook	10.7	11.3	2.0	11.3	8.5	3.0	2.5	3.9	2.5
Pupil-teacher ratio (assumption)	33	33	33	33	33	33	33	33	33
Gross primary school enrolment rate	90%	95%	95%	95%	96%	107%	105%	96%	109%
Net primary school enrolment rate	***80%***	***85%***	***85%***	***85%***	***86%***	***95%***	***94%***	***86%***	***97%***
- Quintile 1	73%	80%	81%	85%	85%	100%	100%	83%	100%
- Quintile 2	78%	85%	84%	85%	85%	100%	94%	85%	100%
- Quintile 3	81%	84%	84%	85%	85%	93%	93%	85%	100%
- Quintile 4	84%	89%	89%	87%	87%	94%	95%	89%	96%
- Quintile 5	86%	88%	89%	86%	87%	91%	90%	88%	91%

Figure 1 Scenarios I-IV: Public Expenditures on Primary Education (Kshs.s Million)

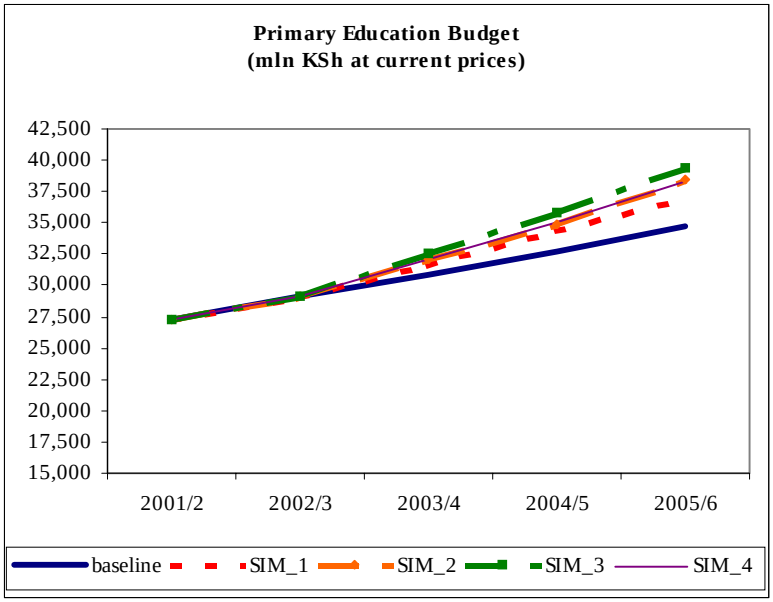


Figure 2 Scenarios I-IV: Real Expenditures per Pupil (primary) (Kshs.s)

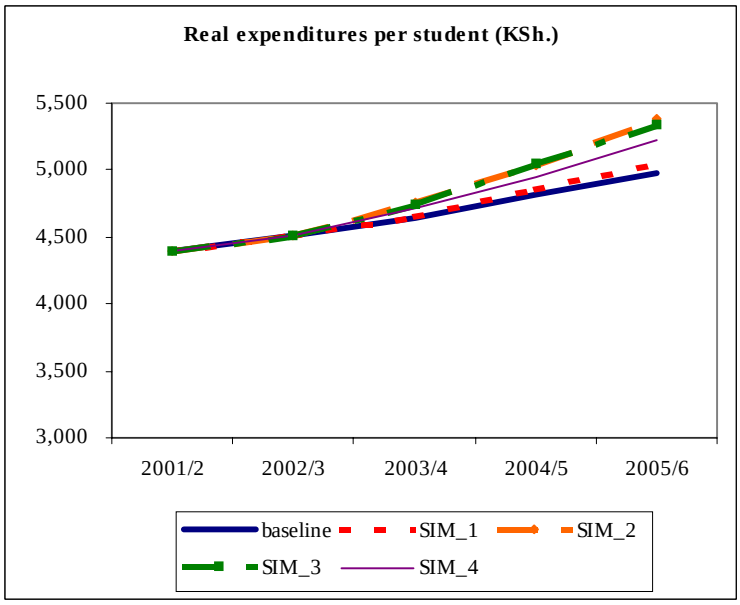


Figure 3 Scenarios I-IV: Net Primary School Enrolment Rate

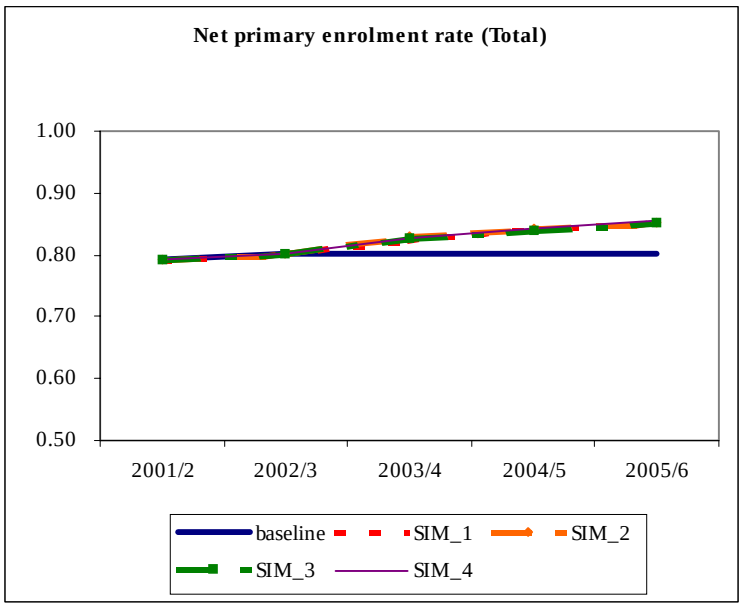


Figure 4 Scenarios I-IV: Net primary School Enrolment (pupils)

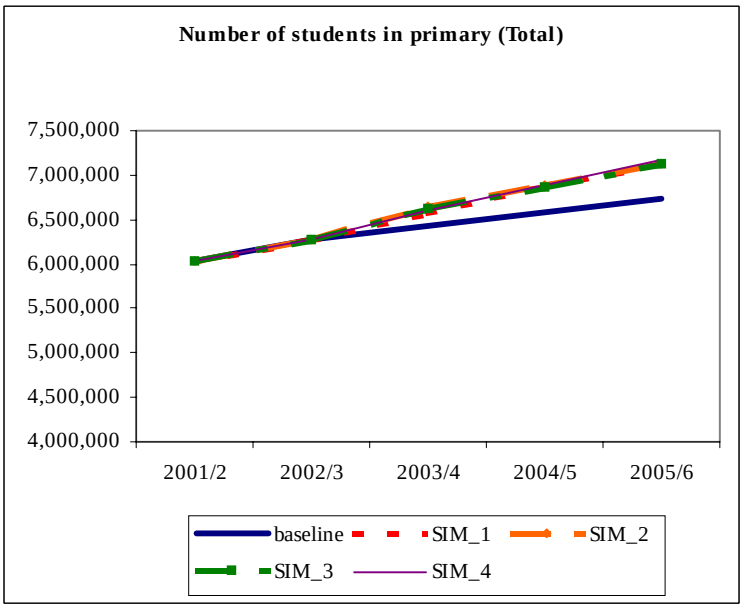


Figure 5 Scenarios I-IV: Required number of teachers in primary education

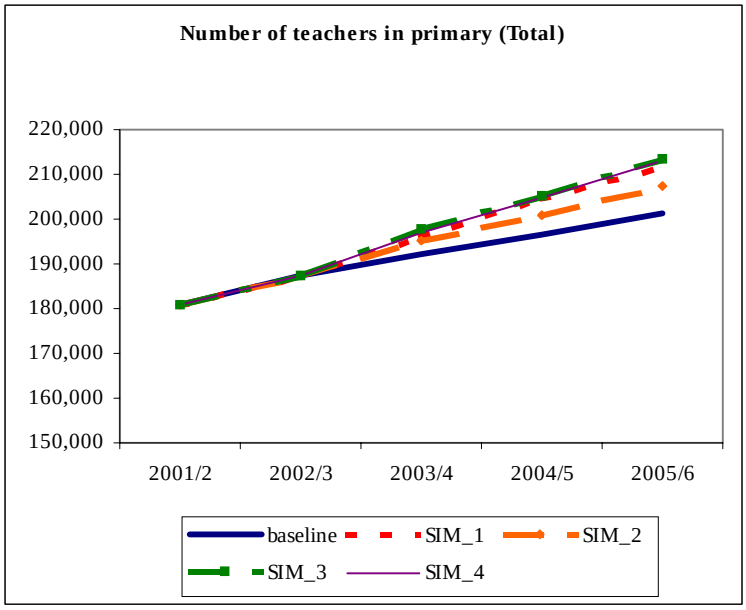


Figure 6a Scenarios I-IV: Net School Enrolment for the poorest quintile (Q1)

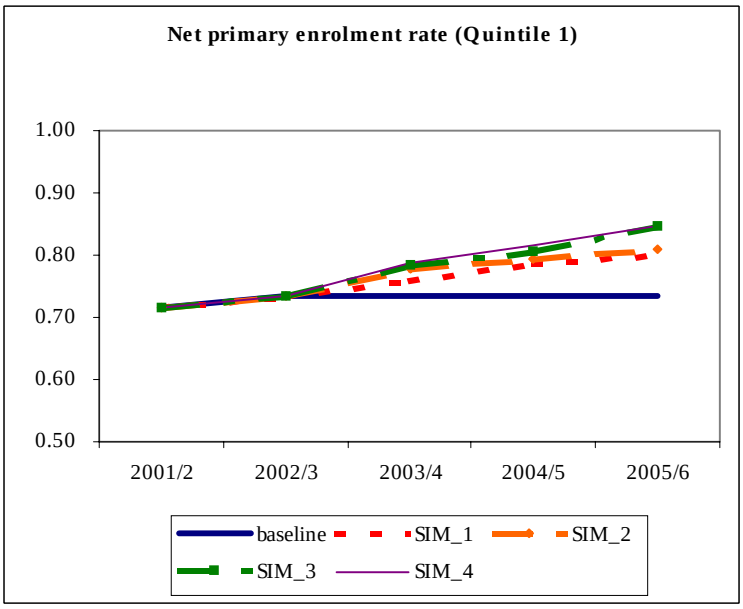


Figure 6b Scenarios I-IV: Net School Enrolment for quintile 2 (Q2)

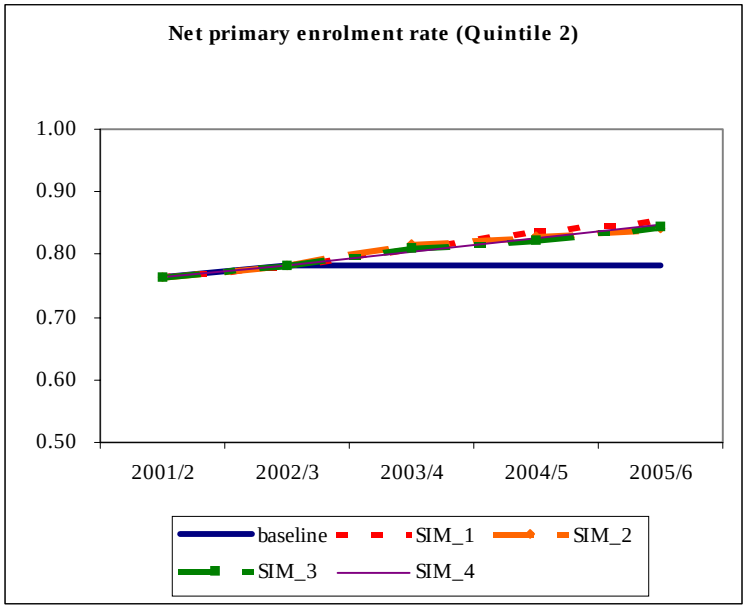


Figure 6c Scenarios I-IV: Net School Enrolment for quintile 3 (Q3)

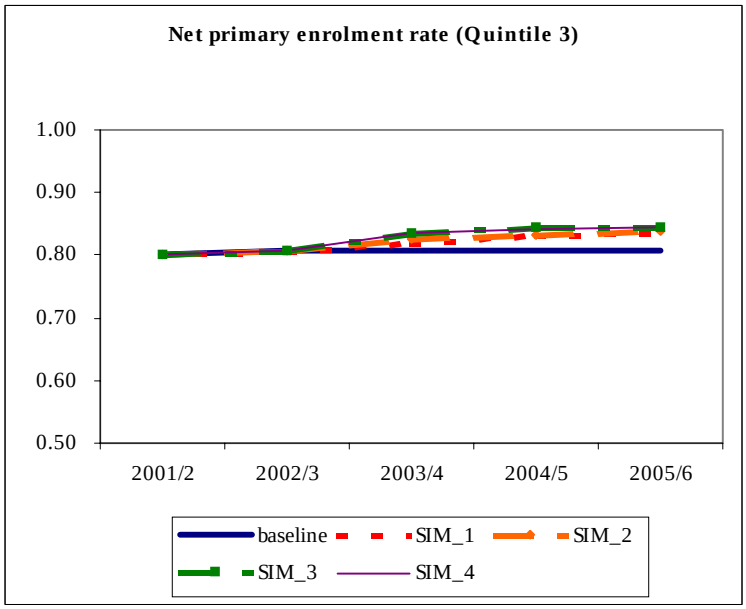


Figure 6d Scenarios I-IV: Net School Enrolment for quintile 4 (Q4)

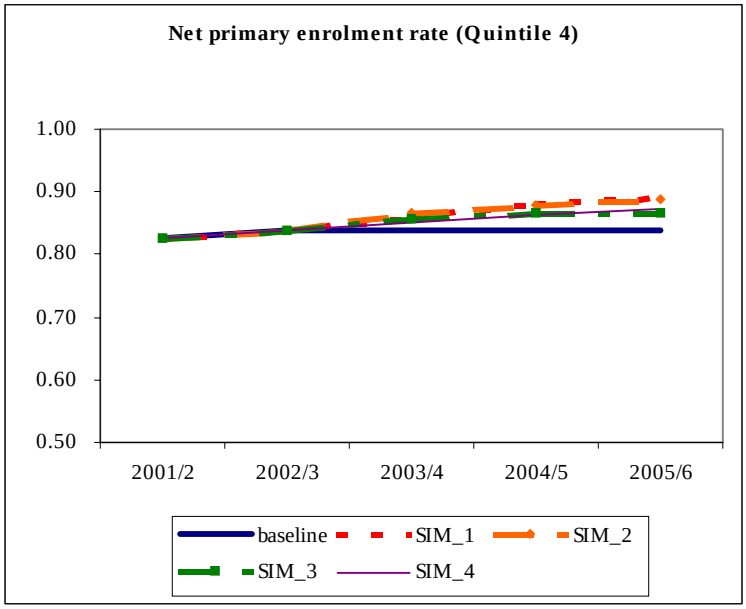


Figure 6e Scenarios I-IV: Net School Enrolment for the richest quintile (Q5)

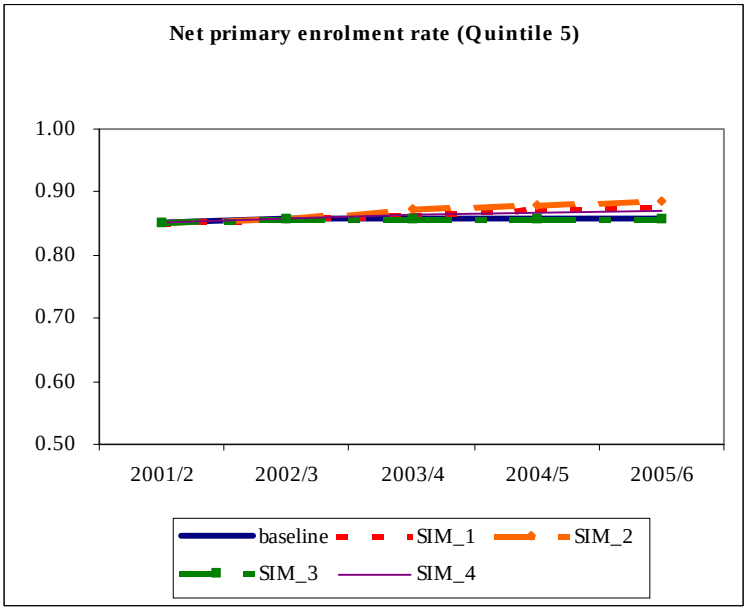


Figure 7 Scenarios V-VIII: Public Expenditures on Primary Education (Kshs.s Million)

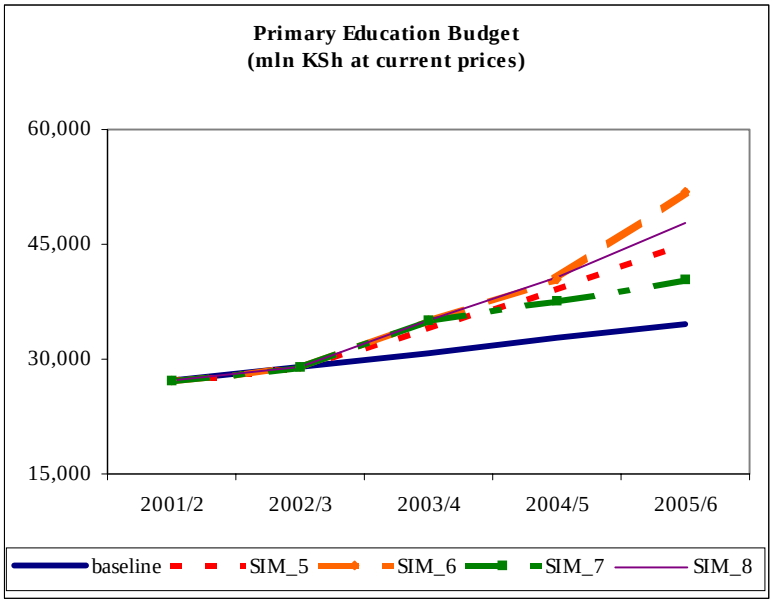


Figure 8 Scenarios V-VI: Real Expenditures per Pupil (primary) (Kshs.s)

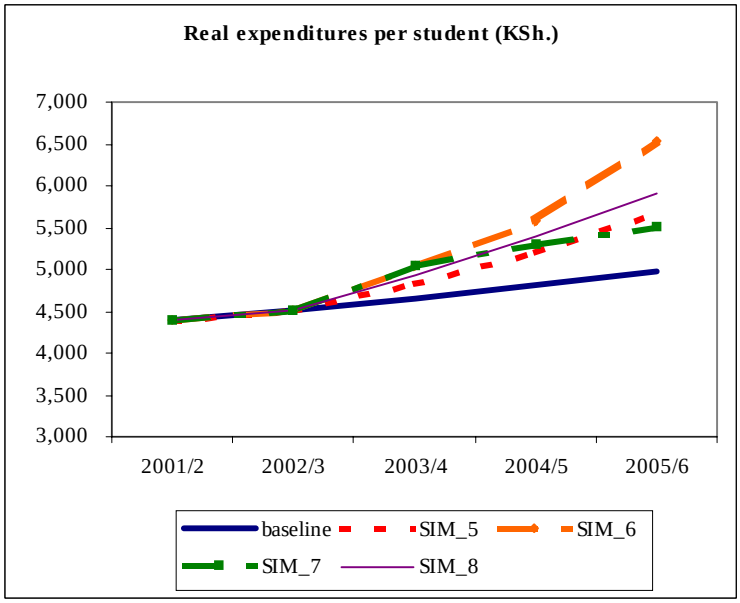


Figure 9 Scenarios V-VIII: Projected Macroeconomic Budget Overrun

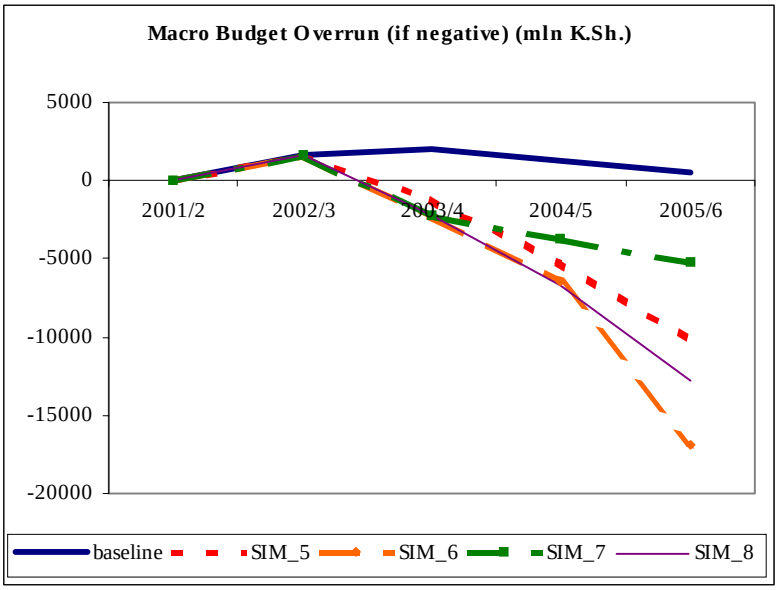


Figure 10 Scenarios V-VIII: Required number of teachers in primary education

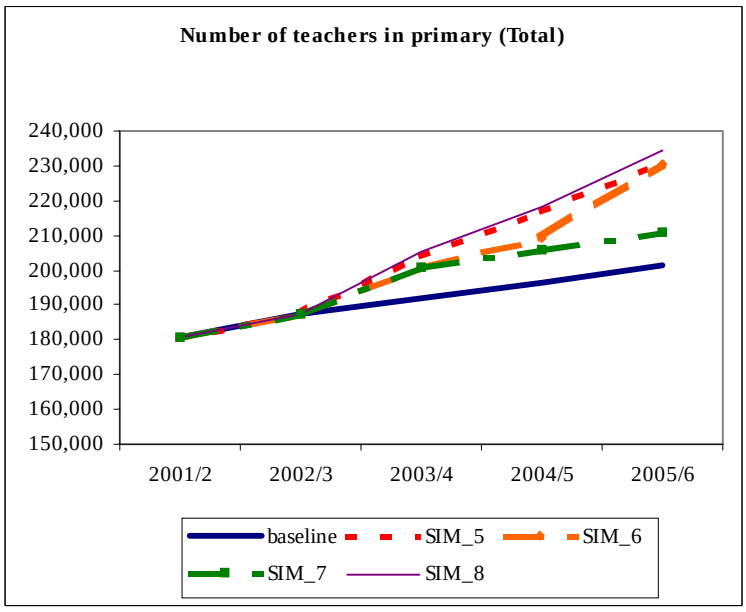


Figure 11 Scenarios V-VI: Net primary school enrolment rate

