



Financial sustainability in the development of secondary and tertiary education

The growth in enrolments in secondary and tertiary education gives rise to the very concrete issue of the physical and financial sustainability of scaling up post-primary education. In an attempt to address this issue, this chapter puts forward different simulations, making it possible to appreciate the probable evolution in enrolments at these two levels of education and what this would represent for the public budget. There are very few African governments that will be in a position to cover this new expenditure with their own resources. For the 29 countries considered in the simulations, a universal schooling of nine or ten years by 2020 would alone imply the multiplication of the lower secondary schooling supply by 6 before then, and would be far beyond the public financing possibilities of the great majority of countries. Some economies are conceivable, as well as the mobilization of other sources of funding, and, particularly, increasing participation by the families. The present situation of these levels of education would rather justify a reduction in quantity and greater promotion of the quality of education.

A growing demand for secondary and tertiary education ill-adapted to the possibilities of most countries today

The increasing number of pupils completing primary education today and their desire to continue education beyond this level¹ combine to place mechanical pressure on post-primary education that few African countries are sufficiently prepared for today. Indeed, most African countries experienced an upward trend in enrolments in secondary and tertiary education, after primary completion, towards the end of the 1990's, but this was not accompanied by the construction of more classrooms and lecture halls and the recruitment of new teachers on the same scale at these levels of education. This has resulted in conditions deteriorating in these levels of education². In addition, the (quite legitimate) accent placed on attaining Universal Primary Education (UPE) has been accompanied in some African countries by poor anticipation of the consequences of the massification of primary schooling on post-primary levels in sectoral programming and/or in the implementation of educational strategies in some sub-Saharan countries.

Today, many arguments are put forward to justify, not only an expansion in universal education to nine or ten years, but also the access of more young people to tertiary education in Africa. Regarding universal education of nine or ten years, some of the arguments, related to the constitution of human capital and economic development, are similar to those expressed several years ago to justify the promotion of UPE insofar, as the social effects after six years of schooling are further enhanced and consolidated with ten years schooling (cf. chapter 7). At the same time, some observers consider that UPE could, in time, carry the seeds of its «own destruction», thus putting the development of the educational pyramid as a whole at risk if it were to turn out that many young people could not go beyond primary education. In addition, today's society, based on information and knowledge, requires each country to have a critical mass of qualified human resources in order to ensure its development. Indeed, tertiary education produces fundamental expertise for the key development sectors (health, education, governance, private sector development, research development ...).

¹ On average 80% of pupils completing primary education accessed lower secondary education in 2005, compared to hardly 60% in 1990.

² The average GER in secondary education rose from 25% in 1998 to 35% in 2005 while the pupil-teacher ratio rose from 24% to 26% for the same period.

Will post-primary education in Africa be able to respond positively to a large share of this potential demand as it has done so far? In other words, are these rates of expansion (especially in upper secondary and in tertiary education) appropriate (considering the already unsatisfactory conditions of education and of supervision of students in many countries), realistic as to the economy (considering the low job opportunities available in the productive sectors³ on the one hand, and national development priorities on the other hand), and financially sustainable and possible in real terms (considering the number of places to be created and of teaching staff to be recruited and trained) even if the financial resources were to be available? Such are the questions that this chapter tries to answer.

This chapter draws on earlier work carried out by the Pôle de Dakar⁴ with the intention, further to other publications⁵ that have already tackled the issue, of providing factual information based on the latest available data on rates of expansion in post-primary education and the financial consequences of same per country, in order to enlighten national policy decision-makers as to relevant choices to be made in programming development policies for their education system. The different questions will be broached in turn for general secondary education⁶ in the first part of this chapter and for tertiary education in the second part.

3 Cf. chapter 7.

4 Cf. Amelewonou and Brossard (2005) and Brossard and Foko (2007).

5 Caillods and Lewin (2001), Mingat (2004), Lewin (2006), World Bank SEIA (2007). The results of the Mingat estimates have been used by Amelewonou and Brossard (2005) and by SEIA (Secondary Education in Africa).

6 Due to lack of disaggregated data per year of study in technical and vocational education at country level.



1. The case of general secondary education

1.1. Memorandum of elements related to context and to educational policy for the countries analysed

This section is comprised of two parts: the first concerns the projection of enrolments in secondary education, taking into account the progress made toward UPE and the assumptions for the development of secondary education; the second part estimates, on the basis of current unit costs of schooling, the financial consequences of these projections. This estimation is to be taken as an illustration and is limited to current expenditure⁷ of the system only.

Secondary education (general and technical/vocational) in Africa, as seen in chapter 3, is organized in two successive levels and can take on different forms, particularly in terms of duration and organisational mode. It is the connector between primary and tertiary education and it lasts from four to seven years, depending upon the country and the duration of primary education. **Analysis has been carried out for countries with a primary completion rate (PCR) of under 75% when complete data (2005 or closest years) is available for primary education and for both levels of general secondary education, i.e. a total of 29 countries⁸ in sub-Saharan Africa.**

The countries studied in the framework of this analysis, although having in common a low level of development of primary education, do not make up a homogeneous group as far as their demographic and economic context and the key parameters of their educational policy are concerned. Moreover, depending upon the level of development of their education system (particularly primary education) and their capacity to mobilize resources for it in general and more particularly for secondary education, the challenge to be faced for the expansion of the latter will differ from country to country. Before going into the issues related to rates of expansion, it is therefore useful to take another look at some elements of context and of educational policies, which are characteristic of the current situation of secondary education in these countries.

Table 6.1 shows the disparities between countries on these different elements compared to the average African situation⁹.

A very wide variation in primary completion and low secondary education coverage are characteristic of the countries studied

Primary completion rate in the group varies from 28% minimum to 74% maximum, with an average registering at 48% compared to 64% on the continent. The level of secondary education coverage being logically connected to primary coverage, the access and completion rates of the two levels of general secondary education register at 36% and 25% respectively for lower secondary and at 15% and 10% for upper secondary, which are very much below continental averages. It seems immediately clear that for some countries, where over one in two children do not complete primary education, it would not be reasonable to consider expansion of secondary education before making significant progress in terms of primary completion.

⁷ Investment expenditure is not considered here within logic of recurrent functioning of the system in a medium and long term perspective.

⁸ Out of the 37 countries with a primary completion rate lower than 75% in 2005 or closest years, Angola, Democratic Republic of Congo, Equatorial Guinea, Gabon, Guinea-Bissau, Liberia, Rwanda and Somalia were excluded from the analysis due to lack of data.

⁹ All average figures relating to the coverage indicators are population-weighted averages.

A low level of income per capita and low State capacity for appropriation of a part of national wealth

With the exception of Cameroon, Congo, Côte d'Ivoire, Djibouti, Lesotho and Swaziland, which have a GDP per capita of over 800 USD (the first three due to oil revenues, which have increased significantly over the past years, and the last three due to the high contribution from services and industry in the GDP), the other 23 countries in the group have a GDP per capita of under 600 USD. The average is under 300 USD, while the African average registers at just over 900 USD¹⁰. In these countries, the capacity of the State to mobilize a part of the national wealth varies from 8% to 25% of GDP with an average of 19% (17% excluding Lesotho and Swaziland which have an exceptionally high rate) while the continental average registers at 22% of GDP. In most of these countries, there is a predominating informal sector¹¹, which explains, at least partially, the difficulty for the State to appropriate a large share of the wealth created at country level.

...Combined with a strong demographic constraint weighing on secondary expansion

The demographic constraint is slightly stronger in the group of countries with low primary completion than on average on the continent. Indeed, the secondary school age group (12 to 18 year olds for most countries in the group) represents 17% of the total population on average for an African average of 16%. Out of the 29 countries, only Lesotho and Swaziland will see a significant reduction in the proportion of 12-18 year olds by 2015. However, for the other countries, the proportion of this age group will continue rising at more or less the same pace as the total population, which does not of course represent an advantage for the increase in school coverage in this level of education. In seven countries in this group, the demographic constraint will be extremely strong with annual growth rates of around 3%, while the average is 2% for the group as a whole. In some countries, the number of young people will even increase by over half between 2005 and 2020. Uganda and Niger are in top place with an average annual growth of over 3.5% for the coming 15 years.



¹⁰ This is a population-weighted average per country.

¹¹ Cf. chapter 7 on the social sustainability of post-primary education.

Table 6.1: Main context and policy indicators in secondary education in the countries studied, comparison with the African average

	Africa	Countries studied		
	Average	Average	Interval of variation	Number of countries
Macroeconomic and demographic context				
GDP per capita	923	269 ^a	90 - 673 ^a	23 ^a
State revenue (excluding donations) in % of GDP	22	19 (17)	8 - 28	29
Share of 12-18 year olds in total population (%)	16	17	15 - 20	29
Results (in %)				
Primary completion rate (PCR)	64	48	28 - 74	29
Lower secondary coverage				
Access rate to 1 st year	51	32	17 - 68	29
Access rate to last year	39	23	6 - 59	29
Gross enrolment rate	49	29	12 - 65	29
Upper secondary coverage				
Access rate to 1 st year	28	14	2 - 34	29
Access rate to last year	19	8	2 - 26	29
Gross enrolment rate	24	12	2 - 33	29
Key parameters of educational policy				
Current expenditure on education as % of State resources	18	20	8 - 30	29
Current expenditure devoted to secondary education (duration adjusted to 7 years) as % of current expenditure on education	36	34	35 - 99	23
Unit cost as % of GDP per capita				
Secondary as a whole including technical education	30	34	14 - 65	23
Lower general secondary	-	29	11 - 60	17
Upper general secondary	-	61	18 - 157	17
Transition rate (transversal) primary - lower general secondary (as a %)	80	68	19 - 52	29
Transition rate (transversal) between the 2 general secondary levels (as a %)	72	61	19 - 97	29
Percentage of repeaters (%)				
Lower general secondary	16	13	2 - 26	29
Upper general secondary	16	14	1 - 29	29
Share of private sector (%)				
Lower general secondary	20	21	5 - 43	17
Upper general secondary	22	24	8 - 47	17

Notes:

a/ calculations do not include Cameroon, Congo, Côte d'Ivoire, Djibouti, Lesotho and Swaziland. The value of the GDP is a population-weighted average.

b/ the figure in brackets does not take into account Lesotho and Swaziland, where the share of public revenue in the GDP is exceptionally high.

Source: Authors' calculations based on sector analysis and UIS data.

More budget priority to education than on average in African countries

The countries studied devote more resources to the education sector than countries on the continent on average: 20% of public revenue on average compared to 18% average on the continent. Depending upon the country, this share varies from under 10% to 30% of State revenue. As for the share of secondary education¹² (general and technical/vocational) in public current expenditure on education, this varies from 19% to 52% with an average of 34% compared to an average in Africa of 36%. This result is quite justified insofar as secondary education is less well developed in these countries compared to the average situation observed on the continent. In addition, on a sample of 17 countries where data is available, analysis of the share of the budget granted to secondary education per type of education (lower general, upper general and technical/vocational) shows that 56% of the budget for secondary education is devoted to lower general secondary¹³, 28% to upper general secondary and 16% to technical and vocational education and training (TVET). These proportions vary substantially from one country to another: from 37% to 66% in lower general secondary, from 14% to 45% in upper general secondary and from 3% to 32% in TVET.

Concerning the other factors related to educational policies, unit costs available for a sample of 17 countries vary between 10% and 60% of GDP/capita in lower general secondary education (average of 29%) and 18% and 157% of GDP/capita in upper general secondary education (average of 61%).

1.2. Different scenarios for rates of expansion in general secondary education

According to the projections made in chapter 2 of this report, only Cameroon and Madagascar, among the 29 countries studied here, will reach UPE by 2015 if their schooling conditions (repetitions and dropping out) observed in primary education in recent years remain unchanged over the next 10 years¹⁴. Aside from these two countries, Guinea and Lesotho will reach a primary completion level of over 80% by 2015, and the other countries will still have completion rates lower than 75% at the same date. Even if most countries have initiated reforms in their education systems that should contribute to significantly improving primary access and survival in the medium term, this result is nevertheless taken into account, as a working hypothesis, in the framework of the simulations. Two series of simulations are thus presented (box 6.1): the first, for the 27 countries where there is a risk of not reaching UPE, are based on the anticipated completion level estimated in chapter 2 and the second, carried out this time for all the countries, are based on the hypothesis that they will all have achieved UPE (a completion rate of 100% in 2015). Sierra Leone is not included in the first series of simulations due to significant fluctuations observed in primary access and survival in recent years (cf. chapter 2).

12 Due to lack of sufficient data on pre-school, literacy and non-formal education, the budget shares allocated to these sub-sectors (low compared to the other levels of education) are not taken into account here and the primary-secondary-tertiary education total has been set at 100% to compare countries. Moreover, as the gross figures do not enable country comparison insofar, as the duration of the levels of education varies from country to country, percentages have been adjusted to fit the commonest duration structure for primary and general secondary education in Africa (6 years for primary education and 7 years for general secondary education).

13 Just as for the share of expenditure allocated to secondary education as a whole, to enable comparability between countries, the figures have been adjusted in line with the most frequently observed durations for these levels of education on the continent : 4 years for lower secondary and 3 years for upper secondary.

14 Projected primary completion level for each country, based on access and survival rates observed over recent years.

Box 6.1. Method of calculation and hypothesis for expansion of secondary education

Projections made in this chapter are based on the number of pupils who will complete primary education in 2015, using the following two hypotheses: first, that this is the total obtained from projections on completion rates in 2015 made in chapter 2 (case 1 below) and second, that all children complete primary education, i.e. considering that all countries will have reached UPE in 2015 (case 2 below). On the basis of this total and the rate of transition between primary and lower secondary education, the number of pupils, who access lower secondary education is estimated among those who complete primary education. Then, the number of children reaching the last year of lower secondary and the total number to be enrolled in lower secondary education are estimated on the bases of the values of repetition and survival rates in the level. The same process is used for secondary education, but starting this time from the number of pupils who complete lower secondary education and the transition rate between lower and upper secondary education. In order to allow for country specificities in the simulations, the projections are made separately for each country on the basis of a simulation model per country; this is the same process as used by Mingat in 2004 in his study on the issues of financial sustainability in the development of secondary education.

In both cases, only three scenarios are presented although many scenarios are possible.

Case 1 : simulations based on the anticipated level of primary completion rate in 2015

Hypothesis for expansion of lower secondary education

- Scenario A1: status quo of all the parameters in lower secondary education on the period i.e. primary → secondary transition, survival and repetition maintained at their 2005 value.
- Scenario B1: progressive increase in transition rate from its 2005 value to 100% by 2015 and survival and repetition maintained at their 2005 values.
- Scenario C1: progressive increase in transition rate to 100% by 2015 along with an improvement in survival. 80% survival in 2015 for countries below that value in 2005 and this value being maintained in the opposite case and reduction in repetition to reach 10% in countries with a higher value in 2005 and this value being maintained for the other countries.

Hypothesis for expansion of upper secondary education

Several scenarios can be derived from the three envisaged for lower secondary education, but only three are selected here, the first stipulating a status quo and the other two aiming at improved internal effectiveness.

- Scenario A2: A1+ status quo on the other parameters of the level.
- Scenario B2: B1 + transition between the two levels to be maintained, survival to be improved. 80% survival in 2015 (for countries below that value in 2005 and this value being maintained otherwise; reduction in repetition to reach 10% in countries with a higher value in 2005 and this value being maintained for the other countries.
- Scenario C2: C1 + transition between the two secondary levels to be maintained, survival to be improved. 80% survival in 2015 for countries below that value in 2005 and this value being maintained reduction in repetition to reach 10% in countries with a higher value in 2005 and this value being maintained for the other countries.

Case 2 : simulations based on the achievement of UPE

Hypothesis for expansion of lower secondary education

- Scenario A1 : status quo on all parameters in lower secondary education
- Scenario B1: progressive increase in transition rate to 100% by 2015 and status quo on survival and repetition.
- Scenario C1 : universal enrolment of nine or ten years duration (depending upon the duration of primary and lower secondary education), primary → secondary transition of 100% in 2015, survival of 100% in 2020¹⁵ along with a reduction in repetition to reach 10% in countries with a higher value in 2005 and this value being maintained otherwise.

Hypothesis for expansion of upper secondary education

- Scenario A2: A1 + status quo on the other parameters of upper secondary.
- Scenario B2: B1 + transition between the two levels maintained, improved survival. 80% survival in 2015 for countries below that value in 2005 and this value being maintained reduction in repetition to 10% in countries with a higher value in 2005 and this value being maintained otherwise.
- Scenario C2: C1 + transition between the two secondary levels maintained, improved survival. 80% survival in 2020, for countries below that value in 2005 and this value being maintained otherwise; reduction in repetition to 10% in countries with a higher value in 2005 and this value to be maintained otherwise.

15 Considering that primary completion is scheduled for 2015 and that the duration of lower secondary education must be allowed for 100% access in 2015 in lower secondary (due to primary-secondary transition set at 100% in 2015) and 100% lower secondary completion in 2020.

When the duration of primary education and lower secondary education are combined, a pupil, completing lower secondary in the countries studied, spends between seven and eleven years in school, if he never repeats. In order to facilitate comparison between the growth rates according to the different scenarios, the results are presented per group of countries, according to the duration of study (cf. table 6.2).

Table 6.2: Countries grouped as to the theoretical number of years necessary to complete lower secondary education

11 yrs (2 countries)	10 yrs (18 countries)	9 yrs (7 countries)	7 or 8 yrs (2 countries)
Uganda, Tanzania	Benin, Burkina Faso, Burundi, Cameroon, Comoros, Congo, Côte d'Ivoire, Djibouti, Guinea, Niger, Central African Republic, Senegal, Chad, Togo, Lesotho, Ethiopia, Malawi, Swaziland	Gambia, Ghana, Mali, Madagascar, Mauritania, Mozambique, Sierra Leone	Sudan (8 yrs) Eritrea (7 yrs)

Source: Grouping based on UIS and national data

Even in the hypothesis of not achieving UPE in 2015 (case 1), some countries will have to multiply their secondary capacity by at least two by then, in order to enrol their pupils in the same conditions as in 2005.

Supposing that some countries do not reach UPE by 2015 and that the primary to secondary transition rate and current schooling conditions in lower secondary education are maintained (scenario A1), the number of enrolments at this level of education for all 26¹⁶ countries would rise from 7.8 millions in 2005 to 13.5 millions in 2015. Supposing a progressive increase in transition between the two levels of education targeting 100% in 2015, and maintaining constant values in survival rates and in the proportion of repeaters at the 2005 level (scenario B1), the number of enrolments in lower secondary would rise to 21.3 millions, i.e. multiplied by 2.7 compared to 1.7 in the first scenario. The multiplication factor would rise to 3.0 in the case of scenario C1, i.e. in case of an improvement in survival (on average at least 80% of pupils accessing first grade reach final grade) and a reduction in repetitions (at the most 10% of repeaters per country). The total number of pupils in this scenario would register at 23.6 millions for the 26 countries as a whole on the horizon of 2015.

In upper secondary education, according to the different scenarios derived from the three hypothesis for the development of lower secondary education, the number of enrolments would rise respectively from 2.4 millions in 2005 to 4.1 millions (status quo in the two levels of education), 6.6 millions (transition of 100% in lower secondary, status quo on survival and repetition in lower secondary and on all parameters of upper secondary) and 9.1 millions (in the case of 100% transition in 2015 between primary and secondary and a significant improvement in internal effectiveness of lower and upper secondary education). The latter hypothesis supposes an increase in survival (at least 80% of pupils accessing the first grade reach the final grade) and a decrease in the proportion of repeaters (at the most 10% of repeaters per level) in the two levels.

¹⁶ According to the projections made in chapter 2, only Cameroon and Madagascar will reach UPE by 2015 out of the 29 countries studied. Sierra Leone was not included in these initial simulations.

Table 6.3: Multiplication factor of secondary enrolments in 2015 per group of countries according to 3 reference scenarios on the hypothesis of non-attainment of UPE

	Total pupils in secondary education in 2005 (or closest year) (000's)		Multiplication factor of total secondary enrolments					
	lower	upper	lower secondary			upper secondary		
			A1	B1	C1	A2	B2	C2
Group 1 (2 countries)	1 114	138	1.7	4.5	5.1	1.7	4.4	6.4
Group 2 (17 countries) ^a	4 165	1 024	1.9	2.8	3.2	1.8	2.8	4.0
Group 3 (5 countries) ^b	1 640	555	1.6	2.2	2.4	1.7	2.5	3.0
Group 4 (2 countries)	890	677	1.1	1.3	1.2	1.1	1.4	1.3
Overall (26 countries)	7 810	2 395	1.7	2.7	3.0	1.7	2.7	3.8

- Group 1: 11 years of schooling (primary + lower secondary)
- Group 2 : 10 years of schooling (primary + lower secondary)
- Group 3 : 9 years of schooling (primary + lower secondary)
- Group 4 : 8 years of schooling in Sudan and 7 years in Eritrea

a) Except Cameroon, country that will reach UPE by 2015 according to the projections.

b) Except Madagascar, which will reach UPE by 2015 according to the projections and Sierra Leone, due to fluctuations in basic data.

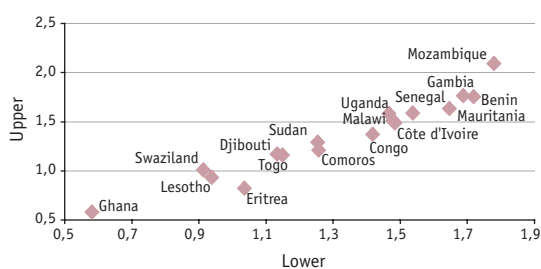
Source: Authors' calculations based on sector analysis, UIS data and population data from the United Nations population division.

At country level (cf. appendix 6.1), the growth rates can be seen to vary greatly, according to the different scenarios. Even in the hypothesis of non-attainment of UPE, with a constant transition rate and supposing a constant value for the key parameters of the two levels of education over the whole period, 9 out of the 26 countries (graph 6.2) in the group will have to multiply their schooling supply by at least two in secondary education by 2015, in order to answer the schooling demand at this level of education. Burkina Faso, Niger and Chad will have to multiply their schooling supply by three. Knowing that on average the schooling conditions, in terms of available places and pupil-teacher ratio, are not currently very satisfactory, this result constitutes an important element to be taken into account when giving consideration to the possibilities of expansion in secondary education. In the same scenario, Ghana, Lesotho and Swaziland show the lowest increases (multiplication factor less than 1), due to a fall in the number of pupils completing primary education and, therefore, to be enrolled in secondary education compared to 2005. For Ghana, this drop is the result of an estimated fall in PCR in 2015 compared to 2005 (cf. chapter 2) and, for Lesotho and Swaziland, of the beginning of demographic transition while anticipated completion rates are higher than in 2005.

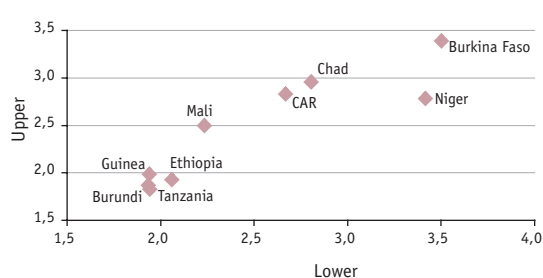


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Graph 6.1: Multiplication factor of under 2 for enrolments in secondary education - hypothesis of not reaching UPE and status quo on secondary parameters.



Graph 6.2: Multiplication factor of over 2 for enrolments in secondary education - hypothesis of not reaching UPE and status quo on secondary parameters.



Source: Authors' calculations based on sector analysis and UIS data.

Universal education of nine or ten years on the 2020 horizon would imply a six-fold increase in schooling supply in lower secondary education on average in the 29 countries.

Supposing that UPE would be achieved by 2015, that transition rates between primary and secondary, and survival rates and the proportion of repeaters all maintained at 2005 values, then the number of enrolments in lower secondary education for all 29 countries would rise from 9.1 millions in 2005 to 25 millions in 2015, i.e. multiplied by 2.8. If transition between primary and lower secondary education was then progressively increased, in order to reach 100% by 2015, and survival rate and the proportion of repeaters maintained at constant values, the number of enrolments in lower secondary would be 38.8 millions, which would imply on average a four-fold increase of current supply. Finally, the number of enrolments in this level of education is estimated at 52.6 millions supposing that universal education of nine or ten years is achieved by 2020. The last scenario would imply multiplying the number of pupils in lower secondary by 6 on average by 2020 in the countries overall.

Allowing for the specificity of the different groups, in the hypothesis of universal lower secondary completion, the growth in the number of enrolments in that level compared to 2005, would vary on average by a factor 5 (for schooling of nine or ten years) to around 9 (for eleven years of universal schooling). At country level, the multiplication factor ranges from 1.6 in Swaziland to 17.3 in Niger.

The countries to be confronted with a spectacular increase in enrolments, based on this hypothesis (cf. graph 6.5), started out from quite a low primary completion level in 2005. With the exception of Benin, Senegal, Uganda and Tanzania, less than one child in two completed primary education in these countries in 2005. On the one hand, Burkina Faso (31% PCR in 2005), Burundi (36%), Central African Republic (31%), Chad (35%) and Niger (28%) should enrol ten times more pupils on average in 2020 than in 2005, in order to ensure universal secondary education for their populations. On the other hand, less effort (from a two to three-fold increase in their present schooling supply) will be needed for countries like Swaziland, Ghana, Gambia, Lesotho and Togo to ensure universal secondary education for their populations.

Table 6.4: Multiplication factor of secondary enrolments in 2015 and 2020 per group of countries according to three reference scenarios on the hypothesis of attainment of UPE

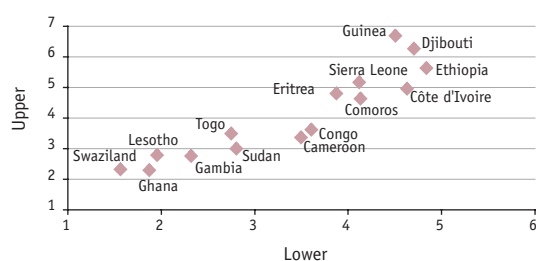
	Total pupils in secondary education in 2005 or nearest year (in 000's)		Multiplication factor of secondary enrolments					
	lower	upper	lower secondary			upper secondary		
			A1	B1	C1	A2	B2	C2
Group 1 (2 countries)	1 114	138	2.3	6.0	8.6	2.3	5.9	11.6
Group 2 (18 countries)	3 065	955	2.2	3.5	4.6	2.2	3.5	5.9
Group 3 (7 countries)	2 282	707	2.5	3.7	4.9	2.6	4.0	7.0
Group 4 (2 countries)	890	677	2.5	2.9	3.3	2.3	3.0	3.9
Overall (29 countries)	9 087	2 774	2.8	4.3	5.8	2.7	4.3	8.0

Source: Authors' calculations based on sector analysis, UIS data and population data from the United Nations population division

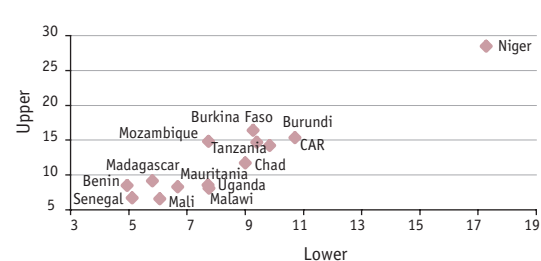
For upper secondary education, according to scenarios A2 (status quo) and B2 (improvement in the internal effectiveness of this level), both derived from scenarios A1 and B1, the needs in number of places, compared to what is available today in this level, should be multiplied on average by 2.8 and 4.3 respectively. However, supposing universal completion of lower secondary and an improvement of internal effectiveness of upper secondary, with transition between the two levels maintained, then it would be necessary to enrol 8.0 times more pupils on average in 2020 than in 2005. The latter scenario would imply enrolling 22.2 millions of pupils on average in 2020 in this level of education compared to 2.8 millions in 2005.

For some countries, especially those in graph 6.4, there is an obvious risk of constraints connected to the physical feasibility of previous rates of expansion (construction of equipped classrooms, recruitment and training of teachers), even if resources were available.

Graph 6.3: Multiplication factor of under 5 for enrolments in secondary education - hypothesis of achieving universal education of nine or ten years



Graph 6.4: Multiplication factor of over 5 for enrolments in secondary education - hypothesis of achieving universal education of nine or ten years



Source: Authors' calculations based on sector analysis, UIS data and population data from the United Nations population division

1.3. Suchlike rates of expansion will have high financial consequences

Earlier studies¹⁷ have all reached the conclusion that the current modes of organization and of provision of education services in the public sector, at both levels of secondary education, would not enable a significant increase in enrolment at these levels. These conclusions, which were reached on the hypothesis of achieving UPE by 2015, and confirmed by Amelewonou and Brossard (2005) and by the World Bank (SEIA 2007), are accepted unanimously today at country level and also by technical and financial partners. The financial implications of the scenarios presented above, once again, confirm these results.

Scenarios A2 (hypothesis of not reaching universal completion and status quo on the parameters of the two levels of secondary education) and C2 (universal completion of lower secondary, transition between the two levels of education maintained and improvement in internal effectiveness of upper secondary education) are used for estimating current expenditure for each level. This only takes into account 17 countries where recent data is available on the share of current expenditure on education in State resources and on public expenditure per pupil (unit costs) in public education, for the two levels of secondary education. Estimated current expenditure for each level is expressed as a percentage of current public expenditure liable to be mobilized for the sector.

Again, several different scenarios can be explored on the basis of possible evolution:

- i) of macroeconomic aggregates (GDP and State's own resources);
- ii) of the share of current expenditure on education in the State's own resources and of the share of secondary education in current expenditure on the education sector;
- iii) of the modes of organization, financing and provision of education services (public expenditure per pupil in the public sector, proportion of pupils enrolled in private education, etc.).

The hypothesis concerning the evolution of macroeconomic aggregates is derived from a macroeconomic frame per country, on the following hypotheses. Depending upon the country, the average annual GDP growth rate is situated between 4 and 6% over the whole period; as for internal State resources, these are improved or maintained constant compared to their 2005 value. The share of education in State resources is set at 20% on the 2015 horizon for countries allocating less than that value in 2005 and maintained at the current value otherwise. As for expenditure per pupil and the proportion of pupils enrolled in the private sector¹⁸, the respective values are also maintained at the 2005 values in both levels of education. The absence of a reference framework as for primary education (Fast Track Initiative indicative framework) limits the possibility of proposing unit costs here, which could be connected to what would be considered an optimum situation by the different countries¹⁹, although Mingat (2004) and Amelewonou and Brossard (2005) have put forward possible trends for the unit costs of education. In addition, supposing that the countries involved would want to further improve the quality of education in upper secondary education (in order to prepare pupils for quality tertiary education) by improving the scientific and technological courses of study, it cannot be excluded that supplementary costs would arise for restoration of the system and the necessary equipment (laboratories, computer facilities, ...). Looking for scenarios to bring about a reduction or an increase in expenditure per pupil can be multiplied to infinity but the job of identifying quantitative and qualitative goals must take place first and foremost at country level, on the basis of a dialogue aimed at defining what is socially desirable and financially realistic for the country.

17 Cf. Lewin (2006), Mingat (2004) and Caillods (2001).

18 In concrete terms, this proportion would have had to be reduced insofar as the extension of secondary education will take place through the extension in supply to rural areas, where parents do not have the means to enrol their children in private structures.

19 The World Bank and the Agence Française de Développement are in the process of working together, in order to arrive at setting up a reference framework in secondary education.

Table 6.5. Current expenditure in secondary education as a percentage of resources available for education, according to two scenarios

Country	Current unit costs (% of GDP/capita)		Non-achievement of UPE and status quo on all parameters of secondary education			Universal lower secondary completion by 2020, transition between the two levels maintained and an improvement in internal effectiveness in upper secondary education		
	lower	upper	lower	upper	overall	lower	upper	overall
Benin	16	56	22%	19%	41%	52%	74%	125%
Burkina Faso	39	84	80%	34%	114%	165%	129%	295%
Burundi	60	96	317%	98%	415%	1404%	671%	2074%
Cameroon ^a	32	-	-	-	43%	47%	20%	66%
CAR	11	37	25%	27%	52%	122%	175%	298%
Chad	27	36	76%	38%	114%	195%	121%	315%
Congo	11	37	15%	13%	28%	35%	31%	66%
Côte d'Ivoire	35	72	14%	9%	23%	33%	24%	58%
Ethiopia	28	47	143%	28%	171%	264%	65%	329%
Guinea	13	18	42%	19%	61%	70%	46%	116%
Madagascar	27	64	85%	43%	128%	164%	126%	290%
Mali	36	124	64%	42%	106%	139%	99%	238%
Mauritania	40	34	30%	16%	46%	95%	62%	156%
Niger	49	157	143%	52%	194%	588%	430%	1018%
Senegal	15	70	11%	16%	27%	26%	47%	72%
Sierra Leone	27	29	95%	28%	122%	140%	53%	193%
Togo ^b	22	34	-	-	-	111%	52%	164%

a) Not concerned by this simulation.

b) Figures not presented due to the drop in total enrolments in secondary education further to a fall in primary completion rate as per projections in chapter 2.

Source: Authors' calculations based on sector analysis data

Whatever configuration is envisaged for the development of secondary education, the estimated results show that the financial consequences for each country are far beyond what is sustainable with public financing.



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2. The case of tertiary education

Chapter 3 demonstrated that tertiary education, just like secondary education, is undergoing remarkable expansion in Africa. It appears very likely that due to the expansion of secondary education, as can be anticipated on different hypotheses (cf. previous section), the number of potential candidates for enrolment in tertiary education will considerably increase in the coming decade.

This section, in three parts, begins by examining the current quantitative expansion of tertiary education in Africa and, on the basis of the trends observed, provides an estimation of the number of students on the 2015 horizon. The second section examines the implications for public finances, taking into account current modes of organization and of provision of education services. Finally, the last section tackles the sustainability of current rates of expansion on physical and logistical levels (increase in the intake capacity of training structures, decentralization of existing institutions, recruitment and training of teaching staff, etc.).

2.1. There is growing demand for tertiary education in Africa and this trend could continue

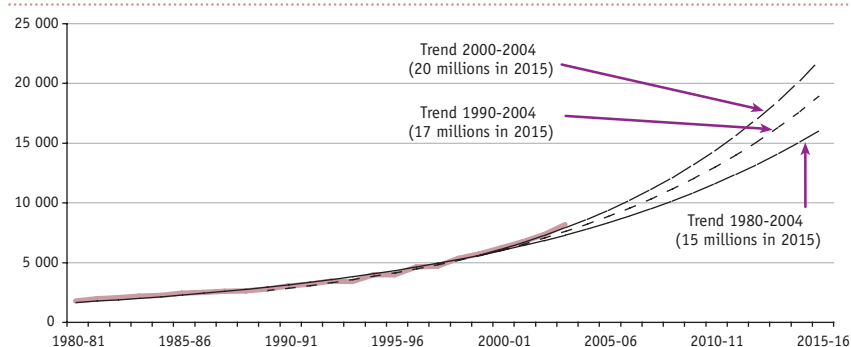
On the continent as a whole, the number of students in tertiary education increased from 5.6 millions in 2000 to 8 millions in 2004, i.e. an annual average increase of 9.5%, compared to only 7.8% per year between 1990 and 2000 (tertiary education in Africa only accounted for 2.6 millions of students in 1990). Thus, there is clearly a significant rise in demand for tertiary education, which was addressed so far by the present structures «absorbing» each year a rising number of students. That said, the rate of expansion of tertiary education, although greater over the recent period, has not been homogeneous in each country. Between 2000 and 2004, it varied from 3 to over 15% per year depending upon the country. It is on the basis of these initial conditions, obviously specific to each country, that the perspectives of evolution in the demand for tertiary education can be envisaged in Africa for the coming 10 or 15 years.

Following the example of the simulations made for secondary education in the previous section, several «models» for the expansion of tertiary education supply can be considered. One option would consist in taking more or less into account, for each country, technical, economical, financial and political factors likely to be favourable to or restrict the quantitative expansion of tertiary education. It is known for example that in a given context, the demand for highly qualified labour (and thus the demand for graduates) increases as the economy develops and becomes more diversified. In this way, human resources planning models were developed on the perspectives of development at country level and the needs for qualified and unqualified labour.

Another option would be to simulate the future evolution in enrolments, based on ongoing dynamics both in upper secondary education (total enrolled in the last grade of this level, total successfully completing secondary education) and in tertiary education itself (access rate to tertiary education, number of students, number of leavers, etc.). Such an approach supposes that two key parameters are known regarding the transition between upper secondary and tertiary education, but which are only available for a limited number of countries in the region: transition rate to tertiary education and the number of tertiary education graduates and dropouts (or complementarily, the survival rate in tertiary education).

In the absence of this data, it is nevertheless possible to use the rates of growth in enrolments in tertiary education over the current period or in the recent past, as a reference for projections. In this way, three projections, as to the demand for tertiary education in 2015, have been produced. They were conducted separately for each country (in order to take into account the initial conditions of each country) then aggregated for the countries as a whole.

Graph 6.5: Number of students in tertiary education in Africa between 1980 and 2004 (in thousands) and projections in 2015 according to three scenarios.



Source: Calculations based on sector analysis, UIS and World Bank data

The first, based on a hypothesis of low growth in enrolments, i.e. the average observed during the last 25 years (between 1980 and 2004), suggests that around 15 million potential students will knock on the doors of tertiary education in Africa in 2015. This figure is however underestimated since it does not take into account the increase in the growth rate in enrolments since 1990. The second projection is based on trends observed since 1990, but also underestimates the potential demand insofar, as it is known that the actual number of students has in fact increased more since 2000 than between 1990 and 2005. The last projection is based on the most recent rates of expansion (since 2000) observed in the different countries. There is undoubtedly a strong probability of it being close to «potential demand» for tertiary education in 2015. This is why we shall examine this projection further. It suggests that if the expansion of tertiary education continues at the current pace, the number of students will more than double (multiplication by a factor 2.5) between 2004 and 2015. In other words, in these conditions, **around 20 millions of students could knock on the doors of tertiary education in Africa in 2015** (including 9.4 millions in the poorest countries²⁰ of the region), compared to around 8 millions actually enrolled in 2004 (including 3.1 millions in the poorest countries).

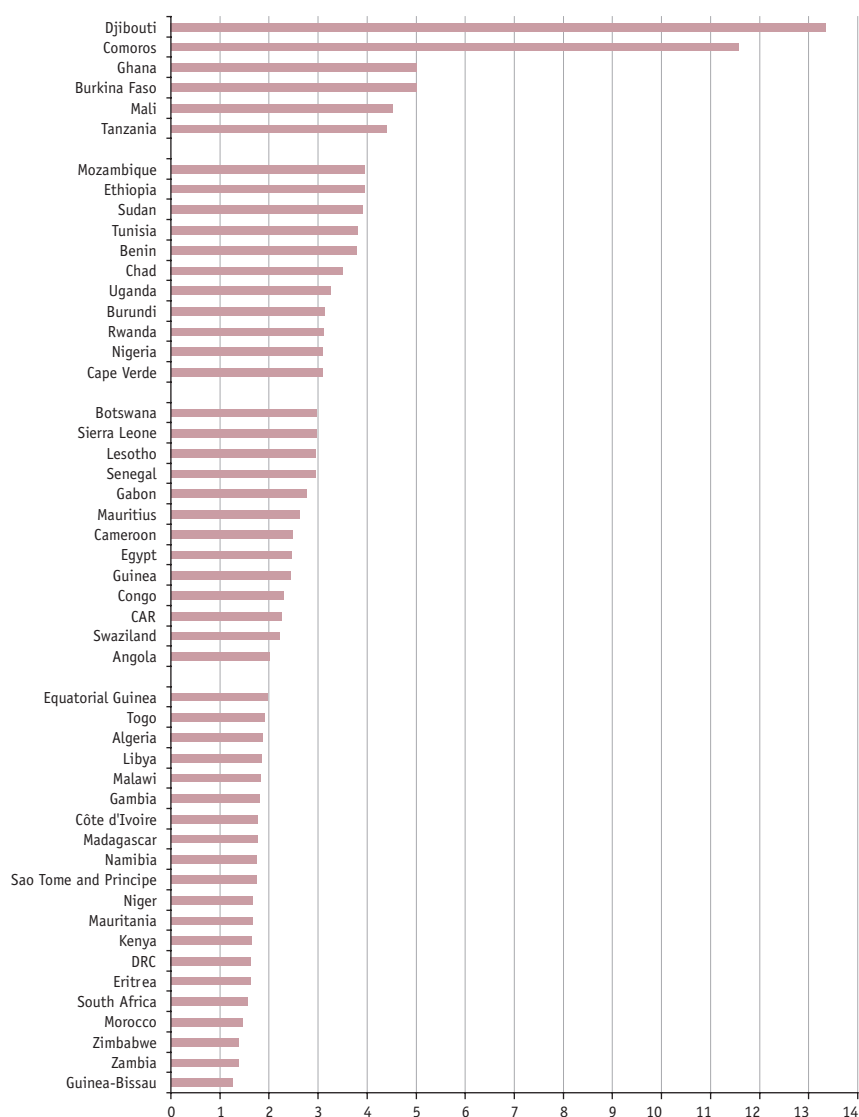
The outcome of the latter projection varies greatly on average from country to country. In half of the countries where the projections have been made, growth rates in potential demand are expected to be far beyond the average trends on the continent as a whole. Thus, for the 50 countries for which projections have been made, graph 6.6 indicates a need for almost double the number of places in tertiary education in 2015 than at present in 20 countries. Included here are countries with high student populations (Algeria, South Africa, Morocco and Libya) but also countries with lower populations that have taken steps to regulate access to tertiary education (case of Niger) or, with a still embryonic tertiary education system, awarding grants to a large share of their students abroad (case of Guinea-Bissau in particular).

For 13 countries, the need is estimated at between 2 and 3 times the number of places available today whilst for the 17 remaining countries, the potential demand for tertiary education should be even higher if current trends were to continue: the number of students in 2015 could be 3 times higher than it is today. For these countries, should current paces of growth be maintained, this would lead to a true «explosion» of the social demand for tertiary education.

²⁰ The classification of countries, according to their level of income, is the one used in a recent World Bank publication (cf. World Bank, 2005b).

The different countries must anticipate the consequences of this strong increase in demand for tertiary education, as to the internal functioning of the tertiary education system (intake capacity, teaching conditions, students supervision and quality of education), its external effectiveness (relevance to the needs of the job market) and financing to mention but these three aspects²¹. Insofar as the State is the main provider of services in tertiary education (and therefore the main source of financing for education and research) in most countries in the region, only the physical and financial consequences of such an expansion for the national public finances are analysed here.

Graph 6.6: Multiplication factor of increase in enrolments in tertiary education in Africa between 2004 and 2015, taking into account current rates of expansion (simulations)



Source: Appendix 6.3

²¹ The issue of the economic and social relevance of this expansion will be dealt with in chapter 7.

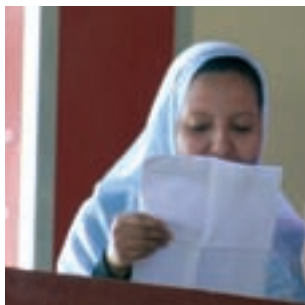
2.2. The current rates of expansion will not be financially sustainable in many countries

Simulations have been made in order to propose a rapid assessment of the financial viability of the perspectives of expansion in tertiary education in Africa. The process is the same as the one used by Brossard and Foko (2007), who have carried out a similar study in French-speaking African countries. Globally, this process is based on hypothesis related, on the one hand, to national public resources liable to be mobilized for tertiary education and, on the other hand, to total costs (current and investment) necessary for the expansion of the systems. Hypothesis can also be made on the volume of international aid in favour of tertiary education, policies for allocation of grants to students abroad, and financial aid granted to the private education sector. Factual information for the most recent year is provided in table 6.6.

2.2.1. A glance at the current financing structure

The issue of the financial viability of expansion projects for the sub-sector (it is also valid for the other levels of education) makes sense when reasoning is based on public resources generated locally (public resources excluding donations). All African countries must seek the financial sustainability of development in tertiary education (taking into account the quantitative dynamics mentioned earlier) but it is especially crucial for the poorest countries insofar, as they have a narrow tax base and, as a result, more constrained public resources. In these countries, public revenue only represented 16% of GDP on average in the recent period, compared to 28% in middle-income African countries (table 6.6). This indicator is very much dependent on the taxation potential and national macroeconomic performance.

Aside from this tax base, public resources allocated to tertiary education vary according to the priority granted to education in the budget trade-offs within education, in the priority granted to tertiary education. In the low-income African countries, the education sector benefited from around 18% of public revenue in the most recent years (a figure varying from 5 to 30% depending upon the country) and tertiary education from 22% of public current expenditure on education (depending upon the country, this figure varies from under 10 to over 30%).



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Table 6.6: Parameters affecting the mobilization of public resources and current expenditure for tertiary education, African countries, 2004 (or closest year)

	Africa	Middle-income African countries	Low-income African countries		
			Average	Interval of variation	Number of countries
Government revenue (excluding donations) as % of GDP	21.7	28.3	16.4 ^a	8 - 26 ^a	33 ^a
Current public expenditure on education as % of public revenue ^b	17.7	15.5	18.4	5 - 34	37
Current expenditure for tertiary education as a % of current public expenditure on education	21.3	20.0	21.7	8 - 40	33
Public expenditure per student in public tertiary education as a % of GDP per capita	305	99	374	57 - 1 489	30
Share of students in public tertiary education (%)	73	58	79	57 - 96	26
Number of students per 100 000 inhabitants ^b	911	2 278	486	34 - 1 040	38

Note: *a/* Does not take into account Congo, Nigeria, Lesotho and Angola, where the share of public revenue in the GDP is exceptionally high (around 40%). The average would be 19.3% if these countries were taken into account. *b/* Weighted average.

Source: Authors' calculations based on sector analysis, UIS, World Bank and the Pôle de Dakar data

Public current expenditure for tertiary education, expressed as a percentage of GDP, ranges from 0.3 to 1.2% in low-income countries in Africa, for an average of 0.72%. This wide variation (of factor 1 to 4) between countries is due to the differences in public expenditure per student and the number of students in the public sector. In the present situation, public expenditure per student is estimated at around 3.7 times the GDP per capita on average in low-income African countries but varies from less than once the GDP per capita in Cameroon or in Democratic Republic of Congo to over 7 times the GDP per capita in countries such as Rwanda, Burundi, Mozambique, Ethiopia or Malawi. Finally, it is estimated that around 20% of students in these countries were registered in private institutions in 2004, and this ranges from 4 to 43% depending upon the country.

2.2.2. It will be difficult to sustain rates of expansion in African tertiary education at current pace and costs and there is a call for urgent reforms in order to safeguard the quality of the education service

Four scenarios have been tested, in order to assess the financial sustainability of expansion in tertiary education in Africa at present pace and costs. **Thus, they are all based on the hypothesis that provision in education would positively address the potential demand estimated earlier** (the third projection). The issue here is to know if the public budget resources for tertiary education will cover the needs in financing incurred, taking into account the current modes of organization of the education services (courses of study offered, role of distance learning and volume of private education supply, etc.), the average study conditions provided to students and the quality of services (access to documentary resources, availability of resources for research and in-service teacher training, etc.).

While the hypothesis concerning the potential demand for education is not questioned at this point in the analysis, it is still possible to **envisage several hypotheses as to the public budget effort for the education sector in general and for tertiary education in particular** and/or methods of providing services in tertiary education (e.g. the share of private supply) and the level of average public expenditure per student. Only hypothesis related to the public budget effort for education and tertiary education have been taken into

consideration. In other words, it has been supposed that the level of public expenditure per student in proportion to the GDP per capita and the share of students in the private sector are maintained²².

To summarize, four financing scenarios have been simulated (cf. box 6.2) but are limited to the 30 low-income African countries for which sufficiently recent financial data (for 2004 in most cases) was available for use. The results of the four simulations are shown in table 6.7.

Box 6.2: The four scenarios tested in the financial simulations for expansion in tertiary education

The **first scenario** supposes that there will be no change in policies both in the production of education services and in the mobilization of public resources for tertiary education between 2004 and 2015. **This is the status quo scenario.**

The other three scenarios introduce alternative hypotheses of mobilization of public resources, at macroeconomic level and at sectoral and sub-sector levels.

In **scenario 2**, the rate of tax pressure (owned public revenue as a proportion of GDP) progressively increases²³.

Apart from the hypothesis concerning the evolution of the rate of tax pressure, two more hypotheses affecting budget priority for tertiary education within education have been tested.

In **scenario 3**, the share allocated to tertiary education in 2015 has been modulated taking into account (i) its present level (according to whether it is below 15% of public current expenditure on education, in the 15 to 25% range or over 25%) and (ii) the country's level of progression towards UPE (with the idea of taking more or less into account the needs of post-primary education, including tertiary education). Should the primary completion rate be initially below 75%, (i) then if the share of tertiary education is over 25% of current expenditure on education, the target is set at 25%; (ii) if it is between 15 and 25%, the target is set at 20%; if it is below 15%, the target is 15%. For countries with a PCR of over 75%, (i) if the share of tertiary education exceeds 25%, the target is set at 25%, (ii) if it is between 20 and 25%, the current level is maintained, (iii) if this share is initially under 20%, the target is set at 20%.

Public budget priority for education in 2015 has been solely determined according to its current level, with the idea that while a currently low priority could be increased, a currently high priority (share for tertiary education over 25% of public resources) could not easily be sustained in time, taking into account the competitive demands for other public services.

In **scenario 4**, the budget share for tertiary education was fixed homogeneously at 20% for all countries. Indeed, the Fast Track Initiative indicative framework, which proposes budget trade-offs enabling to accelerate progress towards UPE, schedules on average 50% of current expenditure on education for primary education, for the countries lagging behind on UPE; this leaves 50% for the other levels of education as a whole. Insofar, as the shares allocated respectively to pre-school and secondary (general and technical-vocational) education should at least be maintained, we have put forward the hypothesis whereby tertiary education could negotiate at the most a share equal to 20% of current expenditure on education (average value for all developing countries). This value is used in scenario 4 even if in some countries (like Senegal, Congo, DRC, Lesotho and Rwanda) the budget share for tertiary education is currently well over 25%, while in others, it is well under (Comoros, Kenya, Niger and Cameroon), at below 15%.

22 Maintaining the expenditure per student in GDP units per capita at its current level does not necessarily mean a decrease in actual expenditure per student in constant monetary units, insofar as better macroeconomic perspectives are anticipated for the coming decade than at present. Thus, if the GDP per capita rises, the actual expenditure per student will increase to the same extent

23 Around 14% in 2015 if it is initially lower, 16% if it is initially between 14 and 16%, 18% if initially between 16 and 18%, but maintained at its present level if it is already over 18%. These hypotheses have been chosen following an approach similar to that used for calculating the cost of Universal Primary Education by Bruns, Mingat and Rakotomalala (2003).

Table 6.7: Financing needs on current public expenditure on tertiary education in 2015 as per different scenarios, for 30 low-income African countries

Policy scenario	Tertiary education coverage in 2015	Public expenditure per student 2015	Measures concerning financing in 2015 ^a				Financing needs for 2005-2015 (in millions USD) 2004	
			Public revenue		Tertiary education as a % of current expenditure on education	% of students in private sector	Total	Annual average
			As a % of GDP	% for education				
Status quo	Trend	2004	2004	2004	2004	2004	6 416	583
Scenario 2	Trend	2004	14-16-18	2004	2004	2004	6 131	557
Scenario 3	Trend	2004	14-16-18	15-20-25	15-20-25 ^c	2004	5 664	515
Scenario 4	Trend	2004	14-16-18	20	20	2004	5 663	515

Note :

a/ Numbers of students per 100 000 inhabitants. «Tendency» means that the expansion of tertiary education follows its current progression.

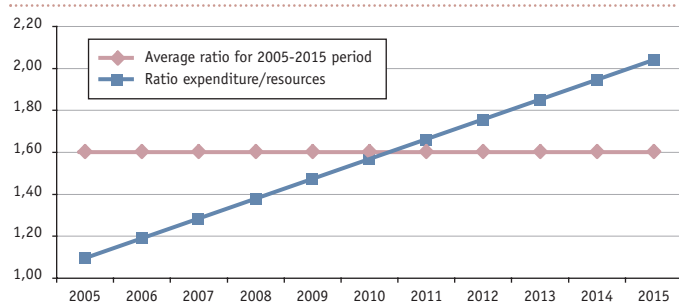
b/ See box 6.3 for more details.

c/ This rate for 2015 is calibrated according to its current level and the country's level of progression towards UPE.

Source: Authors' calculations.

These simulations show that **maintaining the current pace of expansion will represent a huge challenge for most countries**. The average annual financing need for the 30 countries overall varies between 515 and 583 millions US dollars per year between 2005 and 2015, according to the modalities of financing. This shows that on the scale of 30 countries, as a whole, **the alternative hypotheses concerning the mobilization of public resources for tertiary education have a limited influence on the financial gap**. Indeed, this only decreases by 12% between the status quo scenario (status quo in budget trade-offs, in modes of organization and provision of services) and scenario 4 (alternative scenario for mobilizing resources, which tries to «secure» the budget necessary for achieving UPE in the countries furthest behind at this level). In the status quo scenario, the large increase in enrolments would lead to a level of cumulative current expenditure, which would exceed by 60% the volume of public resources liable to be mobilized for tertiary education. But as could be expected, the financing need is progressively accentuated, along with the expansion of the systems: the necessary current expenditure would be 50% over mobilized public resources by 2009 and 75% over by 2012 (cf. graph 6.7).

Graph 6.7: Evolution in the relationship between current expenditure and public resources for tertiary education for the 30 countries, status quo scenario, 2005-2015



Source: Authors' calculations



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The extent of the financing need encourages thinking on other financing alternatives and/or giving consideration to other models of expansion. The financial leeway will however be tight in many countries. Tertiary education is indeed in competition with the other levels of education in public resources appropriation and, for certain levels, the needs generated by the necessary progress towards UPE will lead to curbing, and even to reducing, the relative priority for tertiary education in countries where this is relatively high. This said, the relative priority for tertiary education can still be increased in some countries (case of scenario 3) but the financing gap will only be slightly reduced.

These global results are quite different according to the country, as shown by the results presented in appendix 6.3. Generally speaking, there are very few countries that can be satisfied with the status quo and current rates of expansion²⁵. This suggests that the different countries should pursue very ambitious policies, in order to prevent deterioration in study conditions and in the quality of service in tertiary education. While not exhaustive, five complementary directions could be envisaged, although they will not be described in detail in this chapter. They concern (i) controlling enrolments by quantitative flow management on entering and within the tertiary education system, (ii) controlling production costs of services to bring them progressively down to levels compatible with the global financial possibilities of the different countries and, without this, having negative effects upon the quality of the services provided²⁶. In addition, (iii) incorporation of the private education sector in the global strategy for development of the systems (by way of different incentive measures on a contractual basis, in exchange for quality control on services), (iv) transferring part of the costs to the students (financing by the families for a good quality public service) and (v) setting up incentive measures authorizing public institutions to develop income-generating activities, constitute three more levers to be explored.

International experience shows that a more or less equitable variety of possibilities does exist for making progress in the different directions. None of these levers has to be given priority (Brossard and Foko 2007, Gioan 2007) insofar, as they have neither the same taxation implications nor the same degree of political acceptability (Johnstone 2003).

2.3. Physical sustainability is also to be taken into consideration

Apart from the budget needs required in order to run the structures, the significant increase in enrolments will also require a very high number of qualified teachers to be trained and considerable investments. With regard to the needs in teaching staff, it is estimated that, on the basis of a constant average student-teacher ratio of 1 teacher for 23 students (average value for a sample of 23 African countries in 2003)²⁷, needs in teachers should rise from around 56 000 to 142 000 between 2004 and 2015 for the 30 low-income countries as a whole, for which financial simulations have been made. This implies that in these countries, 103 000 new teachers should be recruited and trained over the period if departures on retirement and other defections, estimated at 30%, are taken into account. In other words, it will be necessary to train twice as many teachers between 2004 and 2015 than between 1990 and 2004. This raises the question as to the actual capacity of the countries to recruit and train so many teachers, even if the necessary financial resources were available.

25 Given the constraints in the financial dimension, but also, as to be seen in chapter 7, the constraints in the economic dimension.

26 The Brossard and Foko study (2007) showed that tertiary education in Africa is quite costly on average and that in many countries, particularly in French-speaking Africa, the structure of expenditure is biased in favour of social expenditure (in some countries, it absorbs more than 50% of the budgets), leaving few resources for academic expenditure and for research and teacher training, which are nevertheless crucial for quality.

27 See Brossard and Foko (2007).

This «physical» constraint is still underestimated for at least two essential reasons. The first is that the student-teacher ratios are already, in many countries, unfavourable to quality teaching. For example, while there are on average 23 students per teacher in those countries where data is available, there are around 15 per teacher in the OECD countries (OECD 2006). In some countries, student-teacher ratios reach record levels: this is the case notably in Benin, Mali, Senegal and Togo, where they are over 40.

Besides the issue of the number of teachers, there are acute needs in many countries for higher-ranking teaching staff. The latter are responsible for ensuring the academic leadership and answering for the quality of education. In an international context of tertiary education, both quality and effective research are necessary in contributing to the countries' position in international competition (cf. box 6.3).

Box 6.3: There will also be considerable needs for higher ranking teaching staffs

In many African countries, teaching staffs in tertiary education are neither sufficiently qualified to train high level executives for a public sector of good quality and for a competitive private sector, nor for the replacement of present staff and the promotion of research. In Madagascar and in DRC, for example, civil servant teaching staffs that have the rank of professors only represent 17% of the teaching profession. In Rwanda, hardly 25% of the teaching profession has a doctorate thesis (around half at the most has the level of a master degree). In Senegal, in the two major public universities (Cheikh Anta Diop in Dakar and Gaston Berger in Saint-Louis), hardly 10 % of teaching staff has the rank of professor. In Gabon, «junior lecturers» represent almost two-thirds of teaching staff in the public sector while higher ranking teaching staffs (professors or senior lecturers) only represent 12 %. In Benin, in the principal public university, Abomey-Calavi University, with 87 % of public sector students in 2006, higher ranking teaching staffs represent around 17 % of the teaching staff, lecturers 18 %, junior lecturers 49 % and other teaching categories 16 %. It must be emphasized that, complementarily, 38 % of teaching staff in this university did not have a doctorate in 2004.

Source: Brossard and Foko (2007), Mignot (2002), Coignard (2006).

Expansion of the systems will require considerable investment with a view to increasing intake capacity in the existing educational establishments (lecture rooms, libraries, laboratories, workshops, lecture halls ...) or to decentralize them (build and equip new educational and administrative structures). The cost and extent of such investments must not be neglected²⁸, particularly in countries already well in excess of intake capacity. In DRC, for example, the number of students in public educational establishments in Kinshasa in 2000 (89 000) was more than twice the theoretical capacity (estimated at 40 000 places at the time). In Benin, the Abomey-Calavi University campus was already over the theoretical capacity by 1985 (there were 50% students more), i.e. fifteen years on from its coming into being (Coignard, 2006). In 2006, there were between 500 and 600 students for 100 places. The situation in the second public university in Benin, Parakou University, was even more unsatisfactory, with an intake capacity ten times less than the number of students (400 places for 5 300 students).

²⁸ Investment expenditure has not been systematically taken into account in the financial simulations because this was only available for a few countries.

3. Conclusion

The results obtained in this chapter show that the high increase in potential demand for post-primary education is the source of tremendous physical and financial challenges to be faced by many countries in the region, especially the poorest countries where significant progress is expected towards UPE.

The future perspectives of expansion of post-primary education are high, but very different between countries and hardly sustainable financially

Total enrolments growth, in post-primary education of most countries has occurred so far at the expense of schooling and study conditions. In secondary education, the results of the different estimations show that the needs are so great that most countries will not be able to achieve universal lower secondary completion by 2020. For example, in countries where supply should be multiplied by 10, in order to reach this goal while maintaining the same schooling conditions as today (same number of pupils per class), this would imply building every year on average 350 schools with six classes in Burundi, 220 in Chad, 80 in Central African Republic. Needs related to recruitment and training of teaching staff for these pupils must be added to that. Even on the hypothesis of non-achievement of UPE by 2015 and supposing that the transition rate between primary and secondary, as well as survival and repetition, are maintained at today's values, needs would still be high for some countries like

Burkina Faso, Niger and Chad, where three times more pupils would have to be enrolled than today.



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In tertiary education, demand remains high and is growing; simulations show that the number of students should more than double in 30 of the 50 countries analysed. These countries could not make do with maintaining current growth rates at the risk of further deteriorating conditions of education and quality. Now, the fall in the quality of educational services can only contribute to pulling Africa back as regards international competition. This competition will require, in coming years that priority is given to quality education and to promoting education that is relevant for local and regional economy.

The scale of such a pace of expansion questions the physical feasibility and the actual implementation of very ambitious post-primary expansion programmes, beyond even knowing if financial resources (public and private national and external) can be mobilized. In this respect, the simulations made show that this expansion will be constrained by huge financial difficulties, which accumulate for secondary and tertiary education.

Potential levers exist but none of which is to be given priority and the combination of levers must be adapted to the specific situation of each country

Faced with the different constraints, several levers are available for building sustainable and socially realistic post-primary education systems. The main ones are the control of pupils/students flows and considering alternative modes of providing educational services.

Alternative modes of organization and provision of service are to be explored

To reach universal lower secondary completion in the countries studied (even if the date of same has to still be defined in each country), the major challenge is of course to reduce the unit cost of education without reducing its quality, in those countries where this cost is very high. With this in mind, merging it with primary education (to form a block of basic education) with polyvalent teachers is one of the possible directions now very often put forward. This practice already exists in some English-speaking countries, which have a longer course of primary education, with the last two years being considered as «higher basic education». Other countries are considering adopting this solution²⁹. Repetition could also be reduced in countries where it is high. Finally, encouraging state-controlled private education (which can be implemented through a public financial incentive) could also contribute to addressing the challenge.

Also, for tertiary education, we could mention the need to improve governance and encourage increased effectiveness in terms of reducing running costs, controlling grants and social expenditure, promoting the diversification of financing sources, especially with a higher contribution from students and their family, and encouraging the development of better-regulated private tertiary education.

Flow regulation: a sector-wide challenge

While merging primary and lower secondary education will hardly be effective in the coming years, even if the different countries start moving in this direction, pupil flow regulation on entering secondary education will certainly be unavoidable for many of them. This seems necessary, at least in the medium term for countries lagging far behind in terms of primary completion and where schooling conditions (and undoubtedly quality) have deteriorated in that level³⁰. For many countries, it seems even more necessary at the entrance to upper secondary education, in order to safeguard quality (upper secondary education's purpose being to prepare pupils for quality tertiary education) and also to control the flow of entrants into tertiary education with reference to the needs of the modern sector of the economy. In tertiary education, additional measures could be envisaged, particularly concerning selection on entrance to some universities and improved management of registration.

Obviously, for the flow regulation policy to be socially accepted, it must be accompanied by measures to prepare insertion on the job market for a large share of primary or lower secondary school leavers, who will not continue their studies in general secondary education. The biggest challenge for technical and vocational education and training in the coming decade is thus to develop short vocationally oriented training schemes for those concerned by the selection process on entrance to general secondary education or between lower and upper secondary. This represents a considerable challenge as these alternative courses of study, bound to be developed massively, are little or non-existent at the present time. This increasingly selective process must also incorporate an equity criterion to give everyone an equal chance in continuing their education beyond primary school (cf. chapter 8, section 4).

²⁹ See World Bank (SEIA 2007, p. 140).

³⁰ Even so, this regulation must not consist in reducing enrolments at this level. On the contrary, in many countries, pressure on secondary education incurred by UPE will be such that selection on access to secondary education level is compatible with a higher number of enrolments.

Appendix 6.1: Multiplication factor of secondary enrolments per country in 2015 according to three reference scenarios on the hypothesis of non-attainment of UPE

Countries	Total pupils in secondary education in 2004 or closest year (in 000's)		Multiplication factor of secondary enrolments					
			lower			upper		
	lower	upper	A1	B1	C1	A2	B2	C2
Group 1	1 114	138	1.7	4.5	5.2	1.7	4.4	6.4
Uganda	623	105	1.5	3.5	3.5	1.5	3.5	3.5
Tanzania	491	33	1.9	5.6	6.9	1.9	5.4	9.4
Group 2	4 165	1 024	1.9	2.8	3.2	1.8	2.8	4.0
Swaziland	49	19	0.9	1.0	1.1	1.0	1.1	1.5
Lesotho	69	24	0.9	1.3	1.5	0.9	1.3	1.9
Djibouti	21	7	1.1	1.2	1.3	1.2	1.2	1.5
Togo	364	81	1.1	1.4	1.4	1.2	1.4	1.6
Comoros	29	14	1.3	1.5	1.6	1.2	1.2	1.5
Congo	192	34	1.4	1.9	2.1	1.4	1.6	1.8
Côte d'Ivoire	521	187	1.5	2.5	2.5	1.5	2.3	2.4
Senegal	312	89	1.7	2.9	3.2	1.8	3.0	3.7
Benin	624	60	1.7	2.7	2.7	1.8	3.0	4.3
Guinea	324	112	1.9	2.8	3.0	2.0	3.2	3.9
Burundi	129	30	1.9	3.9	4.7	1.8	4.0	6.8
Malawi	178	78	1.5	3.5	3.2	1.6	3.5	2.6
Ethiopia	1 083	138	2.1	2.5	2.5	1.9	2.5	2.6
CAR	60	18	2.7	4.7	5.7	2.8	4.5	7.3
Chad	191	65	2.8	3.9	4.7	3.0	3.5	5.5
Niger	151	26	3.4	5.3	7.0	2.8	4.4	10.0
Burkina Faso	230	43	3.5	5.4	5.6	3.4	5.5	9.0
Group 3	1 640	555	1.6	2.2	2.4	1.7	2.5	3.0
Ghana	1 010	319	0.6	0.6	0.6	0.6	0.6	0.7
Gambia	62	23	1.5	1.5	1.4	1.6	1.7	1.5
Mauritania	54	35	1.6	2.6	2.8	1.6	2.5	3.1
Mozambique	187	93	1.8	3.6	4.1	2.1	5.3	7.0
Mali	326	85	2.2	2.8	3.1	2.5	2.3	2.9
Group 4	890	677	1.1	1.3	1.2	1.1	1.4	1.3
Eritrea	139	76	1.0	1.2	1.2	0.8	1.3	1.3
Sudan	751	601	1.3	1.4	1.3	1.3	1.4	1.2
Overall	7 810	2 395	1.7	2.7	3.0	1.7	2.7	3.8

* Except Cameroon and Madagascar, the only countries in the group who will attain UPE by 2015, according to the projections. Source: Authors' estimation based on sector analysis, UIS and population data from the UN population division

Appendix 6.2: Multiplication factor of secondary enrolments in 2015 per country according to three reference scenarios on the hypothesis of attainment of UPE

Countries	Total pupils in secondary education in 2004 or closest year (in 000's)		Multiplication factor of secondary enrolments					
			lower			upper		
	lower	upper	A1	B1	C1	A2	B2	C2
Group 1	1 114	138	2.3	6.0	8.6	2.3	5.9	11.6
Tanzania	491	33	2.2	6.4	9.4	2.2	6.2	14.7
Uganda	623	105	2.4	5.6	7.7	2.4	5.6	8.5
Group 1	3 065	955	2.2	3.5	4.6	2.2	3.5	5.9
Lesotho	69	24	1.2	1.6	2.0	1.2	1.6	2.8
Swaziland	49	19	1.3	1.3	1.6	1.4	1.5	2.3
Cameroon	595	221	1.8	3.1	3.5	1.7	2.7	3.4
Togo	364	81	1.8	2.1	2.8	1.8	2.2	3.5
Congo	233	41	2.0	2.6	3.6	1.9	2.1	3.6
Guinea	324	112	2.3	3.3	4.5	2.4	3.8	6.7
Côte d'Ivoire	521	187	2.4	3.9	4.6	2.4	3.6	5.0
Senegal	312	89	2.3	3.9	5.1	2.4	4.0	6.7
Benin	262	60	2.5	3.9	4.9	2.6	4.4	8.5
Comoros	29	14	2.7	3.1	4.1	2.6	2.6	4.6
Malawi	178	78	3.0	7.1	7.7	3.2	7.1	8.1
Burundi	129	30	3.2	6.4	10.7	3.0	6.7	15.4
Ethiopia	1 083	138	3.6	3.9	4.3	3.4	4.0	4.4
Djibouti	21	7	3.7	3.7	4.7	3.8	3.8	6.3
CAR	60	18	4.0	7.0	9.8	4.2	6.7	14.2
Chad	191	65	4.1	5.8	9.0	4.3	5.1	11.7
Burkina Faso	230	43	4.5	7.0	9.3	4.4	7.0	16.4
Niger	151	26	6.5	10.1	17.3	5.3	8.4	28.5
Group 3	2 282	707	2.5	3.7	4.9	2.6	4.0	7.0
Ghana	1 010	319	1.5	1.6	1.9	1.5	1.7	2.3
Gambia	62	23	2.1	2.1	2.3	2.2	2.3	2.8
Madagascar	486	107	2.3	4.2	5.8	2.4	4.6	9.1
Sierra Leone	155	45	2.1	3.0	4.0	2.0	3.0	5.0
Mozambique	187	93	2.9	5.8	7.7	3.4	8.5	14.9
Mauritania	54	35	3.1	5.0	6.7	3.1	4.6	8.3
Mali	326	85	3.5	4.3	6.1	3.5	3.6	6.6
Group 4	890	677	2.5	2.9	3.3	2.3	3.0	3.9
Eritrea	139	76	2.7	3.1	3.9	2.1	3.3	4.8
Sudan	751	601	2.4	2.7	2.8	2.5	2.7	3.0
Overall	9 087	2 774	2.8	4.3	5.8	2.7	4.3	8.0

* Results of scenario C (1 and 2) are estimated for 2020 insofar, as universal lower secondary completion is scheduled for that date.
Source: Authors' estimation based on sector analysis, UIS and population data from the UN population division

Appendix 6.3: Current level and projection of expenditure and public resources for running tertiary education in Africa, annual average (status quo scenario, 2004 USD in millions)

	2004		Projections, status quo scenario				
			Number of students 2015		Annual average 2005-2015		
	Students	Current expenditure*	Total	Factor 2015/2004	Resources	Expenditure	Gap
Benin	40 698	22	154 000	3.8	28	56	28
Burkina Faso	24 975	17	125 000	5.0	22	54	33
Burundi	15 251	7	48 000	3.1	8	16	8
Cameroon	85 790	43	212 000	2.5	55	92	36
Comoros	1 779	1	21 000	11.6	1	6	5
Congo	10 631	22	24 000	2.3	29	40	11
Côte d'Ivoire	159 917	71	282 000	1.8	90	112	22
Eritrea	4 612	4	7 000	1.6	5	6	0
Ethiopia	172 111	74	678 000	3.9	100	227	127
Gambia	15 30	3	3 000	1.8	4	4	0
Guinea-Bissau	503*	1	1 000	1.3	1	1	0
Guinea	22 223	21	54 000	2.4	27	40	13
Kenya	108 407	76	179 000	1.7	97	121	24
Lesotho	6 457*	39	19 000	3.0	49	83	33
Madagascar	42 143	18	74 000	1.8	23	28	4
Malawi	5 089	13	9 000	1.8	16	21	4
Mali	33 591	14	152 000	4.5	20	44	25
Mauritania	11 045	6	18 000	1.7	7	8	1
Mozambique	22 256	33	88 000	3.9	41	96	55
Niger	8 774	7	15 000	1.7	10	10	1
Dem. Rep. of Congo	193 908*	9	317 000	1.6	11	12	1
CAR	8 828	3	20 000	2.2	4	7	2
Rwanda	25 233	20	78 000	3.1	31	59	28
Senegal	52 282	58	154 000	2.9	74	124	50
Sierra Leone	14 097*	8	42 000	3.0	10	18	8
Chad	10 075	6	35 000	3.7	9	16	8
Togo	18 690	9	35 000	1.9	12	13	1
Uganda	88 360	47	287 000	3.2	60	98	38
Zambia	28 100*	15	39 000	1.4	23	25	3
Zimbabwe	61 353*	78	84 000	1.4	99	114	15
South Africa	760 426		1 185 000	1.6			
Algeria	716 452		1 344 000	1.9			
Angola	13 398*		27 000	2.0			
Botswana	13 221		39 000	3.0			
Cape Verde	2 732		8 000	3.1			
Djibouti	1 134		15 000	13.4			
Egypt	2 334 603*		5 726 000	2.5			
Gabon	7 804		22 000	2.8			
Ghana	69 968		350 000	5.0			
Equatorial Guinea	1 281		3 000	2.0			
Libya	395 481*		728 000	1.8			
Mauritius	17 781		47 000	2.6			
Morocco	343 599		501 000	1.5			
Namibia	15 004		26 000	1.7			
Nigeria	1 289 656		3 982 000	3.1			
Sao Tome and Principe	202*		350	1.7			
Sudan	349 442*		1 401 000	3.9			
Swaziland	6 594		15 000	2.2			
Tanzania	42 948		189 000	4.4			
Tunisia	284 264*		1 081 000	3.8			

* Authors' estimations.

Source: Authors' calculations based on UIS, World Bank and the Pôle de Dakar data

