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MADAGASCAR
PUBLIC EXPENDITURE REVIEW 2015
EDUCATION

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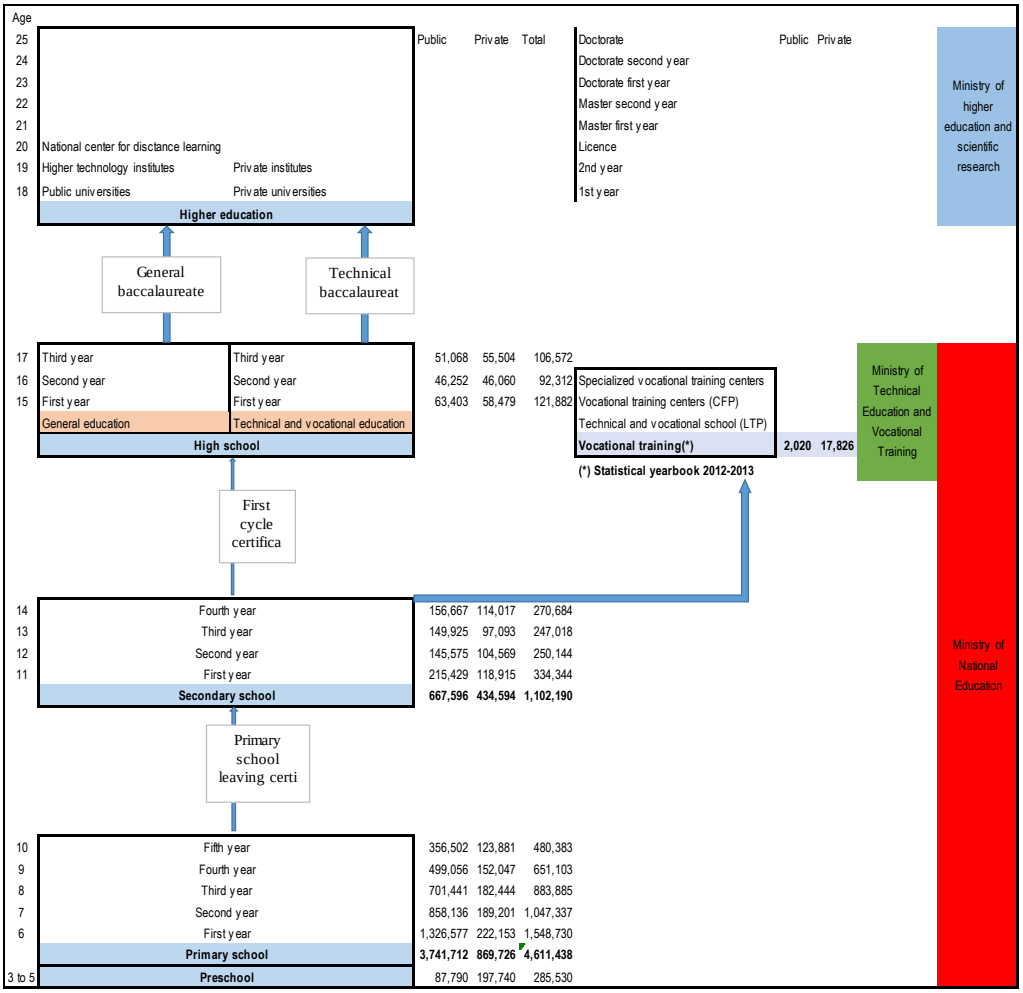
A.1 Organization of Public Education

1. Administration of education

1. **Management of the primary education system in Madagascar follows a centralized model**, **supported by deconcentrated services** (Figure 1). Education is divided into (a) preschool, (b) 5 years of primary education, (c) 4 years of lower secondary, (d) 3 years of upper secondary, and (e) higher education. The age groups corresponding to primary, lower secondary and upper secondary are 6-10 years, 11-14 years and 15-17 years, respectively. Higher education is open only to those who have passed graduation exams *(baccalauréat)*. The Ministry of Education is responsible for implementing the education strategy, with support from deconcentrated entities. The Ministry is represented at the regional level by 22 *Directions Régionales de l'Education Nationale* (DRENs); at the district level by 114 school districts (CISCOs); and at the community *(commune)* level by 1,591 subdistricts (ZAPs).

Figure 1. Organization of Education Sector in Madagascar



2. **The sector has suffered from an overall lack of strategic leadership during the most recent political and economic crisis.** The 2005-08 period was marked by the preparation of sector strategies, including important reforms aimed at improving the functioning and performance of the education system. These reforms included extension of the primary cycle from five to seven years, as well as the revision of curricula and the training of teachers. Implemented as pilots in many education districts (CISCOs), the reforms were not scaled up to the national level, and in some cases were interrupted, because of the crisis. The lack of continuity in management of the sector at all levels—central, regional (DREN), district (CISCO) and local (ZAP)—has had a substantial negative impact on the pace of progress and formulation of a longer-term strategic vision. The elaboration and adoption of an Interim Education Plan (PIE) for the 2013-15 period has temporarily mitigated this situation by guiding the short-term development of the sector (PIE, 2013), but important weaknesses remain in terms of strategic leadership.

3. **Program-based budgeting, introduced in the 2000s, has not been fully implemented.** While public finance management in Madagascar was based on a "traditional" budget up until 2004, a result-based approach and a logic of results was introduced in the Organic Law of Finance (LOLF) in 2004, resulting in the budget nomenclature being structured around missions and objectives. The LOLF has created a wide range of new roles and management tools, but the learning process was interrupted during the crisis. This led to dysfunctions in the expenditures chain and to a de facto return to a resource budget. Besides, many factors have contributed to the return to a logic of means: (a) the inexistence of a budget timetable, (b) the lack of conciliation between the Ministry of Finance and technical Ministries, (c) the lack of cost analysis in the definition of allocations and (d) the lack of cooperation between the Direction of Planning/Administrative and Financial Direction and technical directions.

4. **An important feature of the Malagasy education system is the relatively well developed framework for school-based management.** The school management committees (FAFs, *Fiaraha-miombon'Antoka ho amin'ny Fampandrosoana ny sekoly*) consist of parents, teachers, the school director, and representatives from the local community. They have been in existence in each school since 2002, when the government started providing annual grants to schools on a per capita basis to cover part of schools' operating expenses. The FAFs are responsible for managing these grants, and play a critical role in improving accountability of service delivery and promoting community engagement and social dialogue among local stakeholders. The FAFs are also increasingly participating in the financing of school operations, including hiring and paying community teachers and financing basic supplies. Trends in contributions from school committees in the financing of education are examined in details later in the paper.

2. Human resources management – key features

5. **Two categories of teachers coexist in public schools—civil servant teachers and those hired by the community, known as FRAM teachers.** Civil servant teachers acquire their status after formal training (in ENIs, then in CRINFPs)[1] for six months to two years, or by internal promotion within the civil service based on their profile. Community teachers consist of two groups: (a) subsidized teachers, who receive indemnities from the State, and also, depending on the local context, receive additional funding from parents; (b) non-subsidized teachers, who receive indemnities solely from parents.

[1] Regional pedagogic training centers.

6. **The community teachers system relies on coordination and cooperation between the Ministry of National Education (MEN) and parents**. Community teachers are locally hired and employed by the parents' association based on criteria recommended by the MEN. The contract between the parents' association and the community teacher is subject to approval and supervision by the various local/regional levels of the education administration (sub-district/district levels).

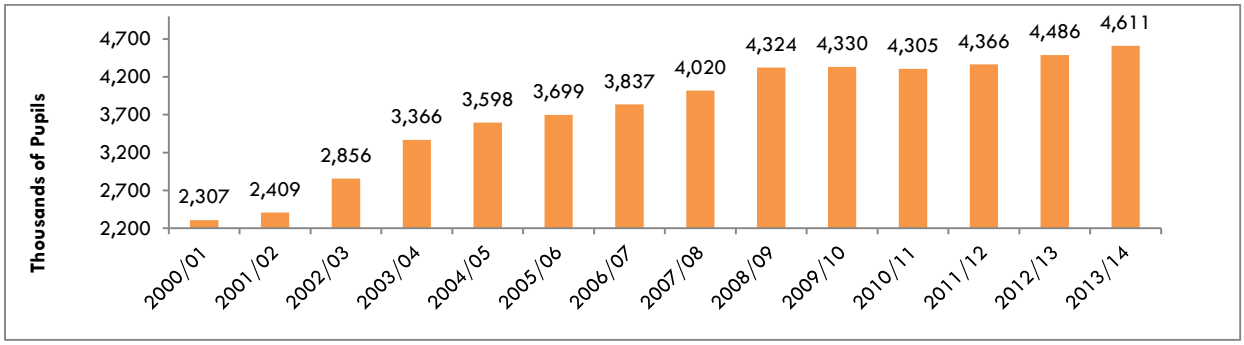
A.2 Recent Trends in Education Outputs and Outcomes

1. Overall enrollment trends

7. **Despite relatively rapid growth, the enrollment rate in preschool remains very low, especially in rural areas.** The numbers of children attending preschool increased six-fold from 2001 to 2013, from about 45,000 to nearly 285,000, an average annual growth rate of 18.8 percent. However, this sub-sector remains the least developed in the educational system, representing only 4.5 percent of total enrollment in 2013-14, or less than 10 percent of pre-school age children. Moreover, the share of private schools in preschool enrollment is very high, 69 percent in 2013-14. This is particularly linked to the weakness of public schools, which are characterized by a lack of infrastructure, furniture, teaching aids and trained teachers, and a lack of resources at the household level to support preschools.

8. **Enrollment in primary education has increased at a slow pace since 2009** (Figure 2). Between 2001 and 2003, enrollment in primary education increased rapidly following various incentive measures taken by the State in the context of Education For All. The pace slowed between 2003 and 2006 while the number continued to grow, which can be partly explained by the depletion of late entries. The pace picked up again between 2006 to 2008 with the abolition of school fees, and the provision of school kits to new school children and school canteens in areas of high food insecurity. However between 2009 and 2011, primary enrollment stagnated at 4.3 million pupils. This stagnation was at odds with the overall context of rapid population growth, and was in sharp contrast to the period immediately preceding the crisis, when the annual growth rate of primary enrollment averaged 7.8 percent over 10 years and 6.2 percent over 3 years.

Figure 2. Primary School Enrollment since 2000



Source: Education statistical yearbooks, 2000-13.

9. **In a context of rapid population growth, the slower pace of enrollment translated in substantial drop in enrollment and attendance rates since 2009.** According to the education statistical yearbooks, the gross enrollment rate (GER) for primary dropped from 157 percent in 2008/09 to 144 percent in

2013/14, equivalent to a 13 percentage point drop. The rate has decreased especially for Grades 2 and 5, losing 23 and 19 percentage points over the period, respectively. According to the Household Surveys, the attendance rate of children aged 6 to 14 years has also receded strongly over the 2005-12 period, from 77 percent to 74 percent in 2010 and 69 percent in 2012. Between 2005 and 2010, the drop was most apparent for primary school-aged children (aged 6 to 10 years), for whom the rate was reduced by 4.6 percentage points, against 1.2 percentage points for children aged 11 to 14 years. However, over the 2010-12 period, the decrease was more obvious for children aged 11 to 14 years, with 6.7 percentage points lower attendance, against 2.1 percentage points for primary school-aged children (Table 1).

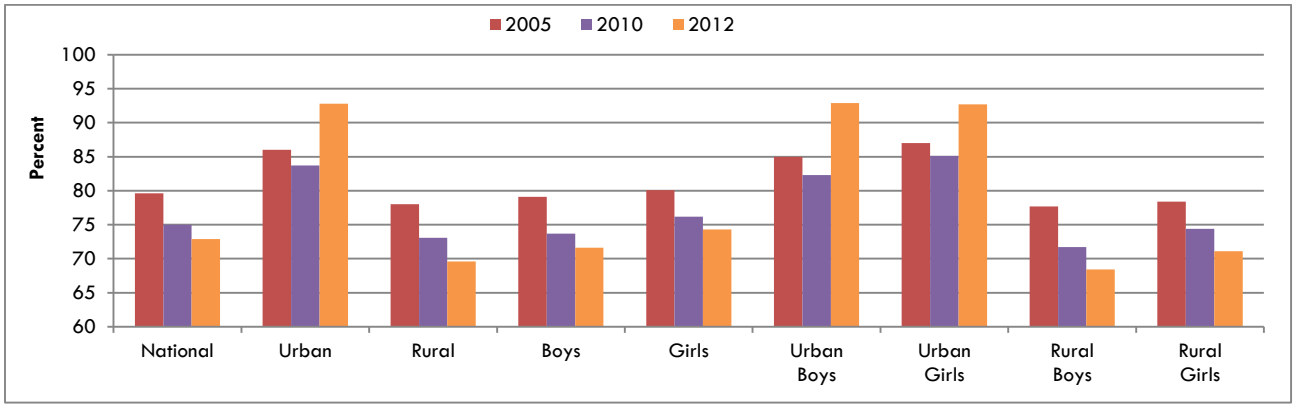
Table 1. Attendance Status of Children, by Age Group, 2005 and 2010 (level and percent)

%	2005			2010			2012		
	Attended	**Dropped out**	**Never Enrolled**	**Attended**	**Dropped out**	**Never Enrolled**	**Attended**	**Dropped out**	**Never Enrolled**
6-10	79.6	2.8	17.6	75.0	2.9	22.1	72.9	6.6	20.5
11-14	73.8	15.0	11.3	72.6	15.2	12.3	65.9	19.3	14.9
6-14	77.2	7.8	15.0	74.0	7.8	18.2	69.9	11.9	18.2

Source: Household Surveys 2005 and 2010, and ENSOMD 2012.

10. **The drop in attendance rates has been unequal, especially affecting rural zones and the southern regions.** On the basis of the Household Surveys, the attendance rates for children aged 6 to 10 have dropped for all socioeconomic categories, the greatest reductions and levels of exclusion being observed in rural areas, especially for boys (Figure 3). In rural areas, the share of children having never attended school has increased over the past five years, whereas the dropout rate has varied little (see Annex Table A.4). Regional differences in terms of attendance rates are equally important. Over the 2005-10 period, rates have receded the most in Anosy, Atsimo-Andrefana, Boeny and Menabe (in the south and west), whereas rates in other regions such as Androy, Vatovavy-Fitovinany and Ihorombe have deteriorated over 2010-12 period.

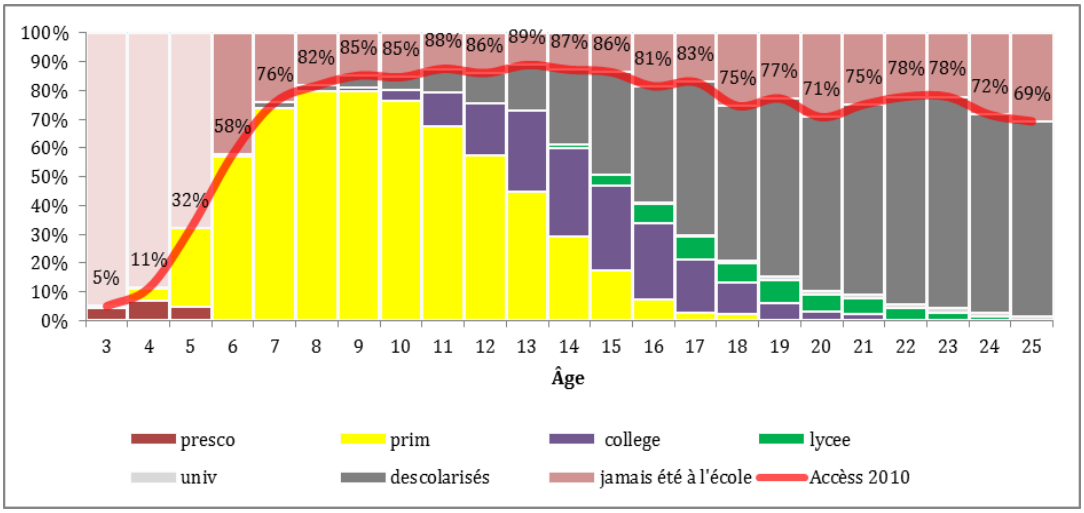
Figure 3. Attendance Rates for Children Aged 6-10 Years, by Gender and Area of Residence, 2005 and 2010



Source: Household Surveys 2005 and 2010, and ENSMOD 2012.

11. **The most recent estimates indicate that 1.4 million children aged 6-10 are likely out of school.**[2] Despite a gross enrollment rate largely above 100 percent, a large number of children and youth remain out of school. Among them, we can distinguish: (a) children who have never attended school; and (b) those who dropped out early. According to the 2010 Household Survey, dropout from primary school starts around 9 years old, when 5 percent of enrolled children drop out. By age 15, 43 percent have dropped out, and only 20 percent of youth remain enrolled at age 20. Overall, about 60 percent of 11-14 year-olds (or about 190,000 youths) who dropped out did so before completing Grade 3, and about 10 percent of that cohort never enrolled in school (Figure 4).

Figure 4. School Situation of Children and Youth Aged 6 to 25 years



Source: Based on data from 2010 Household Survey.

12. **Financial problems are the key drivers of dropout for more than one third of households.** Among the reasons for leaving school, one has to distinguish between those related to supply and those related to demand. Household Survey data show that demand-related issues largely predominate with three-quarters of school dropouts being explained by demand-side factors. In particular, direct costs are the key determinant of non-enrollment for children less than 10 years old, and for the older ones, that reason is combined with the necessity to work. The negative perception of school comes second amongst demand-side constraints. Other reasons include class repetition and early marriage/pregnancy. On the supply side, the malfunctioning of the school is the most frequently cited reason, followed by its remoteness.

2. Education outcomes

13. **The primary completion rate decreased over the last three years and now mirrors completion rates across low-income countries and Sub-Saharan Africa.** Prior to the crisis, Madagascar experienced an upward trend in primary completion rates. Since 2009, however, the primary completion rate has declined from 73 percent to 71 percent, whereas the average in Sub-Saharan Africa (SSA) has increased from 67 to 69 percent (Table 2).

[2] Analysis based in part on "School Exclusion and Inclusion in Primary Education in Madagascar," UNICEF 2012.

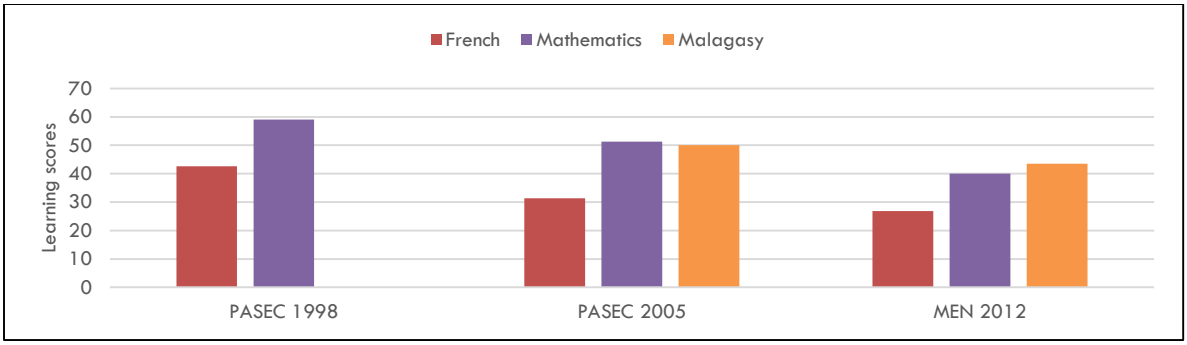
Table 2. Cross-Country Comparison of Primary Completion Rates, 2005-2012

	2005	2006	2007	2008	2009	2010	2011	2012
Madagascar	57.7	56.6	60.9	67.2	73.9	70.5	71.0	69.5
Sub-Saharan Africa	61.4	64.4	64.5	65.5	67.8	69.2	69.2	-
Low-income countries	58.6	60.1	61.0	63.6	65.8	66.7	66.5	-

Source: UNESCO database.

14. **The quality of learning has deteriorated, as evidenced by the low learning outcomes at the end of primary education.** Comparison of data across three rounds of learning assessments indicates a sharp downward trend in all three subject areas (Figure 5). PASEC data, between 1998 and 2005, indicated a sharp decline in grade 5 student learning achievement. French and mathematics test scores decreased by 11 and 8 points, respectively. This trend has worsened considerably over the last few years, especially in the mathematics score, which dropped by another 11 points. Overall, between 1998 and 2012, the national average in French has dropped by 16 percentage points and the math score by 19 percentage points. Comparison of PASEC test results in CONFEMEN countries shows that the French score of Madagascar in 2012 is the worst among all participating countries and the Math score also slipped quite a bit between 2005 and 2012.

Figure 5: 1998, 2005 and 2012 learning scores



Source: Data from Ministry of Education.

A.3 Recent Trends in the Distribution of Inputs

1. Learning material and instructional time

15. **The critical lack of learning material and reduced instructional time contribute to the low quality of teaching**. Every school is supposed to have one textbook per pupil per subject, in either Malagasy or French. However, according to the results of the learning assessment surveys conducted for the fifth grade in 2012, only 55 percent of the surveyed schools have one book for two pupils in French, 58 percent in mathematics and 71 in Malagasy. For 10 percent of the schools, there was one textbook per six students for the three subjects. Moreover, while instructional time is supposed to amount to 960 hours per year in primary education, as much as 15 percent of that time may be lost due to various reasons, including non-adherence to the school calendar, late back-to-school times, extended recess times, early ending times, extended school holidays, natural disasters, examination days, and meetings and trainings carried out by the Ministry of National Education, technical and financial partners or local authorities.

2. Classrooms and Infrastructure

16. The slow pace of school constructions over the past years resulted in increased pupil-classroom ratios which are inequitably distributed across the country. While the pupil-classroom ratio was 47:1 in 2011, the slower pace of school construction between 2012 and 2014 resulted in an increased in the pupil-classroom ratio to 53:1 in 2013/14. This average hide large, and increasing, inequality in how classrooms are distributed across the country. For example, Androy and Atsimo-Atsinanana saw their pupil-classroom ratios increase from 80:1 and 72:1 in 2009 to 81:1 and 87:1 respectively in 2014. On the other hand, pupil-classrooms ratios remain much lower than the average in some regions, including Analamanga, Alaotra-Mangoro and Amoron'i Mania, at 43:1 and 41:1 respectively in 2013.

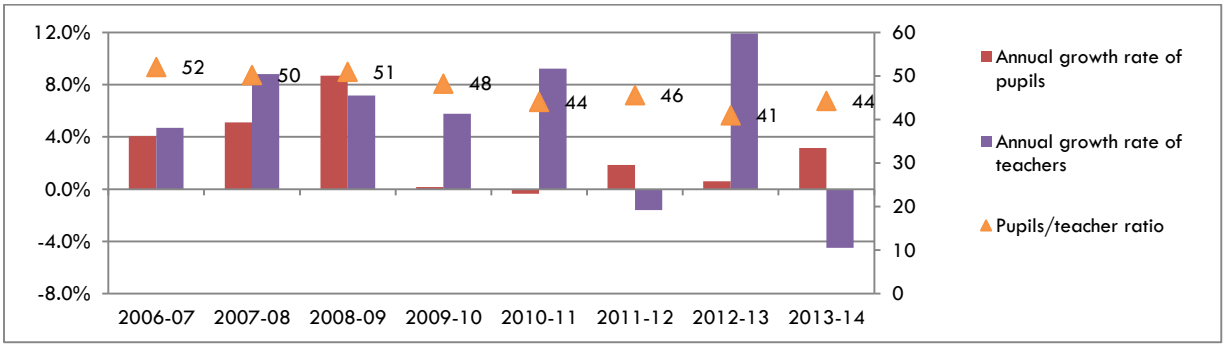
17. A new strategy for school constructions was adopted in 2008, which emphasized community-based construction. In 2007-2008, the Ministry of Education launched the design and implementation of a new school construction strategy. The strategy aimed at addressing the following challenges: (i) weaknesses in the programming of classroom constructions, (ii) absence of standardized procedures and technical standards in school constructions, (iii) cost and financing issues and (iv) difficulties encountered by the sector to manage the programs related to school constructions. As part of this strategy, new construction standards, classrooms designs and cost standards were defined. In addition, the strategy introduced a participatory approach, relying on capacity building, resources and skill transfer to local actors.

18. Implementation of the new school construction strategy was satisfactory, despite substantial financial and capacity constraints. While the initial targets set by the Ministry were not entirely achieved due to financial constraints during the early years of the political crisis, the strategy yielded positive results in many aspects. Indeed, a thorough evaluation carried out in 2012 showed that construction costs had been contained and implementation pace was satisfactory. Moreover, involving local communities and decentralized entities of the MoE had ensured a real transfer of capacity and resources and resulted into effective empowerment of local stakeholders. Finally, as different entities at different levels took part in the process, transparency in the general management of the program had significantly improved.

3. Teachers

19. **Pupil-teacher ratios have improved since 2009, due to an increase in the number of teachers and the stagnation in primary enrollment numbers.** In 2006/07, the annual growth rates of pupils and teachers were 4.1 and 4.7 percent, respectively, resulting in a pupil-teacher ratio of 52:1. However, primary enrollment numbers dropped in 2009 and have increased only slowly since then, while the number of teachers has continued to rise, except in 2011-12. Consequently, the pupil-teacher ratio decreased from 51:1 in 2008/09 to 41:1 in 2012/13, although the trend seems to reverse in 2013/14 (Figure 6).

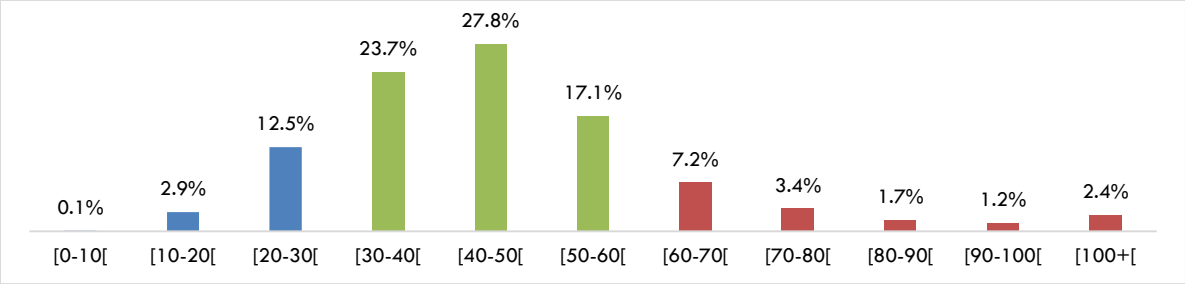
Figure 6. Annual Growth Rate of Pupils and Teachers, and Pupil-Teacher Ratio in Public Primary Schools, 2006/07-2013/14



Source: Education statistical yearbooks, 2006/07-2013/14.

20. **The distribution of teachers is unequal across and within regions.** In 2013/14, 69 percent of schools had a pupil-teacher ratio between 30 and 60, and 15 percent had a pupil-teacher ratio below 30. The lowest pupil-teacher ratios were in Analamanga and Alaotra-Mangoro, with ratios of 36 and 40 respectively, on average. The highest pupil-teacher ratios were found in the south, especially in Anosy and Androy regions, with ratios of 61 and 63, respectively. Despite this wide variation in averages, there were also substantial differences in pupil-teacher ratio within regions. For instance, in Analamanga, 25 percent of the schools had a pupil-teacher ratio below 26 and half had a pupil-teacher ratio below 35. The highest pupil-teacher ratios were found in these regions (312 for Anosy and 271 for Androy). For Androy particularly, half of the schools had a pupil-ratio higher than 56, and one fourth had a pupil-teacher ratio of 75 (Figure 7).

Figure 7. Distribution of Pupil-Teacher Ratio in Primary Public Schools, 2013

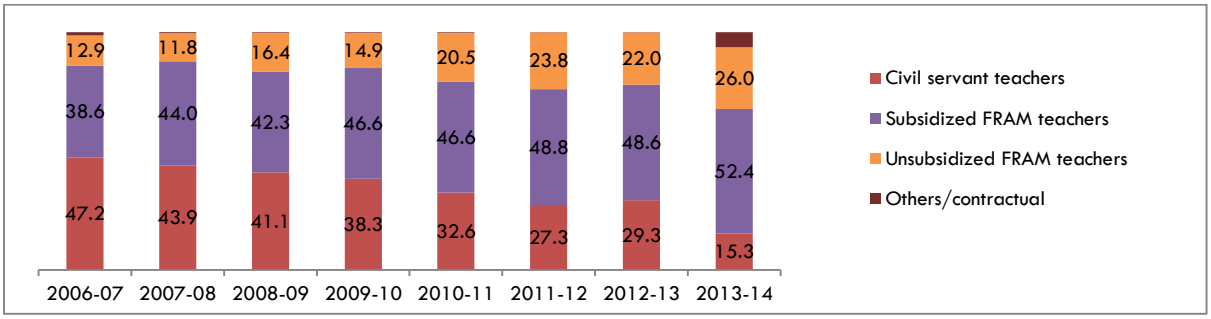


Source: Education statistical yearbooks, 2006/07-2013/14.

A.4 Reliance on community teachers (FRAM)

21. **The share of civil servant teachers has fallen considerably over recent years, and community teachers now make up 80 percent of the total.** As explained in the introduction, teachers are divided into two categories, civil servants and community teachers. In 2006, civil servant teachers represented 47 percent of the total, but were no more than 16 percent in 2013/14 (Figure 8 and Box 1). The drop in the number of civil servant teachers has translated into an important rise of community teachers, from 51 percent in 2006 to 78 percent in 2013. Nearly 70 percent of primary public schools in Madagascar do not have civil servant teachers, and this number is as high as 80 percent in 4 out of 22 regions. The share of community teachers who are subsidized by the State has also decreased over the period.

Figure 8. Public Primary Teachers by Status, 2006/07-2013/14

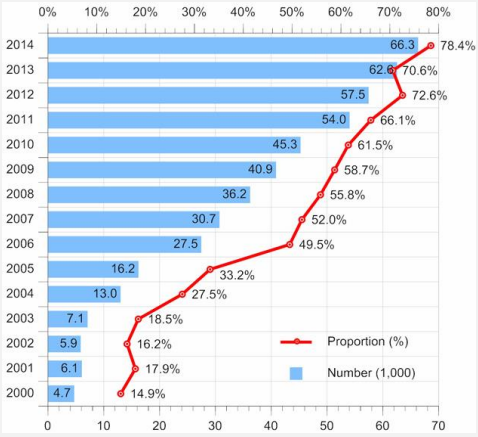


Source: Education statistical yearbooks, 2006/07-2013/14.

Box 1. The Rise of community Teachers as the Main Component of the Teaching Force

In 2014, there were a total of 82,850 community teachers in pre-primary, primary and secondary combined, making up 69 percent of the teaching force (against 58 percent in 2010). At the primary level, community teachers made up 78.4 percent of total teachers in 2014. The phenomenon of community teachers has thus become the most dominant aspect of the education sector. It has enabled the expansion of the system and ensured its financial sustainability. Between 2000 and 2014, the pupil-teacher ratio decreased from 55 to 44.

Trend of community teachers in primary school (2000-2014)



The adoption of a remuneration policy for community teachers was the logical consequence of the increasing importance of the phenomenon. The amount of the subvention has increased over the years, from 30,000 MGA per month over 9 months in 2002 to 110,000 MGA per month over 12 months in 2013. Therefore, the annual remuneration of community teachers has increased nearly fivefold in nominal terms, from 270,000 MGA/year in 2002 to 1,320,000 MGA/year in 2014. In real terms, subsidies to community teachers have increased by 4.1 percent annually between 2002 and 2014, which is largely above the increase on GDP per capita over the same period (0.8 percent annually). Recent trends, however, show a decline in the amount of subsidies to community teachers by 4.2 percent since 2010. Finally, the share of community teachers who receive subsidies has fallen from 75 percent in 2007 to less than 67 percent in 2014.

22. **Community teachers are unequally distributed across regions, while civil servant teachers are concentrated in a few regions.** There is a strong correlation between the share of community teachers and poverty rates. The share of community teachers was more than 84 percent, on average, in the poor regions Atsimo Andrefana, Atsimo Atsinanana, Betsiboka, Bongolava and Melaky. The absence of civil servant teachers is particularly striking in the very poor regions of Ampanihy (4 percent), Benenitra (8 percent), Kandreho (6 percent) and Besalampy (9 percent). In contrast, the share of civil servants in the total was 37 percent in the less poor regions Analamanga and 51 percent in Amoron'i Mania (Table 3).

Table 3. Schools without Civil Servant Teachers by Region, 2013/14

Region	%	Region	%
ANALAMANGA	37%	MENABE	74%
AMORON'I MANIA	51%	SOFIA	76%
HAUTE MATSIATRA	55%	ANOSY	77%
VAKINANKARATRA	55%	BONGOLAVA	78%
ITASY	58%	ATSIMO-ATSINANANA	78%
ANALANJIROFO	62%	IHOROMBE	78%
ALAOTRA-MANGORO	63%	BOENY	79%
ATSINANANA	67%	BETSIBOKA	81%
DIANA	71%	ATSIMO-ANDREFANA	82%
SAVA	73%	MELAKY	85%
VATOVAVY FITOVINANY	74%	ANDROY	88%

Source: Education statistical yearbooks, 2013-14.

The high reliance on community teachers who are vastly undertrained and underqualified is a contributing factor to the low quality of education outcomes (Table 4). Community teachers are generally underqualified, with more than 80 percent of them having no form of teaching qualification. Only civil servant teachers benefit from initial, pre-service training, although any form of pre-service training was suspended between 2006 and 2012. In addition to non-existent pre-service training, the in-service training programs managed by the MoE do not match the needs of a growing cohort of generally unqualified community teachers with limited skills. The lack of appropriate training is aggravated by the lack of a coherent teacher support system. School inspectors have virtually disappeared. The ratio of pedagogical counselors to teachers is low in the school districts (1:173). The sub-district officers (chefs ZAP), who are closest to schools, lack the resources, time, and skills to support teachers with limited teaching and language skills. Various analyses have shown the direct impact of the increasing share of community teachers on education outcomes. The 2012 learning assessment, for example, showed a strong and significant relationship between community teachers and low learning outcomes.

Table 4. Determinants of Learning Outcomes in CM2 Public Schools, 2012

	(1) Score in French	(2) Score in Math	(3) Score in Malagasy
Characteristics of teachers			
community teachers	-4.421**	-5.853**	-1.161
	(1.34)	(1.99)	(1.93)
Duration of teacher training	0.199*	0.238	0.048
(in number of days)	(0.09)	(0.14)	(0.13)
Absence of teacher (2 or more days)	-0.901	-3.007**	-0.891
	(0.78)	(1.16)	(1.12)
Other characteristics			
Multigrade class	2.190*	-0.034	5.221***
	(1.06)	(1.59)	(1.52)
Permanent or semi-permanent classroom	5.447***	13.897***	6.659***
	(1.17)	(1.75)	(1.65)
Constant	20.088***	28.449***	34.906***
	(2.43)	(3.64)	(3.67)
Observations	919	919	919

Threshold of significance: *10%, **5% and *** 1%.

A.5. Key Findings and Policy Implications

Key Findings

Madagascar's education system exhibits severe weaknesses that leave a large number of children without the basic skills required to function on the labor market:

Structural weaknesses

- The last 10-15 years have witnessed a rapid drop in education outcomes.
- The absence of a sustained and quality mechanism for teachers training has had a large impact on the declining quality of education.
- The large number of out-of-school children is putting substantial pressure on the system.

Conjectural weaknesses

- Enrollments in primary education have stagnated, and even decreased in some years, since the start of the political and economic crisis in 2009.
- Inputs to the sector have been dramatically reduced, including the number of civil servant teachers, which has continuously decreased, resulting in a rapid increase in the number of community-hired teachers. These teachers now make 80 percent of the total teaching force in primary schools.

Policy Implications

Madagascar has an urgent need to improve the quality of its education system, while at the same time catering to the specific needs of children who are absent from the system.

Investing in quality

- **Stabilizing the teaching force.** Improving management of teachers is perhaps the highest priority for the Government of Madagascar. This will entail:
  - (i) creating a sustainable supply of qualified teachers,
  - (ii) ensuring the equitable distribution of teachers across the country, with a special focus on the distribution of qualified teachers to areas where they are the most needed,
  - (iii) reestablishing adequate administrative and pedagogical support to the teaching force.
- **Creating the conditions for learning.** In addition to teachers, there is a need to harmonize and improve the quality of other important inputs, including:
  - (i) the curricula across the country,
  - (ii) the supply of textbooks and other learning materials.

Addressing the needs of out-of-school children

- **Scale up effective interventions targeting the most vulnerable,** including conditional cash transfers and school feeding programs.
- **Pilot interventions providing second-chance education.**

B.1 Who Finances Education?

23. **Total public spending on education has decreased since 2009, mostly due to a contraction in external funding to the sector.** Total public spending on education was sustained for a few years after the crisis at around 3.5 percent of GDP, but decreased substantially to 3.1 percent in 2012 and 2013. This decrease is not explained by a GDP growing more quickly than public spending, but rather by a contraction in the total amount spent on education. Total public expenditures on education decreased by 8 percent between 2009 and 2013 (from 782 to 721 billion 2013 Ar.), despite an initial 10 percent increase between 2009 and 2011 (Table 5).[3] Changes in the level of foreign aid explain the trend, as internally financed expenditures remained fairly stable in constant terms throughout the period (Figure 9).[4] Internal financing now largely dominates public funding of education, and reached 81 percent of public expenditures in 2012 and 2013.[5]

Table 5. Internal and External Funding of Public Expenditure in Education, 2009-2013

In Millions of constant 2013 Ar.	**2009**	**2010**	**2011**	**2012**	**2013**
Internal funding	593,690	529,854	608,228	593,177	582,620
Foreign aid: on-budget	98,540	146,999	145,976	60,755	27,497
Foreign aid: off-Budget	90,191	148,412	103,665	77,581	110,738
Total public expenditures [(a)]	782,421	825,265	857,869	731,513	720,855
Percent of GDP	3.4%	3.6%	3.7%	3.1%	3.1%
Percent internally funded	76%	64%	71%	81%	81%

[(a)] includes major NGOs

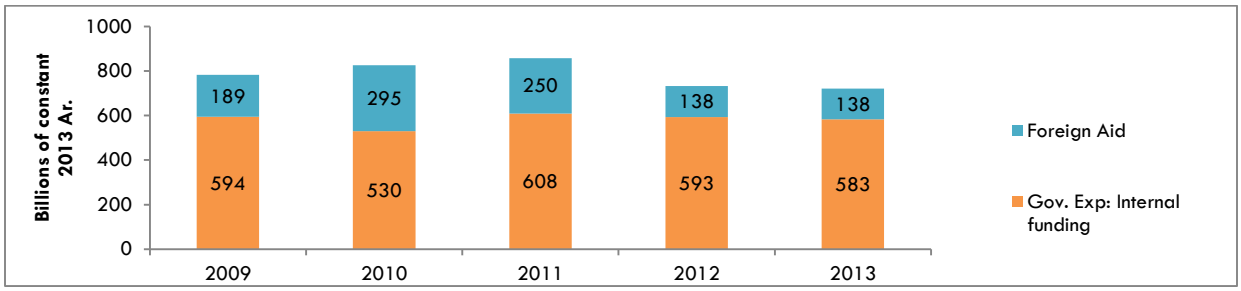
Source: Calculated from AMP disbursements and SIGFP data from MFB.

[3] The figure includes funding from major international NGOs as reported on the Aid Management Platform; however, contributions from major NGOs are small relative to contributions from other sources.

[4] Although it would appear that foreign aid increased in 2010 while government funding went down, this is likely due to the fact that budget support is not distinguished from internal resources in the government accounts. When the budget support was cut in 2010, this translated into a reduction in domestic funding, when in fact it may have been entirely due to a reduction in budget support.

[5] There was no budgetary aid in these years, so the category is fully internally financed.

Figure 9. Internal and External funding of Public Expenditure in Education, 2009-2013

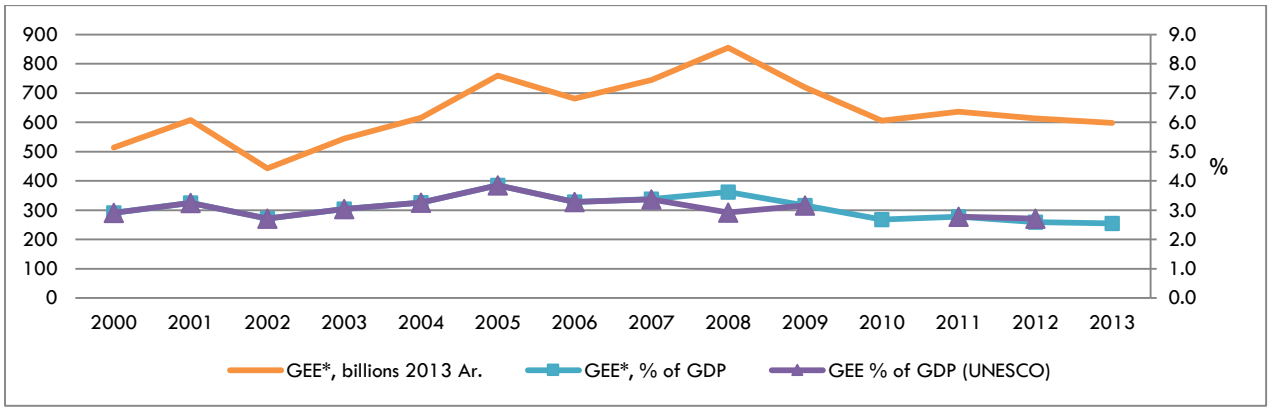


Source: Calculated from AMP disbursements and MFB/SIGFP data. Total public expenditure includes major NGOs.

B.2 Government Expenditures in Education: Size and Trends[6]

24. Government education expenditures were on an increasing trend from 2000 to 2005, but subsequently decreased to reach a low of 2.6 percent in 2013.[7] Figure 10 traces total government expenditures in education[8] from 2000 to 2013. The sharp increase in both levels and percent of GDP from 2003 to 2005 brought public education expenditures to a high of 3.8 percent of GDP in 2005. In real terms, government education expenditures reached their maximum in 2008, followed by a sharp drop coinciding with the political crisis. The period since 2010 shows remarkable stability, but the 2.6 percent of GDP reached in 2012 and 2013 is still the lowest since 2000.

Figure 10. Government Education Expenditure (GEE), 2000 to 2013



[6] Due to problems of data interpretation and documentation, different sources of data tend to show significant differences in the magnitude of government expenditures in education as well as total government expenditures. The analysis below presents results using data from MFB (SIGFP, the MEN's Interim Education Plan (.PIE), the IMF (for general government expenditure), and UNESCO.

[7] The series combines data from the MEN/PIE for 2000-2011 and government accounts from MFB/SIGFP for 2011-2013. Expenditures are taken at the level of commitment rather than execution (*mandatement)* to match the PIE definition. Although total education expenditures from the PIE could not be reconciled with SIGFP data for the period 2006-2009, largely because of large differences in investment expenditures, the 2011 totals matched very closely, so the PIE series could be extended to 2013 with reasonable confidence in comparability. However, the exercise confirmed some weaknesses in government accounting of externally financed on-budget expenditures.

[8] Total government expenditure includes all levels from pre-school and literacy to higher education and research.

Note: A star (*) denotes expenditures recorded at the commitment level (*montants engagés*) instead of execution (*mandatement*), as was done for the PIE. The GEE* series is from PIE for the period 2000-2010 and from SIGFP for 2011-2013.
Source: Data from MFB/SIGFP, MEN/PIE, UNESCO Institute of Statistics.

25. **Relative to other countries, the share of GDP allocated to education appears lower than average over all time periods since 2000, and the gap increased after 2009.** Madagascar spent on average 3.1 percent of GDP over 2000-2012 compared to 3.7 in SSA developing countries (LDCs) and 3.4 in low-income countries (LICs). The country also went against the trend of increasing education expenditures observable in all comparison groups—a diverging trend that started around the 2009 crisis. The Madagascar 2010-2012 average is one-third lower than the SSA and LIC averages (Table 6).

Table 6. International Comparison of Public Education Expenditures (percent of GDP)

	Government Education Expenditure/GDP averages (on available data)		
Country/Comparison Group	**2000-2012**	**2008-2012**	**2010-2012**
Kenya	6.36	6.67	6.67
Comoros	5.71	7.61	n/a
Mozambique	4.89	n/a	n/a
Rwanda	4.70	4.71	4.92
Senegal	4.33	5.39	5.60
Cote d'Ivoire	4.27	4.60	n/a
Burkina Faso	4.15	3.63	3.63
Niger	3.50	4.03	3.97
Madagascar	**3.10**	**2.89**	**2.75**
Cameroon	3.08	3.30	3.33
Congo, Dem. Rep.	2.50	2.50	2.50
Zimbabwe	2.50	2.50	2.50
Central African Republic	1.42	1.25	1.21
Sub-Saharan Africa (developing only)	**3.73**	**4.08**	**4.31**
Low income	**3.42**	**3.88**	**4.16**
Low & middle income	**3.91**	**4.35**	**4.53**
High income	**5.20**	**5.40**	**5.46**

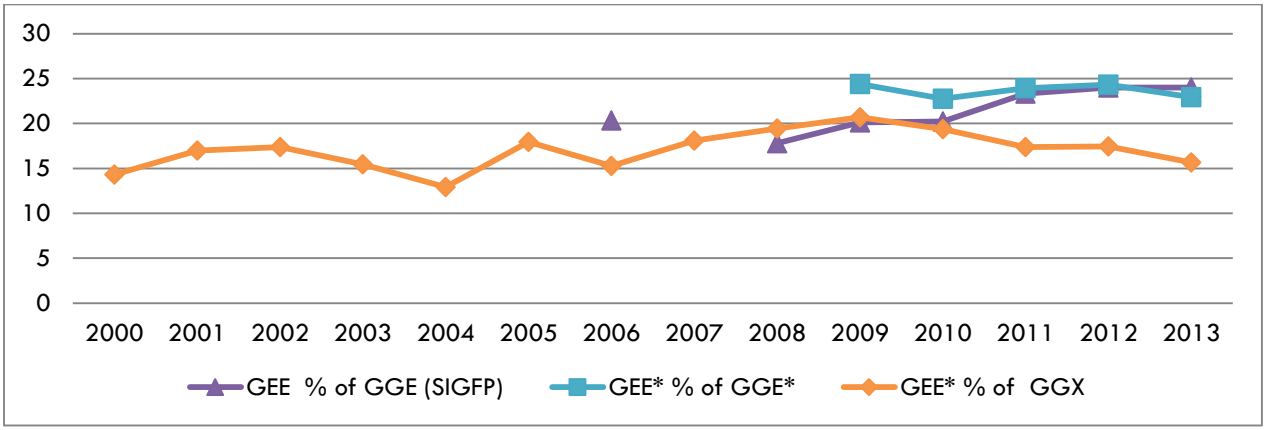
Source: UNESCO Institute of Statistics.

26. **The low share of GDP allocated to education seems, however, to reflect the overall contraction of public spending rather than a lack of prioritization by the Government.** Over the last ten years, general government expenditures decreased overall, from a peak of 25 percent of GDP in 2004 to a low of 15 percent in 2012.[9] It is therefore important to look more closely at the evolution of education expenditures in the general budget to assess the evolution of GOM's commitment to education. While important data limitations exist, it seems that the priority given to education in the overall budget has in fact increased

[9] IMF data, total general government expenditures percent of GDP.

quite substantially over the period 2006-2013.[10] The series shows an increase in the share of education in government expenditures (Figure 11).

Figure 11. Education Expenditure in General Government Expenditure, 2000 to 2013 (percent)



Note: A star (*) denotes expenditures recorded at the commitment level (*montants engagés*) rather than at execution (*mandatement*), as was done for the PIE. GEE are government education expenditures, and GGE are total expenditures of the government from the general budget. GGE* was not available in the data received from MFB prior to 2009. GGX are general government expenditures from IMF data.
Source: Data from MFB/SIGFP, MEN/PIE, IMF, UNESCO Institute of Statistics.

27. **In fact, in the midst of a severe budgetary and fiscal crisis, which saw an important contraction of overall public spending, the share of education in the public budget has remained higher than in most SSA countries** (Table 7). International comparisons of the share of public spending allocated to education can only be made using the UNESCO data series. Although data availability is largely uneven across years and across countries, it is sufficient to establish international benchmarks. According to these data, 21 percent of total spending is allocated to education in Madagascar, which is substantially higher than the average of SSA developing countries and the low income group as a whole. The relatively high share of education in government expenditures can be interpreted as a sign of political commitment to education; but since we have been considering executed expenditures rather than budget appropriations, it could also be the result of a stronger execution of the budget, which is discussed below.

[10] Major inconsistencies across data sources resulted in difficulty in assessing recent trends in the share of total budget allocated to education. Differences of up to 10 percentage points were identified and the direction of change was not consistent from one source to the next, especially looking at the post-crisis period (Figure xx). The most reliable series in terms of trend is the one based on realized expenditures from the MFB. Indeed, both education and total general budget expenditures rely on the same raw data and take account of actual executed expenditures (verification stage). However, the data from SIGFP are only available since 2009. The 2006 and 2008 data were reconstituted by MFB from records in SIGFP.

Table 7. International Comparison of the Share of Education in Government Expenditures

	% of General Government Spending (average based on available data)		
Country/Comparison Group	**2000-2012**	**2008-2012**	**2010-2012**
Comoros	24.12	n/a	n/a
Kenya	22.45	17.21	17.21
Cote d'Ivoire	22.17	24.61	n/a
Mozambique	21.85	n/a	n/a
Rwanda	20.90	20.16	20.06
Senegal	20.52	21.51	n/a
Burkina Faso	18.50	19.43	19.43
Niger	17.65	18.51	19.30
Madagascar	**17.43**	**18.21**	**20.60**
Cameroon	16.00	17.60	17.09
Central African Republic	13.02	12.08	12.04
Congo, Dem. Rep.	8.89	8.89	8.89
Zimbabwe	8.26	8.26	8.26
Sub-Saharan Africa (developing only)	17.28	17.43	17.13
Low income	16.99	17.47	17.58
Low & middle income	12.26	16.48	16.29
High income	13.79	13.57	13.96

Source: Data from UNESCO Institute of Statistics.

B.3 Governance and Budget Constraints

1. Execution of the budget: Governance issues

28. **Several factors need to be taken into account when interpreting execution rates.** Normally, comparing budget appropriations to executed expenditure can be used as a measure of planning capacity at the line ministry level, and of general quality of governance both at the ministry level and in overall budget management. For Madagascar, several issues need to be considered in interpreting execution rates. First, executed expenditures recorded in the government accounts (SIGFP) may not fully account for all realized expenditures, leading to over- or underestimating execution rates, depending on the performance of expenditures not included in the SIGFP or whether they are included differently at different stages. Second, various blockages in the budget exist that may prevent ministries from using budgeted funds. These blockages are not necessarily due to a lack of capacity for budget execution; rather, they may signal a need for specific attention to overall management of the budget, in particular of cash flows.

29. **Differences between budget appropriations and expenditures could also be attributed, in large part, to the way externally financed investment expenditures are recorded in the government budget.** Indeed, disbursements of foreign aid marked *on-budget* in the Aid Management Platform are much higher than externally financed executed education expenditures in SIGFP (Table 8). This does not appear to be a feature of the education sector, but of government accounts in general. These differences can lead

to underestimating execution rates, as some expenditures related to externally funded projects are not included in the government accounts at the stage of execution, yet most are included in budget appropriations.[11] Documentation relative to the rules regarding inclusion/exclusion of foreign aid managed by the government (normally on-budget but in fact not spent through the budget) would be necessary to allow better tracking of investments and to analyze execution rates more precisely. This is particularly true of investment expenditures, which are in most part financed by foreign aid and therefore not fully included in the government SIGFP records. It is important to separate the current and investment budgets in the following analysis of budget execution.

Table 8. Under-Accounting of Foreign Aid in Government Accounts, 2009-2013

	2009	2010	2011	2012	2013
AMP foreign aid disbursements marked on-budget *(billion 2013 Ar.)*	98.5	147.0	146.0	60.8	27.5
of which, percentage included in SIGFP	0.3	6.1	8.3	20.4	10.2

Source: Data from Primature (AMP), MFB/SIGFP.

30. **Rules related to the execution of the budget may also prevent full execution; this is notably the case for regulation rates imposed by the MFB**. Operational budgets financed by internal resources are subject to quarterly regulation rates—the maximum percentage of appropriations that can be committed by the end of each semester, the fourth quarter rate normally being 100 percent. Civil servant salaries are subject to a linear regulation (25, 50, 75 and 100 percent), but the quarterly percentages for other expenses in the operational budget, including indemnities, are subject to a non-linear schedule that can be changed during the year (Table 9 and Box 2).

Table 9. Regulation Rates, 2010-2014 (percent)

	Term 1	Term 2	Term 3	Term 4
2010	12.5	32.5	58	100
2011	12.8	43.1	69.4	100
2012	11.3	41.6	68.0	100
2013	8.80	52.10	67.20	100
2014	4.30	42.20	71.40	100

Note: The regulation rates shown in the table concern only investment expenditures, except for 2011 and 2012, which also encompass salaries. Data source: MEN via MFB.

[11] Another issue identified in the course of this PER is related to the payment of value-added taxes (VAT), which are paid by some externally funded projects and subsequently reimbursed by the Government. It is not clear exactly where these provisions appear in the budget, but they seem to be included in the SIGFP procedure, and provisions need to be made as part of the budget process to pay for these liabilities. Due to lack of predictability regarding the total amount of these expenditures, there might appear to be some blockages. Unfortunately, the data obtained for this PER is not sufficient to determine the magnitude of the problem.

31. **The issue of regulation rates is particularly relevant to the education sector and is often raised as an important constraint in budget execution.** There are at least two reasons why regulation rates are more constraining for the education sector than for other line ministries. First, the first quarter of the academic year is the last quarter of the fiscal year, so budget restrictions announced in the last quarter affect expenses at the beginning of the academic year and could therefore have a real effect on the full academic year. Second, as noted earlier, the education ministry relies heavily on community personnel to supplement teaching personnel in public schools. The subsidies for these community teachers are also subject to regulation rates, since they are included in the non-wage operational budget. Tight regulation rates therefore have a large impact on the capacity of the ministry to transfer these subsidies. To understand the magnitude of this problem and the impact of budget management techniques that have been necessary to mitigate these constraints, there would need to be a careful examination of quarterly budget data, which could not be obtained for this PER.

32. **Budget reallocation and rectification may also lead to an overestimation of the ministry's capacity to execute according to plans.** Issues related to difficulties in planning for both external resources and enrollments for the next academic year could explain, at least partially, the need to rearrange credits across the ministry during the year. The observed effective fungibility between allocations and expenses across different sub-administrations and programs is likely to increase execution rates for total expenditures but significantly reduce the ability to track expenditures by function or at the program level.[12] Here also, it is difficult to appreciate the magnitude of the problem and its impact on allocation and execution, but it needs to be taken into account when evaluating resource allocations by functions at the executed level.

Box 2. Budget Rectification

In Madagascar, budget allocations within broad categories are generally modified mid-year to accommodate requested transfers of credits. A new Finance Law is not necessary if these changes follow certain criteria. From the month of May, *ordonnateurs* and program coordinators can request modifications to the SIGFP to move credits. These requests need to be approved by MFB and published by decree before they are effective in the SIGFP. Rules differ depending on whether the transfer is (a) within programs, (c) across programs in the same ministry; or (c) across programs of different ministries. The procedure is simplified when changes are within programs, although the change still needs to be published by decree. It is, however, clear from the Law that, for operational expenses, whatever the nature of the modification requested, the total amount in each economic category reported in the Law (indemnities, goods and services, and transfers) cannot be changed. Regulations/procedures concerning these modifications are delineated in MFB *circulaires*. Any change across categories requires a rectification of the Law of Finance. Consequently, in years when the Law was not rectified (all years in the period considered except 2008 and 2010), there may be differences between total appropriations initially granted to a line ministry and final appropriations, but there should be no difference by category for operational expenditures. Restrictions, however, do not apply to externally financed credits, in particular for the investment budget.

Based on past budget data, it is clear that there have been allocation changes made to initial budget appropriations, especially in the non-wage current budget, but the education sector cannot be identified as a net gainer or a net loser in the reallocation process overall. It was a net beneficiary in 2008, 2009 and 2013 and a

[12] This is particularly notable when looking at changes in the amounts of transfer expenditures not detailed in the SIGFP (for example, transfers to CNAPMAD).

net loser in 2006, 2011 and 2012. Table xx gives the ratio of final (modified) to initial budget appropriations for the education sector and for the non-financial general budget. Changes in the operational budgets were on the order of 10 percent in most years except 2010 (when a revision to the Law of Finance was approved), and up to 17 percent in 2013. The 2010 differences are likely due to the reduction in budgetary aid.*

Final vs Initial Budget Appropriations in Education and Overall, 2006-2013

	2006	2008	2009	2010	2011	2012	2013
Overall education budget	**0.89**	**1.03**	**1.01**	**0.88**	**0.98**	**0.97**	**1.04**
Current operations: regular wages	0.99	1.05	1.03	1.04	0.93	1.01	1.01
Other current operations	0.92	1.08	1.00	0.63	1.09	0.90	1.17
Internally financed Investment program	0.75	0.87	1.00	0.39	1.00	0.62	1.00
Externally financed Investment program	0.73	1.00	1.00	0.93	1.00	1.00	1.00
Overall general non-financial budget	**1.03**	**1.06**	**1.00**	**0.80**	**1.00**	**1.00**	**1.00**
Current operations: regular wages	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Other current operations	0.97	1.12	1.00	0.73	1.01	1.01	1.01
Internally financed Investment program	0.84	1.17	1.00	0.99	0.97	0.94	0.95
Externally financed Investment program	1.19	1.00	1.00	0.61	1.00	1.00	1.00

*****The information on budget support could not be obtained from the MFB.
Source: Data from MFB/SIGFP.

2. Execution of the budget: Execution rates

33. **Overall execution rates for the Ministry of Education have been consistently higher than those of the general budget, by 5-15 percentage points every year since 2006** (Table 10).[13] Breaking down this rate across broad budget categories reveals some differences, however. Execution rates for operational expenditures have been consistently higher in education than overall, except in 2013 when they fell just below execution rates of the general budget, although they remained above 90 percent. Looking at the internally financed investment budget gives a different picture, with the execution rates in education following those of the general budget until 2010, and then falling significantly below.[14]

[13] Rates are calculated relative to the rectified budget. Comparing executed expenditures to initial appropriations since 2006 do not reveal important or systematic over- or under-budgeting by broad categories for education. The only noticeable tendency is in positive rectifications of the wage budget, which reveal themselves as unnecessary in view of final execution rates. In most other cases, the amounts allocated in the rectified budget were almost entirely used, except in 2013, when under-budgeting for non-wage recurrent expenditures led to an over-budgeting (by about 10 percent) in the rectified budget.

[14] Given the caveats raised above about the accounting of foreign aid in government accounts, it is not possible to interpret execution rates for the externally financed investment program. Internally financed investment, on the other hand, should not be subject to such problems. It is not clear why executed expenditures for the internally financed investment program overall could be higher than final voted appropriations in 2012 and 2013, except if some executed expenditures were, in fact, based on the initial budget. What is clear, however, is that a large part of the weak execution rates for internally financed investment in education are not related to governance inside the ministry, but rather to overall budget management issues.

Table 10. Execution Rates in Education vs Overall Execution of the Budget, 2006-2013

	2006	2008	2009	2010	2011	2012	2013
Education	**0.78**	**0.71**	**0.65**	**0.80**	**0.76**	**0.93**	**0.86**
Current operations: regular wages	0.95	0.86	0.84	0.90	0.95	0.94	0.92
Other current operations	0.98	0.99	0.84	0.95	0.95	0.99	0.91
Internally financed Investment program	0.71	0.93	0.59	0.92	0.30	0.77	0.51
Externally financed Investment program	0.02	0.05	0.00	0.10	0.13	0.46	0.07
General non-financial budget	**0.61**	**0.60**	**0.49**	**0.74**	**0.67**	**0.80**	**0.81**
Current operations: regular wages	0.95	0.88	0.79	0.92	0.95	0.93	0.93
Other current operations	0.94	0.61	0.68	0.94	0.84	0.97	0.93
Internally financed Investment program	0.74	0.93	0.53	0.97	0.59	1.34	1.48
Externally financed Investment program	0.24	0.26	0.12	0.12	0.15	0.10	0.04

Note: Rates are calculated as the ratio of executed expenditures *(dépenses mandatées)* to final appropriations *(credits modifies).*
Data source: MFB (SIGFP).

34. **Interestingly, the comparison of executed expenditures to final appropriations does not exemplify problems related to the sharp (nearly 50 percent) reduction in the current non-wage budget in the fourth quarter.** To all appearances, the constraint was not binding in the end, since only 10 percent of final appropriations for the recurrent non-wage budget were not executed. Looking at modified versus initial budget appropriations, however, reveals that 2013 budget appropriations for non-wage recurrent expenditures were revised upward by close to 20 percent mid-year, which must have significantly eased the fourth semester's budget constraint.

Box 3. Improving the Transfer of community Teachers' Salaries: Results from a Field Study

A case study was undertaken in the context of this PER that analyzed various aspects related to community teachers, including the payment of their subsidies. The results show that the existing payment mechanisms have had positive impact on the system, including:

- an improvement of the conditions of community teachers, which are explicitly part of the sector strategy and recognized as such by the MoE;
- a reduction of absenteeism of community teachers and an overall increase in motivation;
- a reduction of the costs of education borne by families who previously financed the salaries of community teachers
- a relative efficacy of the payment mechanisms which varied according to local circumstances.

Despite these positive aspects, some important weaknesses persist, including:

- *Substantial delays in payment combined with long periodicity in payments*, resulting in severe financial difficulties for teachers and often translate in higher contributions from parents to fill the gap,
- in remote areas, the payment of subsidies require long travel for community teachers which have implications in terms of absenteeism and financial costs for community teachers,

Improving the payment mechanisms of community teachers would require the following:

- *Revising the procedures for managing the payment of community teachers' subsidies* which are complex and cumbersome. They include the need for a confirmation of teachers' presence and efforts, through an *attestation de service*, which often constitutes a bottleneck and results in delays. With the development of a database at regional and central levels, the identification and localization of community teachers has become more reliable, which calls for a shift from control *a priori* to an *a posteriori* form of control. During the transition, control *a priori* could be done only twice per year.
- *Reducing delays in payment*. Such delays are mostly due to lengthy administrative processes (including the mailing by post of control documents) and to delays in accessing funds at central levels (the classification of community teachers' subsidies as transfers in the budget implies that they are subject to restrictions imposed by MFB, including through the regulation rates). These delays are different in nature and entail different recommendations. On the one hand, the move towards an automatized system and *a posteriori* controls would accelerate administrative procedures, but would require substantial technical assistance to support the process. On the other hand, the reclassification of community teachers' subsidies as "quasi-salaries" in MFB budget would contribute to reducing delays by lifting the existing restrictions imposed by MFB.
- *Modifying the periodicity of payment*. While subsidies are currently paid every two months, this could be brought down to one month. This would not necessarily involve an increase in transaction costs for MoE or MFB and would substantially improve the working conditions of community teachers.
- *Clarifying the fiscal status of subsidies*. The current fiscal status of subsidies remain unclear. While they constitute an income, they are usually not declared by beneficiaries and therefore not taxed. Options for clarifying the current situation include the promulgation of an exoneration of taxes for community teachers' subsidies, the consequences of which could be analyzed in details by a special commission.

3. Deconcentration of education expenditure

35. **The level at which expenditures are administered can impact the overall performance of budget execution.** On the one hand, deconcentration of expenditures can improve the efficiency of budget execution, allowing a closer connection between administrative and operational units. On the other hand, for deconcentration to have the intended effects requires additional capacity at the local levels, as well as strengthened communication between various actors along the expenditure chain. Deconcentration of expenditures has been an important priority at the Ministry of Education, and the ratio of central to deconcentrated expenditure was retained as one of the ten indicators included in the pluri-annual performance sheet prepared for the MFB and used as a budget preparation tool. Box 4 provides the background necessary to understand how deconcentration can be measured in government accounts (SIGFP).

Box 4. Measuring the Deconcentration of Education Expenditure Using SIGFP

Something can be inferred about deconcentration of public expenditure by looking at the level at which expenditures are mandated in government accounts (SIGFP). The following four levels of administration relevant to the public education sector are coded in SIGFP: the central level (Ministry), the 22 regions (DRENs), the 113 district (CISCO), and 303 grouping of communes (ZAPs, although their expenses are effectively managed at the district level), and the school.

In addition, there are six general Treasuries located in each ex-province, which administer the payment of regular salaries. There are also 148 lower secondary schools (CEG and CEGR), and 199 upper secondary schools *(lycées)* with own expenditures in SIGFP.

The following items are particularly interesting when looking at deconcentration of expenses:

- **Regular wages**, which represent the bulk of MoE expenditures, are administered at the central level by the MFB, with salaries distributed across the six ex-provinces and the central administration.

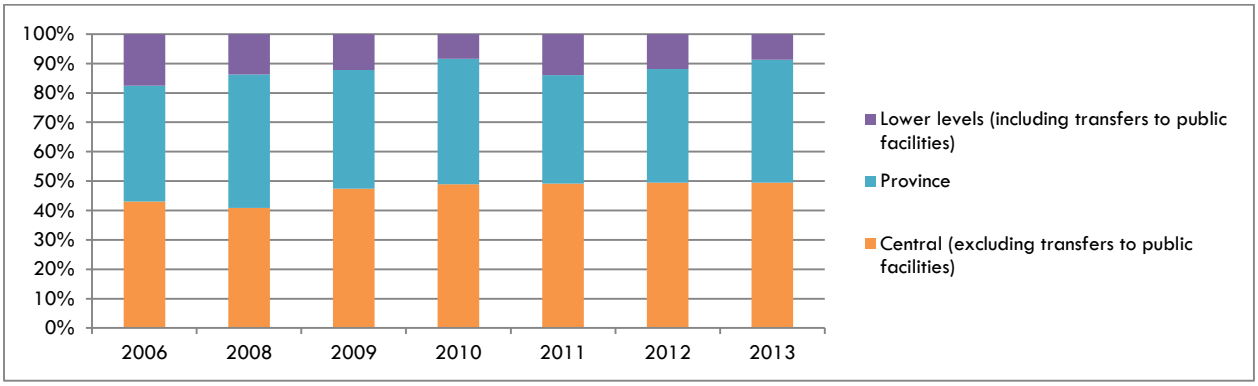
- **Transfers,** which make up 81-84 percent of the non-wage operational budget, are mostly composed of subsidies to pay community teachers and transfers to primary schools for general educational expenses *(caisse ecole)*
  .
  - **Subsidies to community teachers**, part of the non-wage operational budget, mandated and transferred by the central level (DGEFA) to regional treasuries. DRENs are responsible for administrating the payments at the regional level upon verification at the school and CISCO levels. Transfers to pay community teachers are included as subsidies to the private sectors in SIGFP, they are included as centrally managed below.

  - **Transfers to public entities**, in particular those going to primary schools, can be considered as deconcentrated in the sense that the schools are directly responsible for the management of expenses paid out of the allocated amounts.

36. **Over the period 2006 to 2013, the share of expenditure managed at a deconcentrated level below the province level has decreased to less than 10 percent of total MOE expenditure** (Figure 11). Considering the totality of MOE expenditure (including wages and including all education missions) and assigning transfers to public schools to the deconcentrated levels, the central level manages over half of all expenditure while another 40 percent goes to the provincial treasuries to pay non-central salaries. The share managed by the central level has increased from 43 to 50 percent while the share going to lower levels (including central level transfers to public facilities) has decreased from 17.6 to 8.2 percent of total MOE expenditure.[15]

[15] Restricting the data to education up to secondary level gives a deconcentrated share (below the province and including transfers to public entities) at less than 4 percent, down from 18 percent in 2006.

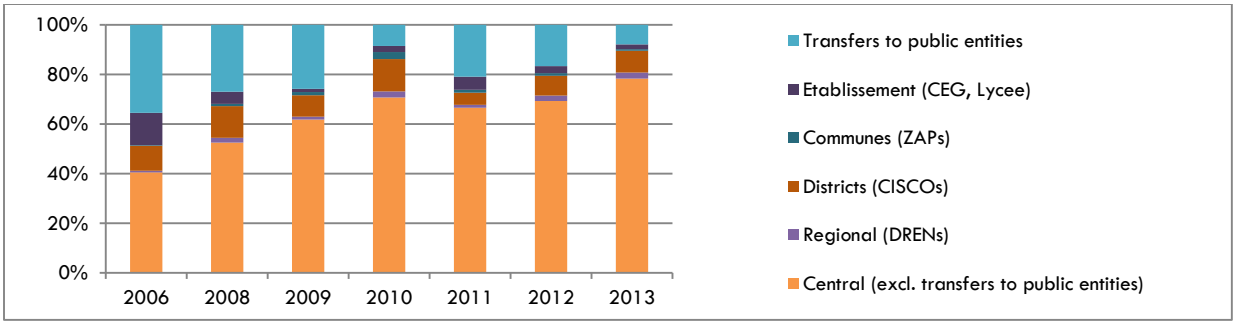
Figure 11. Deconcentration of Total Public Spending in Education (all missions), 2006-2013



Source: Data from MFB/SIGFP.

37. **The centralization of resources is even more pronounced for expenditures up to secondary education** (Figure 12).[16] Excluding higher education and professional training, the analysis shows a sharp increase in the share of centrally managed spending over the period 2006-2013. This centralization of resources is mostly attributable to the increasing share of salaries in MoE budget, resulting from the overall contraction of spending and priorization of salaries within the ministry's budget. The most recent period was marked by drastic cuts in the budgets of CISCOs and schools, resulting more of the budget constraints than from a deliberated attempt to limit deconcentration of resources. It is worth noting however, that the budget cuts at lower levels were partially compensated by external funding (especially cuts in schools operational budget coming from domestic resources) and it is unclear whether these external resources have been taken into consideration in SIGFP.

Figure 12. Deconcentration of Current Non-Wage Public Spending in Education (up to secondary), 2006-2013



Source: Data from MFB/SIGFP.

[16] This analysis does not include expenditures that are not marked as linked to education in the program budget. Some investment expenditures directed to education are in fact realized outside the education missions under the Ministry of Decentralization through the Local Development Fund (FDL). Expenditures directed to education make up about 30 percent of funds in the FDL but are still very small relative to Education expenditures of the MOE (less than 0.5 percent). Nevertheless, they have the potential to increase and could improve the decentralization picture of investment, which is currently fully centralized in Education.

B.4 Overall Efficiency Analysis: Linking Public Expenditures and Outcomes

38. Overall efficiency analyses are particularly helpful to benchmark the structural performance of the system in comparison to other countries (Box 5). The objective of this analysis is to establish a link between the level of public education expenditures and general education outcomes using information from a large set of countries of all income groups and regions. The methodology and motivation as well as limitations of the analysis in terms of the outcome indicators chosen are presented in Box xx. The structural analysis, which evaluates a long-run "Madagascar effect" based on estimation from an unbalanced panel of 144-176 countries over the period 1980-2012 is presented in Annex xx along with details on the methodology and regression results for both structural and current efficiency analyses.

39. However, various limitations to the analysis impose caution when interpreting the results. In order to grasp the overall picture and make policy recommendations regarding the size of public expenditure, one cannot look at results of the efficiency analysis in isolation of analyses of inequalities in terms of financial burdens and outcomes. In addition, because education outcomes are usually affected with substantial delays by changes in the learning and teaching environment, it is possible that the efficiency analysis does not capture accurately the capacity of the system to transmit competencies and knowledge to its pupils.

Box 5. Efficiency Analysis of Public Education Expenditure

Overall/system efficiency analysis is often presented comparing efficiency score estimated by Data Envelopment Analysis methods (DEA) to situate countries relative to an *Efficiency Frontier* (see Herrera and Pang (2005) for a review of the literature). It is, however, difficult to interpret DEA efficiency scores for countries with low levels of spending. In particular, a country can obtain a very high efficiency score despite very poor education outcomes. Keeping sight of where the country stands in terms of both levels of input and output while assessing efficiency is thus very useful. The methodology presented here uses the same data as for DEA but efficiency is assessed visually in two dimensions rather than using a summary indicator. One dimension is obtained using deviations from expected public expenditure and the other using deviations from expected education outcome. Expected outcomes and expected expenditures take account of the country's income level (in PPP), its size, and effects of regional and income groupings for LDCs. The unexplained variation is used to determine relative efficiency.

Evaluating "structural" efficiency: Structural efficiency relates to the long-term standing of the country relative to others in terms of public expenditure performance. It is important to measure to establish some benchmark that can be used to interpret current efficiency, especially because these results depend on characteristics of the Madagascar's education system (such as the relative importance of the private sector). A measure of structural efficiency can be obtained using all time periods and countries for which data are available and exploiting the panel structure of the data. A random-effects regression separates the residual variance in two parts: one that is common to all countries and one that is country specific. The country specific residual variance or "random effect" can be used to measure the structural advantage/disadvantage of the country (the country's typical deviation from expected outcomes).

Evaluating changes in "current/conjectural" efficiency: Beyond looking at the general position of the country relative to others, it is important to gage how it has changed across two time periods. In this case, expectations are estimated for each time period averaging values over 2 or more years (dampening measurement errors) and running an Ordinary Least Square regression on the cross-section of countries for which data is available. Residuals are then calculated as the difference between observed and predicted values.

The choice of outcomes indicators: Different types of outcomes can be considered depending on whether efficiency is assessed over a long time period (structural efficiency), or using averages calculated over short time periods (current efficiency). In general, outcomes that are most contemporaneously related to current expenditures, sufficiently dependent on the overall situation in the country, and sufficiently available and comparable across countries are best suited to evaluate changes over time. Herrera and Pang (2005) use primary and secondary enrollment (gross and net), completion rates (first and second level), years in school, and learning scores. Based on data availability, the gross primary and secondary combined enrollment ratios, primary completion rates, and the youth literacy rate (only available 2000 and 2009) are used here. The youth literacy rate is most relevant to the structural analysis as it is less contemporaneously related to expenditure than the other two but is only sparsely available. Enrollment rates are somewhat problematic for Madagascar given the inaccuracy of population estimates. Combining primary and secondary rates dampens (but does not solve) the problem. Learning outcomes would have been a good indicator in the structural analysis to capture the quality dimension but are not sufficiently available (number of years) or comparable across countries. Unfortunately, this was the case for all other internationally comparable indicators of quality.

The choice of expenditure indicators. Government education expenditure data in percentage of GDP (or GNI) are widely available in the UNESCO Institute of Statistics' database for the period 1980-2012 (covering 177-211 countries, depending on the year). The indicator is comparable across countries and goes through country clearance procedures. The indicator includes all public expenditures externally or internally financed.

The four-quadrants graphical illustrations. Results can be plotted into a four quadrant graph where (0,0) is the point where both education outcome and expenditures are at levels predicted by the model. Deviations from expected education outcomes are represented vertically (y-axis) and deviations from expected expenditure horizontally (x-axis). For most education outcome indicators, higher is better, so a position in the NW quadrant is most efficient and a position to the SE is least efficient. The SW quadrant includes countries which underperform in terms of education outcomes but also have relatively low expenditures. They are called underachievers. Those in the NE quadrants are overachievers.

Why focus on government expenditure? Although outcomes are the combined result of public and private education, and all education expenditures are expected to have some effect on outcome, the present analysis only considers public expenditures. First, as discussed above, there are no reliable data on total expenditures in education and no data that are comparable across countries. Second, according to the evidence provided above, public education represents the bulk of education expenditures, and it is also closely connected to the private education system; third, the outcomes considered focus on primary and primary/secondary education, accounting for more than 80 percent of children under 14 years. Finally, and importantly, even if comparable data on private expenditure are available, the point here is to evaluate public expenditure needs on efficiency grounds. If a country can obtain better education outcome overall with less public expenditure because the private sector takes on a larger part of the burden, it is indeed an efficiency improvement in terms of public expenditure.

40. **Structurally, Madagascar places in the group of most efficient countries in terms of enrollment and underachiever in terms of completion** (Figure 13). In other words, considering the full variation of expenditures and outcomes over 1980-2012, Madagascar tends to spend slightly less on education (in percent of GDP) than its level of income, size and geographical location would predict while it achieves average or better than expected outcomes in terms of enrollment (primary and secondary combined) and youth literacy. However, the result is different when looking at completion rates: Madagascar achieves slightly lower completion rates than the levels of expenditure would predict. These

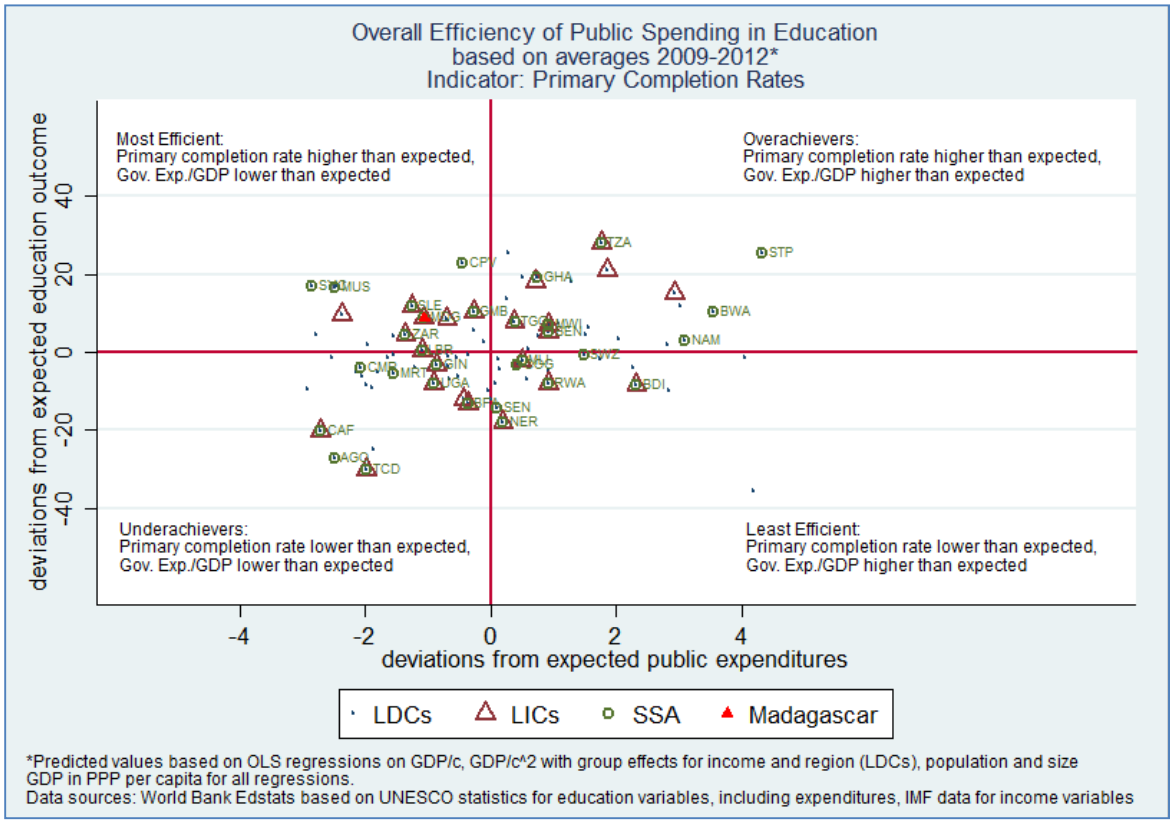
results are however not to be interpreted as reflecting the current situation but need to be taken into consideration when interpreting the results presented below.

41. **Overall, the system demonstrated some resilience to the severe cuts in public funding during the crisis and remains broadly efficient compared to other countries.** The analysis shows a slight increase in efficiency during the period 2009-2012 compared to 2000-2008 in terms of completion rates (Figure 14). In other words, the decrease in completion was less than what could have been predicted given the simultaneous decreased in spending. However, it is likely that the delayed effect on completion explains part of this result. On the other hand, the analysis shows that although the country's advantage in terms of GERs was reduced, it remains well above expectation. This may indicate a certain degree of resilience of the system, likely to be related to the rapid increased in private spending to compensate the cuts in public spending. In addition, it is important to note that this analysis does not fully take into account the potential loss in terms of education quality which would be measured through learning outcomes.[17]

42. **Overall, the above analysis shows the relatively good structural performance of the system, but hides important weaknesses, including in terms of learning outcomes.** Madagascar has a high potential in education as it has managed to achieve better or similar outcomes than comparable countries with lower expenditures. So far, the crisis does not appear to have had a significant impact on efficiency if 2009-2012 averages are considered. This would seem to indicate that there some room to increase public expenditure on education without moving to a situation of overspending relative to other countries. Important caveats include however (a) it is likely that the full impact of the recent years is not fully captured, especially on indicators which react with a delay (such as completion rates), (b) the efficiency of the system is so far analyzed through the lenses of enrollments and completion, ignoring therefore changes in the equality of education. Given the dramatic decrease in education learning outcomes over the past decade, it is probably the case that although Madagascar is relatively more efficient than others at getting children to school, it is performing particularly poorly in terms of ensuring that resources are translated into improved learning outcomes.

[17] The full set of results is presented in Annex3.

Figure 13. Expenditure Performance of Public Education: Pre/Post-Crisis Efficiency Based on Completion Rates



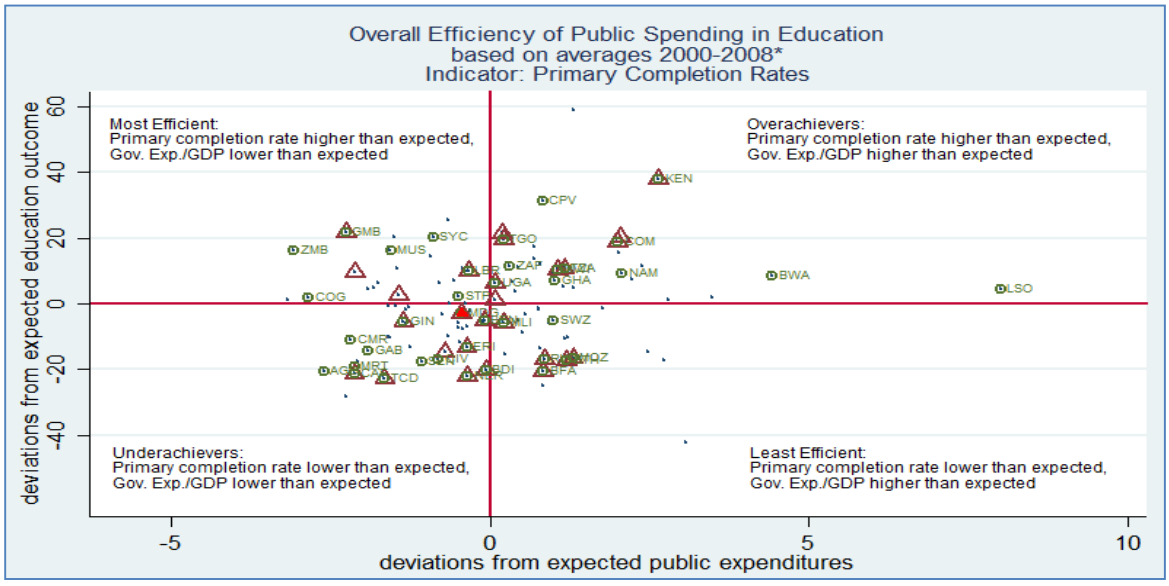
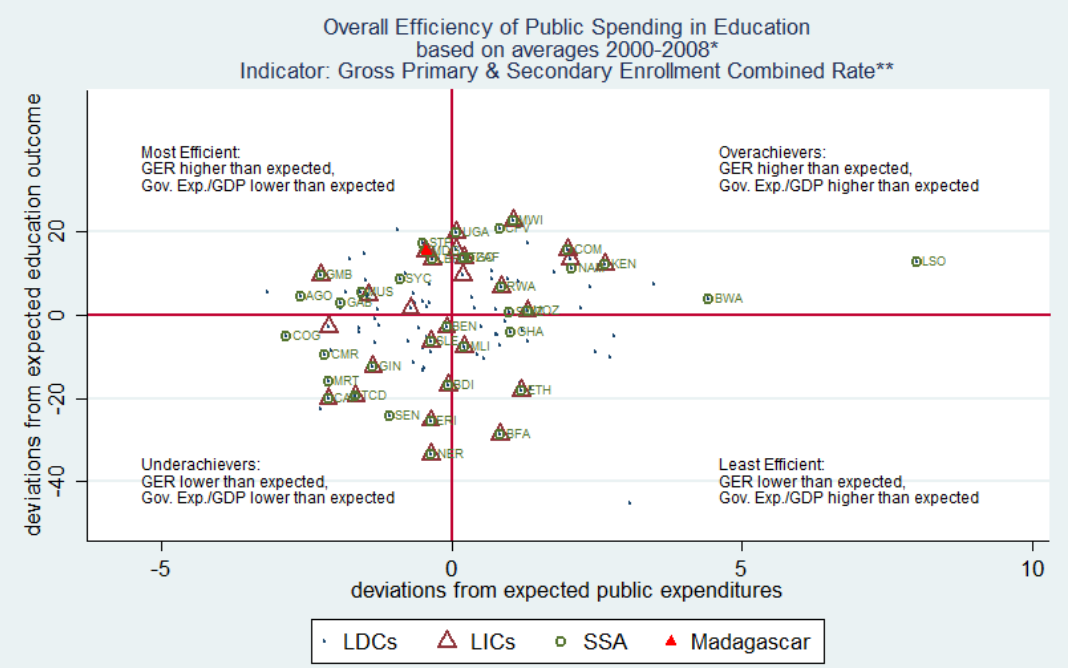
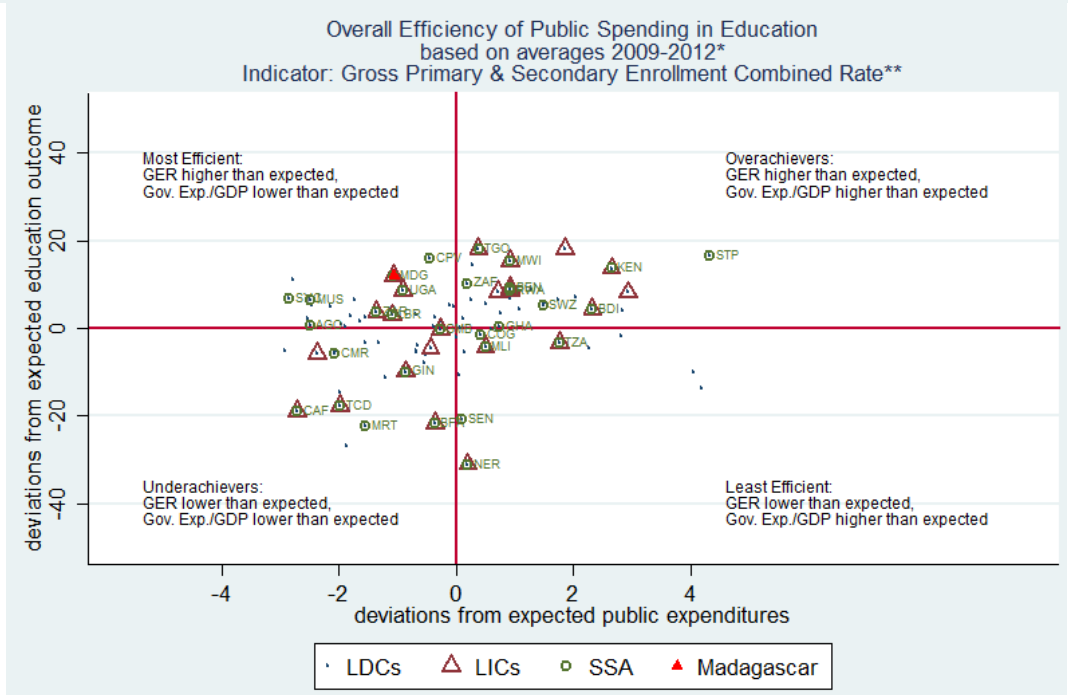


Figure 14. Expenditure Performance of Public Education: Pre- vs Post-Crisis Efficiency Based on Gross Enrollment Ratios (primary/secondary combined)



*Predicted values based on OLS regressions on GDP/c, GDP/c^2 with group effects for income and region (LDCs), population and size GDP in PPP per capita for all regressions.
** Gross enrollment rates for Madagascar: 2005-2008 average
Data sources: World Bank Edstats based on UNESCO statistics for education variables, including expenditures, IMF data for income variables



*Predicted values based on OLS regressions on GDP/c, GDP/c^2 with group effects for income and region (LDCs), population and size GDP in PPP per capita for all regressions.
Data sources: World Bank Edstats based on UNESCO statistics for education variables, including expenditures, IMF data for income variables

B.5 Key Findings and Policy Implications

Key Findings

Madagascar's education system appears to be largely underfinanced, and public investment in the sector remains, for now, relatively efficient in terms of enrollment and completion.

Level of public spending to education

- Public spending on education has consistently received a relatively high priority in the budget.
- However, Madagascar spends only 3.1 percent of GDP on education, the lowest share among comparable countries, due mainly to the overall low envelope of public spending.
- Public spending on education has decreased since 2010 due to a sharp drop in external funding. More than 80 percent of public sector funding comes from domestic resources, compared with 65 percent in 2010.

Execution of public spending

- Execution rates appear to be relatively high, but multiple budget reallocations indicate a low capacity of the Ministry of Education to execute its budget according to initial plans,
- Tight regulation rates appear the be an issue for the education sector, especially in Q3
- The sector remains highly centralized in terms of budget execution, despite a well-established school management framework.
- There exist serious limitations in the way budget execution is captured by SIGFP, which reduces MoE ability to perform budget analysis and to use the budget as a tool for implementing the sector strategy.

Overall efficiency of public spending

- The efficiency analysis shows a certain resilience of the system to severe spending cuts, in terms of enrolling children in school.
- However, the efficiency analysis does not capture: (a) the substantial increase in households' contributions, which may have mitigated the impact of cuts in government spending; or (b) the probable impact on education outcomes of falling investments in the sector.

Policy Implications

In a context of rapid fall in learning outcomes, there is a need for additional public spending targeted directly at improving quality.

Spending more

- To durably improve education outcomes, Madagascar needs to invest more in education, in line with other countries.
- Given the already high share of education in the total budget, increased spending must come from either an overall larger envelope of public spending or increased contributions from external funding (public or private).

Executing better

- Better tools are needed to inform budget decisions. The SIGFP needs to be fully utilized, and key information needs to be inputted into the system. External funds, especially on-budget funds, should be consistently recorded in the SIGFP.
- There is room to further deconcentrate the execution of spending, and the channeling of additional funds to schools could be explored.
- Regulation rates could be adjusted to the specific needs of the education sector, to alleviate some of the pressures in preparing the new school year.

SECTION C. ELEMENTS TO ASSESS TECHNICAL EFFICIENCY OF EDUCATION EXPENDITURE

43. This section considers the efficiency of on-budget education expenditures. Although efficiency and equity improvement are often compatible in the social sectors, one needs to interpret results in conjunction with the distributional analysis in section D.

C.1 Elements to Assess Technical Efficiency: Analysis of Input Shares

1. Salaries

44. **A first glance, at the share of salaries in the total education budget would indicate a reasonable wage bill, compared with other countries** (Table 13). Education, more than other sectors, relies heavily on human resources and, although the share of salaries in the public education sector in Madagascar has increased, it *appears* to compare favorably to international benchmarks (Box6). Using comparable data across countries from UNESCO, the shares reported for Madagascar vary from 47.7 percent for 2007, to 70 percent for 2008 and 68.5 percent for 2011. These are low relative to most others in the comparison group. However, although the UNESCO data is deemed comparable across countries, it is not clear how these ratios take account of community salaries. Indeed, different countries may rely more or less heavily on community teachers, and the payment of these salaries may not always be identifiable as wages in the government accounts. This is an important issue for Madagascar, where the government subsidizes a large quantity of teachers hired by the parent-teacher associations (FRAMs) to teach in the public schools.

Table 13. Share of Salaries in Public Spending on Primary Education, Comparison with Selected Countries

	2000s Average	Data Availability
Cape Verde	**77.9**	2002, 2004, 2005, 2009
Mauritius	**62.3**	2010
Seychelles	**73.3**	2002, 2003, 2006
Congo, Dem. Rep.	**85.0**	2010
Madagascar	**62.1**	2007, 2008, 2011
France	**74.2**	All years

Note: SSA countries were selected if they were placed in the "most efficient" quadrant in the overall expenditure efficiency analysis of section B. The data for this variable are scarce so other countries in the group such as Gambia and Zimbabwe could not be included. France was selected as a HIC reference for Madagascar; in the structural efficiency analysis based on all available years, France placed in the overachievers quadrant toward the more efficient (close to expected level of expenditures/GPD and higher than expected achievement).
Source: UNESCO Institute of Statistics.

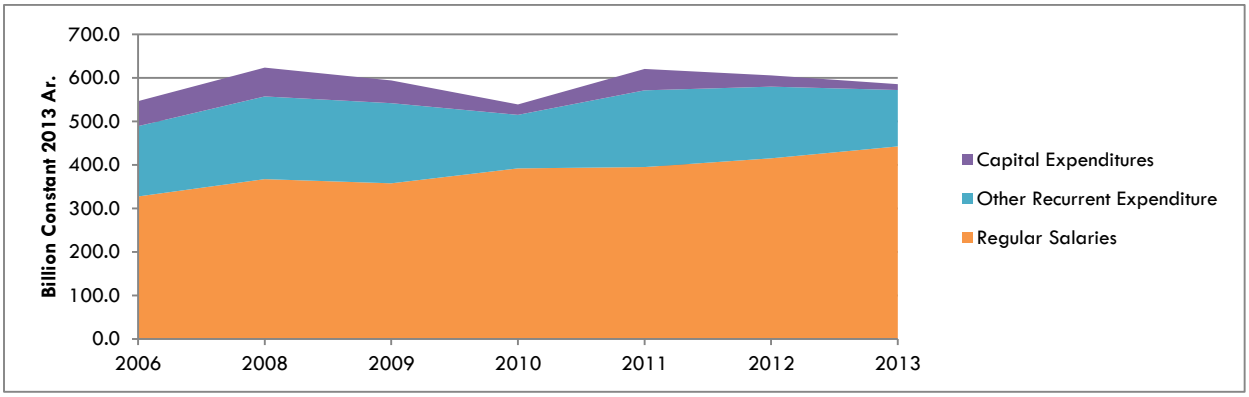
Box 6. Analyzing Input Shares in Education

There are no benchmarks relative to the optimal combination of inputs that go into the "production" of education (labor, capital, materials and supplies), but we know that (a) the production of education is highly labor intensive, and (b) there is a large degree of complementarity among inputs.

Teachers are the most important resource, but they need schools and supplies to teach effectively, and more supplies or more classrooms would not have much effect without more teachers. When too much is spent on one input (particularly wages), other inputs are crowded out and the imbalance impedes efficiency, in particular by reducing the quality of education. In addition to being necessary on efficiency grounds, keeping a reasonable balance between expenditures on different inputs in the education sector is necessary to ensure sustainability. This is why, although efficient ratios cannot be determined with the available data, it is important to track changes in the relative shares of public expenditures going to each input.

45. **The share of regular teachers' salaries in the budget has been fast increasing, and the wage bill has reached unsustainable levels.** Looking at changes in regular salaries is informative to address issues of sustainability because regular salaries are not flexible downward. Using more recent data from the MFB/SIGFP shows that the share of regular salaries is following a fast increasing trend, reaching over three fourths of the education executed budget in 2013 (Figure 15). Although this is still within reasonable limits, the trend is not sustainable. The recent announcement that 10,000 community teachers will be absorbed into the civil service in 2014, and another 10,000 in 2015, are in that sense worrying (see Box 7 for more details).

Figure 15. Evolution of Real Education Expenditures by Broad Economic Category



Source: Data from MFB/SIGFP.Data source: MFB/SIGFP.

Box 7. The Impact of the Regularization of Community Teachers as Civil Servants

Recent political decisions in the sector include the progressive integration of community teachers in the civil service. Analyses carried out under this PER have aimed at estimating the potential impact on the MFB budget of such integration, using various scenarios. Projections for 2020 show that the number of teachers would reach 96,100 for an expected 5.2 million children in primary school. This would translate into the recruitment of an additional 68,000 civil servants compared with 2014. An analysis of the potential impact of this decision on public spending on education is presented below. The evolution of the macroeconomic context was simulated using two different scenarios, in line with the recent scenarios elaborated by the IMF. More details on the methodology and scenarios for the macro context are provided in the case study developed for this PER.

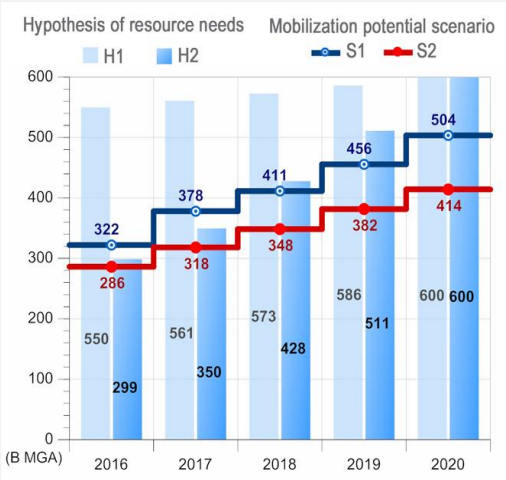
In addition, the analysis examined two different hypothesis for integrating community teachers in the civil service:

- Hypothesis 1: all community teachers are integrated in the civil service as early as 2016, and new teachers are hired as civil servants.
- Hypothesis 2: community teachers are progressively integrated in the civil service to ensure that all teachers are civil servants by 2020. More specifically, this hypothesis assumes the integration of 10,000 community teachers in 2016, 15,000 in 2017, 15,000 in 2018, 16,000 in 2019 and 16,960 in 2020.

The results of projections show that Hypothesis 1 is unsustainable even in the most favorable case of the evolution of the macroeconomic context. Indeed, from 2016 onwards, the salary needs for primary schools would amount to 550 billion MGA. This amount exceeds the global amount of the 2014 MFB budget, which was 541 billion MGA in 2014, and is 10 times larger than the current amount allocated to community teachers' subsidies.

Simulating the impact of the integration of community teachers

In the case of Hypothesis 2, the results of projections show that the integration of 10,000 community teachers in 2016 and as many in 2017 would result in salary costs equivalent to about 300 billion Ar in 2016 and as much as 350 billion Ar in 2017. This compares with 286 billion Ar and 318 billion Ar projected for salary costs in 2016 and 2017 respectively. Under both scenarios 1 and 2, the wage bill would amount to 600 billion Ar by 2020, far above the projected resources available for salaries under scenario 1 (504 billion Ar) and scenario 2 (414 billion Ar). This scenario seems hardly sustainable even in the case of favorable economic growth (Scenario 1), and completely unrealistic in case of a slower economic growth (Scenario 2).



The results of these simulations show that the integration of community teachers as planned will have large and unsustainable consequences on the MoE budget. To improve its feasibility, it would seem essential to envisage one of the following options: (a) dramatically slow down the progression of integration, or (b) allocate more resources to education. Even in the latter case, this simulation shows that the integration of community teachers into the public service, even if progressive, will result in further increasing the already high weight of salaries in the MoE budget. The interventions aiming to improve the quality of education, such as the improvement of infrastructure, but also teacher training and the improvement of the availability of learning material, could therefore not be financed by the State budget.

46. **The way salaries of community teachers are accounted makes it difficult for the Ministry of Education to have an accurate picture of the current and future wage bill.** It is important to include all labor costs when looking at efficiency issues in terms of the balance of inputs. Given the weight of community teachers in the total, it is particularly important to incorporate their salaries when assessing the level and trends of the wage bills. Yet, these salaries are currently included in the SIGFP as transfers to the private sector and not directly distinguishable from other subsidies. In order to properly account for the total wage bill, the non-wage budget was decomposed into labor and non-labor costs, and the amounts paid to community teachers was identified. Given the importance of these subsidies for primary education and as a share of the budget (as will be shown below), they should be explicitly separated from subsidies to the private sector and identified as indemnities, so that the Ministry can easily monitor the levels of spending on salaries.

47. **Once community teachers are considered, the share of salaries in total education spending reaches 90 percent, up from 70 percent in 2006, a level far above the regional average**. Including subsidies to community teachers, up to 70 percent of the non-wage budget consists of labor costs.[18] The proportion has fluctuated over the years without an identifiable trend, with peaks in 2009 and 2013, although the subsidy to community teachers decreased in real terms in 2013.[19] All labor costs included, the share of the labor in public education went up from 70 percent in 2006 to 90 percent in 2013, while capital expenditures went from 11 to 2 percent and non-labor operational expenditures from 19 to 7 percent. The series in constant currency units shows that the changes in shares are due both to a steady increase in expenditures on labor and a significant decrease in expenditures on the other inputs. The first sharp increase in labor costs happened before the crisis, followed by a period of relative stability as a share of the budget from 2009 to 2012 and another sharp increase in 2013 (Table 14). Figure 16 clearly shows capital and non-wage recurrent expenditures crowded out by labor in 2013.

[18] The figures on community teachers' subsidies are based on verified data for 2011-2013, and on educated guesses for the previous years, based on disaggregation of accounts by SOA. Note that the decomposition, in addition to identifying all labor costs, removes the effects of possible changes in accounting that may affect reported trends.

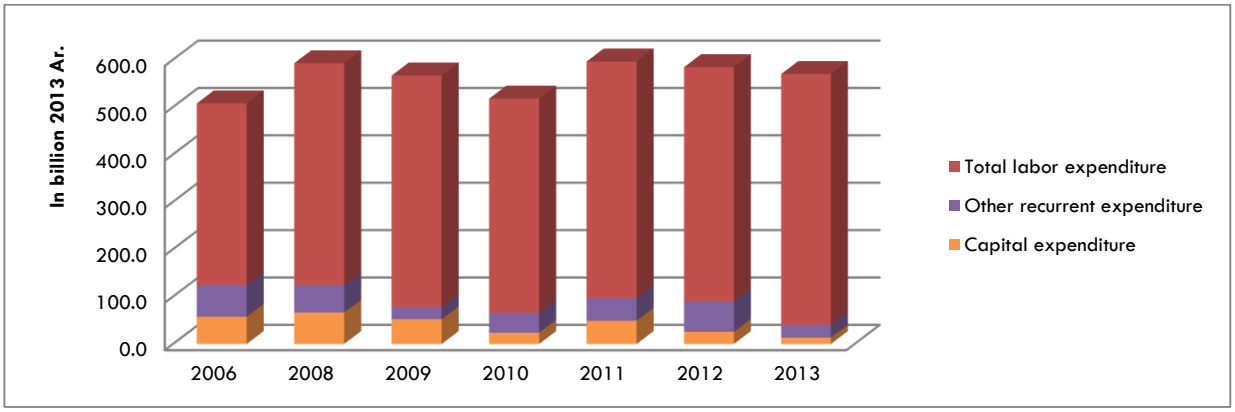
[19] Details on transfers for 2010 to 2011 were obtained from the MoE at the level of budget appropriation. Additional data from the Direction in charge of fundamental education and literacy (DGEFA), the SOA from which the most community teachers' subsidy transfers originated in 2011 to 2013, provided the data on executed transfers. The distinction is quite important, especially in the post-crisis years, as large differences could be identified between modified credits and mandated expenditures at the disaggregated level in the MoE budget. The differences were particularly large for credits directed to pay the subsidies to community teachers. Comparing the data provided by the MEN to the SIGFP data disaggregated by account code and administrative units (SOA), correspondences could be established so that executed expenditures on community teachers' subsidies could be at least approximated. Since community teachers' subsidies were found to account for more than 97 percent of transfers to the private sector in administrations overseeing the functioning of schools, our estimates are reasonable. Once again, the data for 2010 are found to be problematic, as 25 percent of the community teachers' subsidies (8.5 billion current Ar.) that were identified in the final budget appropriations documented by the MoE data could not be found in the corresponding SIGFP account.

Table 14. Decomposition of Executed Expenditures of the Non-Wage Recurrent Budget into Labor and Non-Labor Expenditures, 2006-2013

In percent of the non-wage recurrent budget	**2006**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Regular personnel salaries and charges	14.1	22.3	31.8	20.4	28.1	13.6	31.5
community teachers	19.9	30.7	39.0	28.1	31.0	33.8	35.0
Other non-regular personnel	0.5	0.4	0.4	0.3	0.4	0.7	0.4
Good and services	65.5	46.6	28.8	51.1	40.4	51.9	33.1
Recurrent capital expenditures	4.9	7.8	6.2	8.9	1.8	0.6	0.9
Others recurrent expenditures	24.1	16.3	14.9	17.2	13.8	13.0	12.1
Labor costs in non-wage recurrent exp.	**34.5**	**53.4**	**71.2**	**48.9**	**59.6**	**48.1**	**66.9**

Data sources: Government accounts from MFB (2006 and 2008-2011), MoE (2010-2013).

Figure 16. Decomposition of the Education budget into broad input categories, 2006-2013

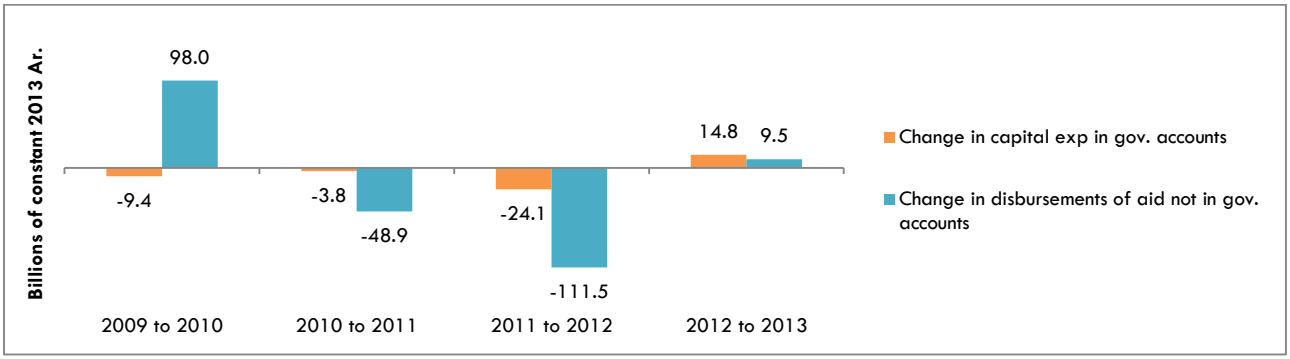


Note: Decomposition based on executed expenditures (dépenses mandates). Labor and capital include expenditures from the recurrent non-wage budget (category 3 expenditures).
Source: Data from MFB/SIGFP. Data source: MBF (SIGFP) data (reconstituted for 2006 and 2008).

2. Investment

48. **External support to investment through external funds has not compensated for the decrease in the share of domestic spending allocated to this category of expenses.** Given that capital expenditures are mostly off-budget and, as seen before, even on-budget foreign funds appear to end up being spent off-budget, it is important to include these expenditures in looking at the balance of inputs—particularly since they also go in the production of public education and are in good part directed to investment. It does not appear, however, that foreign aid not included in the government account compensated for decreases in capital. In fact, the opposite occurred in 2011 and 2012, with both domestic investment and foreign aid going down (Figure 17).

Figure 17. Net changes in Investment in Education, Including Foreign Aid, 2009-2013



Source: Data from MFB/SIGFP. Data sources: MoE (SIGFP) and AMP (foreign aid).

49. **Overall, the high share of the budget devoted to salaries leaves very little room for complementary inputs, which are key to improving education outcomes. W**hile Madagascar appears to have labor costs lower or comparable to other countries when looking at regular teacher salaries, including payments to community teachers puts the country way above international benchmarks. This leaves little space for spending on other type of inputs that are also key to improving education outcomes, including school infrastructure, teacher training, and teaching and learning materials. Indeed, the quality issue is not just about having a sufficient number of teachers in the classroom, but about necessary complementary inputs that both regular and community teachers need to fully utilize their skills.

C.2 Elements to Assess Allocative Efficiency: Expenditure Analysis by Function

Box 8. Allocative Efficiency Analysis Using Functional Allocations of Expenditure in Education

Allocative efficiency analyses generally examine the types and combinations of goods and services produced in relation to demand. The term allocative efficiency is loosely interpreted here in the sense that consumer preferences and demand are not directly measured. Instead, the analysis rests on some general appreciation of needs based mostly on enrollment ratios, completion rates, and literacy indicators and on well-known characteristics of education at different levels.

Analysis of the distribution of education expenditures by level are useful to assess allocative efficiency in terms of whether expenditures are aligned with the needs of the population and are directed to functions with highest positive externalities and best value-for-money characteristics. The question is whether efforts are placed where they are most needed and where they will have most effect.

The need to prioritize some levels against others is based on specific conditions of the country in terms of level of development, demographic characteristics, and current educational achievement. In the case of Madagascar, the Government has identified primary education as a priority to ensure that all children possess basic skills and competencies.

1. Data quality and governance considerations

50. **Although Madagascar has been using a programmatic budget for the period in this report (2006-2013), there were many changes across years in the way expenditures are categorized within and across programs.** The definitions of programs were changed several times between 2006 and 2011. In particular, it is difficult to track primary and lower secondary levels separately or to identify administrative expenditure versus educational expenses within programs and for the Ministry as a whole. Even after 2011 when budget classifications stabilized, significant differences were detected in the way equivalent types of expenditure were processed within and across programs in different years. Moreover, the structure of the programmatic budget has not been aligned with the objectives and main programs of the Interim Education Sector Plan 2013-2015, making it difficult to assess the alignment between budget and strategies.

51. **Related to this, the lack of disaggregation of salaries by program makes it difficult to monitor changes in functional distribution of spending across the years.** Considering that personnel costs account for such a large part of the executed budget, the way salaries are accounted for severely limits the analysis. Indeed, personnel expenses are not broken down by program, so assigning salary expenditures to the different programs cannot be routinely done using the SIGFP data. In the absence of such prior sorting, classifications can be reconstructed with some degree of approximation using average salaries by category of personnel, combined with data on the distribution of personnel within the different programs.[20] Allocating salaries by program in the budget would be an important improvement to better inform budget decision.[21]

52. **Similarly, administration expenditures cannot be properly separated into the different levels of education.** Indeed, the way administration was included in the accounts changed frequently since the introduction of program budgeting. In addition, the assignments by level introduced in 2010 looked arbitrary and also changed every year.[22] Allocations free of administrative changes would have to be done using fixed shares (as was done for the PIE) and, although this could be useful to calculate unit costs, it does not add any information when looking at trends.

53. **Moreover, large differences at the disaggregated level between executed expenditures and voted budgets make the use of budget appropriations as a measure of functional distribution problematic**. Classifications at the level of execution could also be problematic if, within the same

[20] Such a breakdown of salaries by program was reconstituted for the Education Interim report (PIE) up to 2011.The analysis was done using 2006 and 2010 detailed personnel and average salary information. Fixed percentages were then used for in-between years. We rely on this breakdown and complete the series for 2012 and 2013 using the same ratios as in 2011. The breakdown of community teachers into the different levels of education would normally be done automatically by assigning a different program to the transfer expenditure. Unfortunately, this is not always done in the SIGFP so the figures below rely on data provided by the MEN on appropriations and a decomposition by SOA to approximate these numbers.

[21] The work represent an important cost for the MEN personnel who need to periodically reconstitute these series to produce typical reports such as the PIE and the information gained by these estimations is incomplete relative to what would be gained using program budgeting tools, especially with regards to trends.

[22] For example, in 2009, 50 percent of DREN expenses were allocated to secondary education; in 2010, it went down to 19 percent ; in 2011, 92 percent and in 2012 and 2013, zero

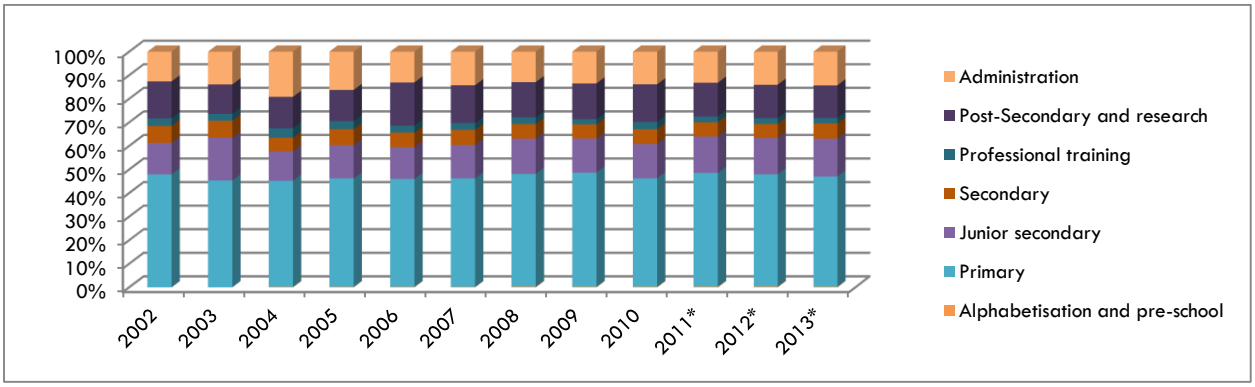
administration, funds designated for a certain type of activity are in fact used for another activity but still accounted as pertaining to the original one. Movements between SOAs with different functions between the final credit stage and the execution stage make the functional analysis less reliable.

2. Functional classifications of expenditures

54. The analysis below uses the reconstitution by program that was presented for the PIE and extends it to 2013.[23] Regular wages up to secondary education are based on 2011 ratios found in the PIE data, implicitly assuming that the labor ratios remained constant.[24] Given the weakness of the investment data previously documented, the analysis focuses on expenditures of the recurrent budget.[25] A reconstitution of expenditures by level and function, using an alternative methodology based on detailed information on administrative units and account codes in SIGFP, is presented in Annex 3.

55. **Primary education absorbs almost half of total non-investment education expenditure, driving most changes in the recurrent budget for education.** Data from the SIGFP show a remarkable stability in shares allocated to the different levels across the period. However, this stability does not necessarily reflects a continuous priority to primary education, but results from the methodology used to allocated salaries across levels and functions (using quasi-fixed shares, as explained above). Yet, beyond the trends, it remains that primary education receives a large share of public spending on education, between 45 and 48 percent over the period 2002-2013 (Figure 18). This share is in line with that in other countries at a similar level of development, and reflects the priority given to primary education by successive governments.

Figure 18. Allocation of Recurrent Education Expenditure by Level and Function, 2002-2013

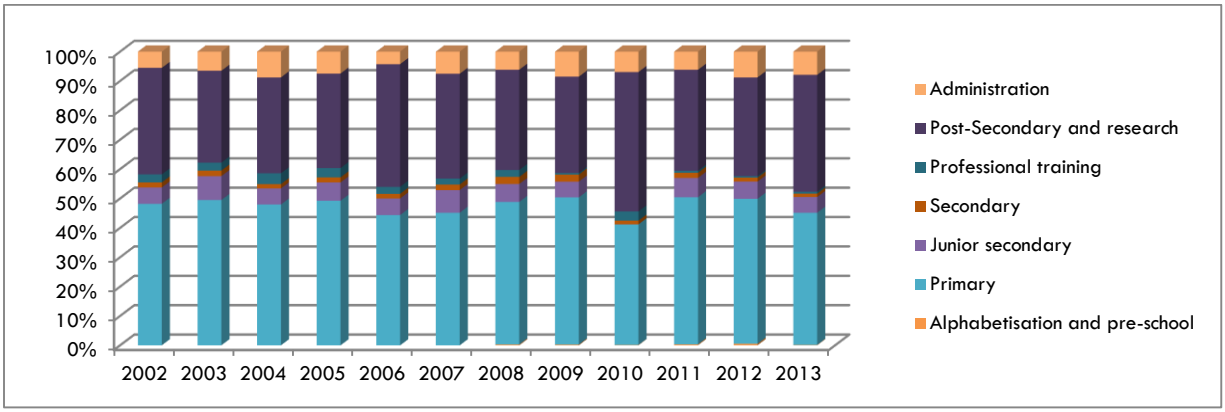


Note: 2011-2013 are base of MFB data, except for the allocations of regular wages by levels up to secondary which are based on 2011 ratios from PIE calculations.
Source: Data from MEN/PIE and MFB/SIGFP.

[23] The series reports expenditures at the commitment level instead of executed to match the PIE methodology. Extension to 2013 data was possible given that total expenditures reported in the PIE matched the 2011 SIGFP totals (although it was not the case for previous years) and budget programs remained the same between 2011 and 2013.
[24] Taking account of changes in these ratios requires detailed data on staffing that was not received at this time.
[25] In addition, important errors in the investment numbers for primary education in 2003 to 2005 were detected for 2003 to 2005 in the PIE spreadsheet.

56. **The non-wage recurrent budget, although a much smaller part of total expenses shows a surprisingly large and increasing share of education spending going to post-secondary education.** While the share of primary education in the non-wage recurrent budget is approximately the same as above, post-secondary education and research become nearly as prevalent, while the intermediary levels (all secondary and professional training) receive very little of the non-wage budget (Figure 19). The surprisingly high share of non-wage recurrent budget going to post-secondary may be related to the fairly large program of support to university students, including scholarships. Still, the extremely low share of non-wage recurrent budget allocated to secondary education is worrying, given the increasing importance of this level of education for the acquisition of key skills and competencies.

Figure 19. Allocation of Current Non-Wage Expenditures by Level, 2002-2013



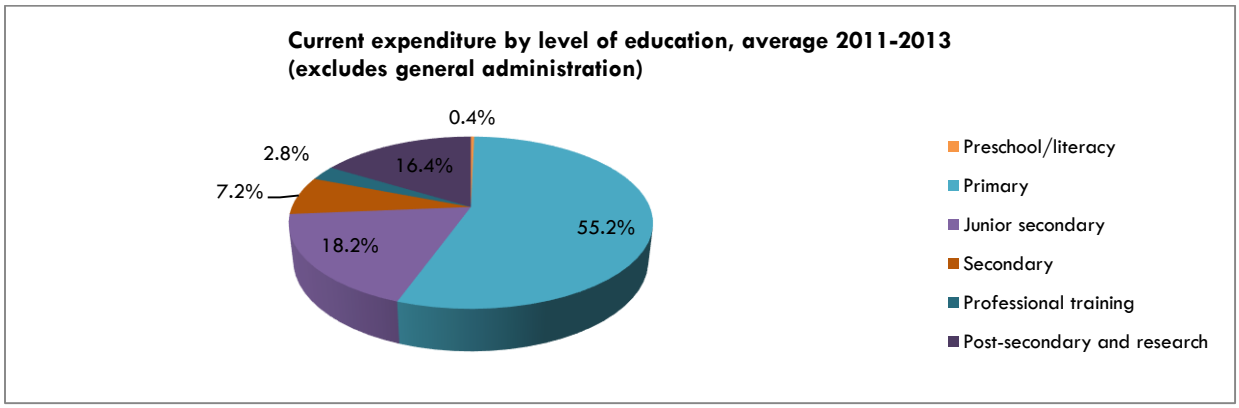
Note: 2011-2013 are based on MFB (SIGFP) data and budget classifications.
Source: Data from MEN/PIE and MFB/SIGFP.

57. **The large share of non-wage recurrent budget allocated to primary education is mostly explained by the subsidies to community teachers.** As mentioned above, subsidies to community teachers are included in the non-wage recurrent budget and have made up over two thirds of non-wage recurrent expenditures going to primary education since 2009, and up 78 percent in 2013.[26] These subsidies have also significantly contributed to changes in non-wage recurrent expenditure since 2009. The large share of primary education found in the data above is therefore due mostly to labor costs.

58. **Overall, including all salaries but excluding investment, Madagascar spends more than half of its education budget for primary education, while relatively little is spent on secondary education** (Figure 20). Internationally comparable data places Madagascar close to the average of low-income and SSA countries. The more recent data presented above, although it does not include investment, would indicate that the share going to primary and lower secondary have increased above the average of most countries in the sample except Burkina Faso. The data presented in Table 15 is based on all data available in the 2000-2012 period, although availability is very uneven across countries.

[26] Figures based on SIGFP executed expenditure for *Education Fondamentale 1er cycle, mandatement* level.

Figure 20. Total Current Expenditure by Level of Education, Average 2011-2013



Note: Fixed salary allocation for up to secondary education using PIE weights, general administration expenditure excluded. Series based on the existing budget classification.
Source: Data from MFB/SIGFP; fixed salary allocation for up to secondary education using PIE weights.

Table 15. International Comparisons of Public Expenditure Shares by Level of Education, averages 2000-2012

	Primary (2000-2012)	Secondary (2000-2012)	Primary (2010-2012)	Secondary (2010-2012)
Burkina Faso	63.5	15.4	59.4	18.4
Benin	53.3	26.2	52.8	28.0
Cabo Verde	48.7	31.8	43	37.1
Burundi	46.5	28.8	46.2	26.6
Senegal	43.6	24.6	40.0	29.0
Cote d'Ivoire	42.3	33.5	..	..
Congo, Dem. Rep.	36.8	28.2	33.0	33.7
Congo, Rep.	33.7	35.9	31.0	53.3
Cameroon	33.6	54.4	34.3	51.4
Seychelles	28.8	25.3	24.0	16.1
Mauritius	28.8	44.5	26.8	51.7
Average LIC s	**50.3**	**25.4**	**..**	**..**
Average SSA (LDC)	**45.6**	**28.7**	**..**	**..**

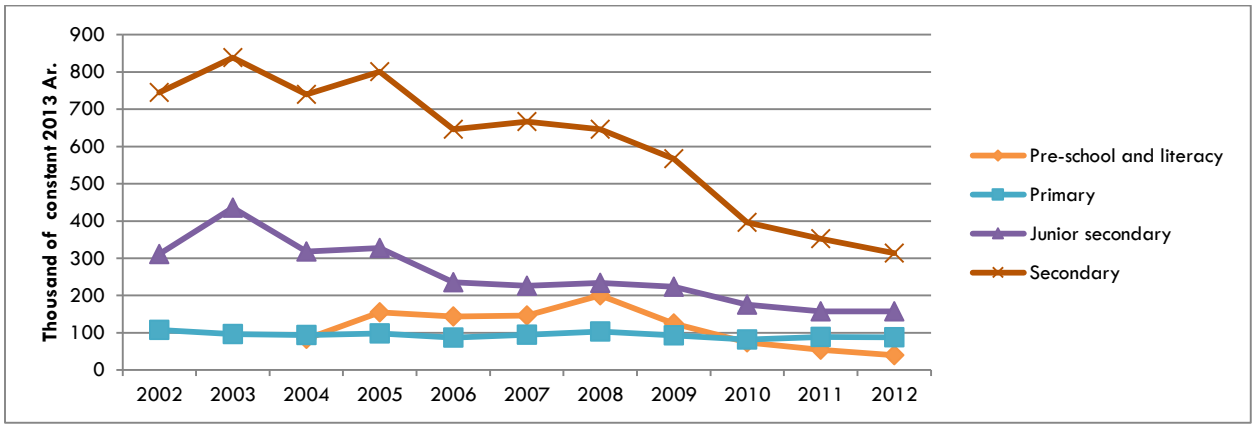
Source: Data from UNESCO.

C.3 Unit costs

59. **Unit costs have decreased for all levels but primary education since 2009**. Figure 21 shows a significant decrease in the unit cost per student in secondary education, consistent with increasing enrollments and non-increasing or decreasing expenditure. The unit cost for primary education remained very stable, at less than 100,000 Ar. per student for most of the period, which represents less than 10 percent of the estimated GDP per capita in 2013. Excluding investment, the 2012 unit costs in USD at the 2013 exchange rates are 39 USD per student per year for primary school, 71 for junior secondary and 141 for upper secondary school (8, 15, and 30 percent of GDP per capita). When adding investment spending, unit

cost in primary education amounted to 42 USD or 9 percent of GDP/capita in 2012. (Note that the figure is higher than the 6.51 percent reported in the UNESCO series below.)

Figure 21. Public Non-Investment Expenditure per Student, 2002-2012



Source: Data from MEN, *Annuaires Statistiques* and PIE; MFB/SIGFP. 2012-2013 enrollments not yet available.

60. Using the UNESCO series (to retain comparability), Table 16 below shows that unit costs in Madagascar are lower than the regional average but comparable to countries with comparable per capita GDP. It is interesting to see that the Gambia, which placed high in terms of overall efficiency in section B analysis, spends a much higher share of its GDP per student in primary school. On the other hand, the DRC, which also placed in the efficient region, spends very little per student (although the DRC data is based on a single year and is likely much less robust than the Gambia result based on the full period).

Table 16. Primary School Unit Cost Comparisons, Madagascar and Sub-Saharan Africa

In percent of GDP/capita	Average 2008-2012	Years data available	GDP in USD/capita 2012	Gross enrollment ratio primary (%) 2012	Years data available
Congo. Dem. Rep.	4.91	2010	231	110.8	2008-2012
Cameroon	6.55	2008-2012	1181	110.6	2008-2012
Uganda	7.15	2009-2012	596	..	
Madagascar	**7.17**	**2008-2012**	**451**	145.1	2008-2012
Rwanda	7.93	2008-2012	682	133.7	2008-2012
Seychelles	8.62	2011	11240	..	
Mauritius	10.02	2008-2012	8850	108.1	2008-2012
Togo	10.11	2008-2012	607	132.8	2008-2012
Cote d'Ivoire	15.44	2012	1057	94.2	2008-2012
Burkina Faso	15.70	2010-2012	636	84.9	2008-2012
Gambia. The	17.05	2008-2012	497	85.2	2008-2012
Sub-Saharan Africa (all income levels)	12.85	2010		101.7	

Source: Data from UNESCO Institute of Statistics series for unit cost/GDP.

C.4 Key Findings and Policy Implications

Key Findings

Madagascar's public education spending is mostly geared towards salaries, which are rapidly increasing, leaving little room to finance the quality agenda.

Economic analysis of public spending

- Combining regular and community teachers, salary costs represent 90 percent of total public spending on education, up from 70 percent in 2006.
- Regular teachers, who represent 78 percent of the total teaching force, absorb a disproportionate share of the wage bill.
- Community teachers' salaries are classified as "transfers" in SIGFP, which complicates the analysis of changes in the wage bill.
- Capital spending has been dramatically reduced, due to a combination of factors, including the drop in external aid.
- Overall, public spending on education is heavily focused on salaries, leaving little room to finance other inputs that have an impact on education quality. The ongoing regularization of community teachers into the civil service is likely to aggravate this situation over the short term.

Functional analysis of public spending

- The share of primary education in total education spending is line with comparable countries.
- Unit costs in primary education appear to be on the lower side of comparable countries, while the rapid decrease in unit costs in secondary education is worrying, given its importance in terms of skills acquisition and in promoting primary completion.

Policy Implications

There is a need to progressively reorient spending towards inputs that have a direct impact on quality, while improving the ability of the Ministry to perform economic and functional analysis of the budget.

Supporting the quality agenda through better targeting of public investment

- Until the system is allocated more resources, containing the wage bill will be necessary to ensure that other items can be supported. This might require a slower implementation of the ongoing regularization of community teachers.
- Madagascar could also consider further refining its framework for contractual teachers, to ensure that the necessary improvement in the status of community teachers remains sustainable.
- The ongoing regularization provides an opportunity to improve the distribution of qualified teachers across the country, which has been shown to be a key driver of learning achievements.
- Investing in items other than salaries is an absolute priority. In particular, more public resources are needed to substantially improve teacher training, curricula and learning materials.
- The learning crisis in primary should not entirely detracts attention from secondary education, which remains key for future growth and development.

Better use of the budget as a strategic tool for the sector

- A renewed focus on program budgeting would help the Ministry in the preparation and analysis of the budget.
- Various adjustments could be made to facilitate budget analysis, including better categorizing of salary costs of community teachers, and systemizing the rationalization of administrative and salary costs by level of education.

SECTION D. DISTRIBUTIONAL ANALYSIS OF PUBLIC EDUCATION EXPENDITURE

D.1 Distribution of Public Education Expenditures by Region and Type of Residence

61. Given that Madagascar has not had a census for many years, per capita distributions may not be a good reflection of reality. However, spending decisions at the Ministry level are typically done according to enrollment figures, with the aim of creating a close relationship between population and expenditures. Public education expenditures should also be positively related to poverty. The following analysis is based on current education expenditures, including wages.[27] Levels of education considered include up to secondary to ensure that facilities are available in all regions. The distribution by province and region with regard to population is examined first,[28] followed by an analysis of the relationship between per capita expenditures and regional poverty levels. The last subsection briefly assesses rural/urban differences

1. Regional allocations versus population shares

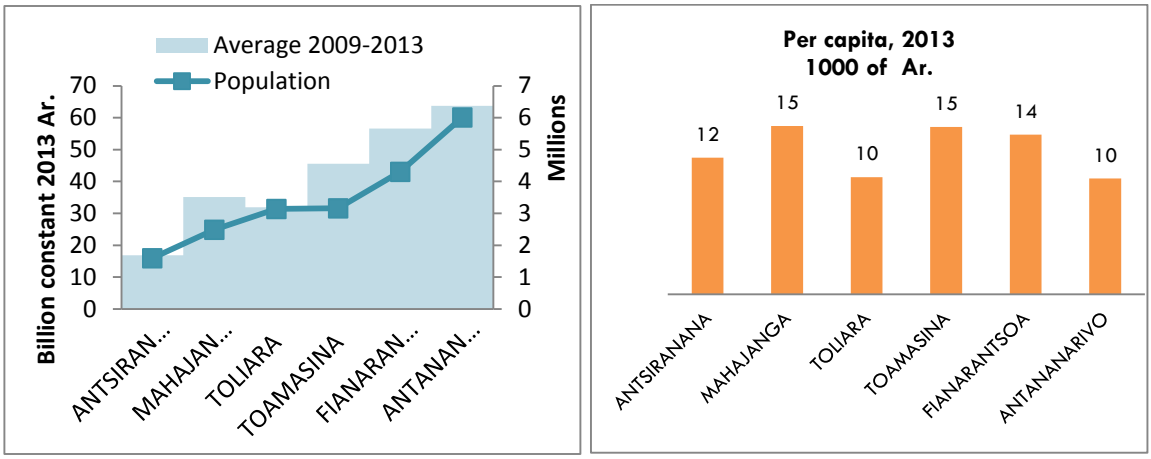
62. **The distribution of current public spending on education is broadly equal across former provinces; however, some economies of scale are noted**. The allocation of non-central non-investment education expenditures by ex-province roughly follows current population estimates, although Mahajanga and Toamasina receive 50 percent more per capita than Toliara and Antananarivo (Figure 22).[29] In addition, the allocation by province has remained stable since 2010 after an important reduction of relative expenditures going to the province of Antananarivo in 2008 and 2009.

[27] Unfortunately, the analysis cannot include investment which is not identified by recipient region for the most part. Funds allocated to regions by the FDL are also too small to make a difference in the picture presented here but difference in FDL allocations by regions should be monitored considering the fact that this type of investment will have a direct impact on communities.

[28] The allocations by province relies fully on data from the SIGFP while allocations of wages by regions are based on specific salary data, also from MFB. Differences between the two sources are documented in Annex 1, Tables A.1 and A.2).

[29] Antananarivo likely benefits disproportionately from expenditures at the central level so a lower per capita benefit from non-central expenditure is expected. About one half of current public education expenditures (including wages) are allocated to the central level, the rest being allocated across provinces.

Figure 22. Current Expenditure (up to Secondary) by Province in Relation to Population



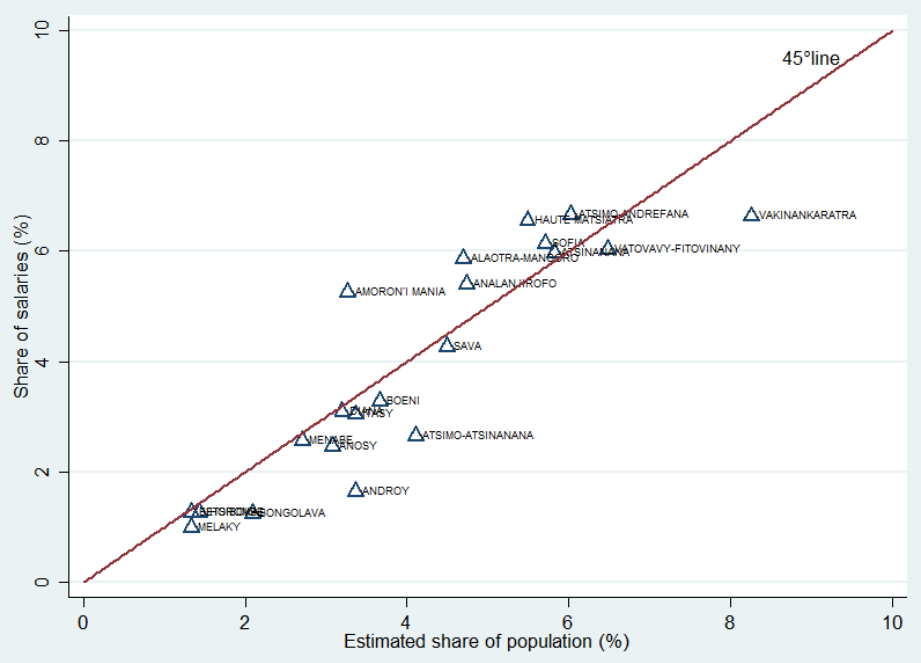
Note : Excludes Expenditures assigned to the central level (56 % of current expenditure in 2009, 44 % in 2013)
Source: Expenditure from MFB, population data from INSTAT, Madagascar.

63. **Looking at regular salaries, the data also show a reasonably equitable distribution across regions, although Androy and Atsimo-Atsinanana stand out as receiving less and Amaron'i Mania as receiving more** (Figure 23). As shown earlier, regular salaries constitute a sizeable part of current expenditure. Although the SIGFP does not distribute salaries by region, the information could be obtained separately from the MFB (*Service de la Solde*). The differences between the SIGFP data and the salary data are reasonably distributed across regions and should not affect distributional results.[30] The breakdown of salaries by region shows a relatively good alignment between population and salaries of regular teachers. It is worth noting, however, that some regions receive significantly less than their population share, including Androy and Atsimo-Atsinanana, which are among the most vulnerable regions in terms of poverty and education outcomes.[31]

[30] The 2008 and 2009 salaries by region were not shared by the MFB. Salaries identified as paid to central personnel were removed from the regional totals and grouped with central salaries (on account that central level personnel likely spend most of their time in the Capital). The regional amounts were aggregated at the province level and compared to the wage data in the government accounts (SIGFP). The salary data included 11-32 percent more than SIGFP for years prior to 2009 and about 10 percent less in the period 2010-2013 (Annex 1, Table A.2).

[31] Because physical mutation of staff happen significantly faster than changes in the accounting of these salaries that are subject to more cumbersome procedures, some salaries may be assigned to one region when in fact the staff works in another. Staff at the MoF evaluated this issue as relevant for up to 15 percent of the staff in any region. However, they do not anticipate that this would affect regional breakdowns because all regions are affected equally, except for the Antananarivo because some staff would prefer to keep their files in the capital.

Figure 23. Distribution of Public Education Regular Wages across Regions vs Population Shares, 2013



Source: Data from MFB, direction de la Solde

2. Relationship between expenditures and poverty

64. **The distribution of government current expenditures by region indicates some regressivity, with some leveling out during the most recent period**.[32] Data show that government current expenditure per capita by region is negatively correlated to poverty ratios and positively related to per capita consumption in both periods, which would indicate some regressivity, although statistical significance is weak (Table 17). Although one cannot see clearly whether the distribution is more or less regressive in 2010, the correlation coefficient between the change in expenditures and poverty rates indicates that government expenditures decreased less in poorer regions (Figure 24). One possible explanation is that poverty ratios changed significantly in the period considered and evened out across regions, while expenditure per capita decreased in all regions by an average of 40 percent without marked differences among regions (ranging from about 30 to 50 percent).

[32] To increase data quality, in particular to smooth issues related to mutations of personnel mentioned above, averages of 2006-2008 current expenditures are compared to averages of 2009-2013. Salaries are averaged over 2006 and 2007 for the pre-crisis period and 2010-2013 for the post-crisis period. Other current expenditures from SIGFP are averages of 2006 and 2008 for the first period and 2009-2013 for the second period. Poverty levels are calculated from the periodic Household Survey (EPM) 2005 and 2010.

Table 17. Correlation Coefficients between Government Expenditures by Region and Poverty

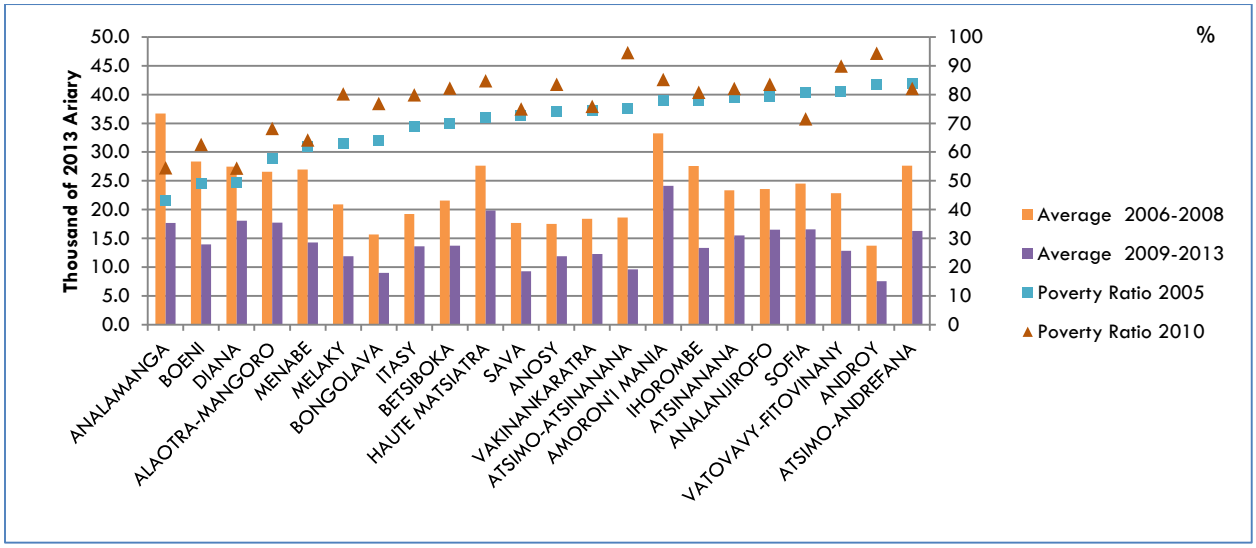
	Poverty ratios	p.c. Cons
Government current expenditures, 2006-2008	**-0.41 (0.06)**	0.35 (0.10)
Government current expenditures 2009-2013	-0.31 (0.16)	0.36 (0.11)
Change	**0.52 (0.01)**	**-0.52 (0.01)**
% change	0.28 (0.21)	-0.33 (0.13)

Significance levels in parentheses

EPM 2005 poverty ratios/ per capita consumption figures are used for 2006-2008 average expenditures and for changes; 2010 figures are used for the 2009-2013 average.

Source: Data from EPM, SIGFP, and salary regional data (MFB).

Figure 24. Current Public Expenditure per Capita in Education by Region Ranked by 2005 Poverty Rates



Source: Data from MFB, INSTAT (population), EPM (poverty).

65. **Severe data limitations prevent a finer analysis of the distribution of spending by poverty level.** Analyzing regional distribution is insufficient to precisely assess the relationship between poverty and public spending on education. Much more could be done if census data or any representative data at the district level were available. Indeed, regression type analysis using data at the commune or district level could be very effective in analyzing efficiency and equity of public expenditure, as they allow the use of a larger number of observations to test different types of relationships (the number of regions, 22, is too small to establish statistical significance with good confidence levels). Unfortunately such analysis is not be feasible at this point because, although the salary data are broken down by district, we do not have representative non-expenditure data at below region levels. Future analysis would gain much from running a quality census.

3. Rural/urban differences

66. **Similarly, some data limitations prevent a comprehensive analysis by rural and urban center to be carried out.** Given the differences in poverty ratios and consumption per capita between urban and rural areas (Table 18), it is important to devote some additional efforts to the rural and semi-rural

disadvantaged areas. The government expenditure data cannot be directly divided into rural and urban locations, but it identifies activity units by commune code. To carry out an analysis by type of residence, we used the official delineation of communes into rural and urban categories under the 2011 Decree.[33] Communes were classified into four levels of urbanization to minimize border effects and avoid over-identifying communes as rural. Unfortunately, many expenditures for primary schools are in transfers that are not identifiable by commune with the data obtained. The small amounts that can be identified by commune, however, are likely to be indicative of the level of activity.

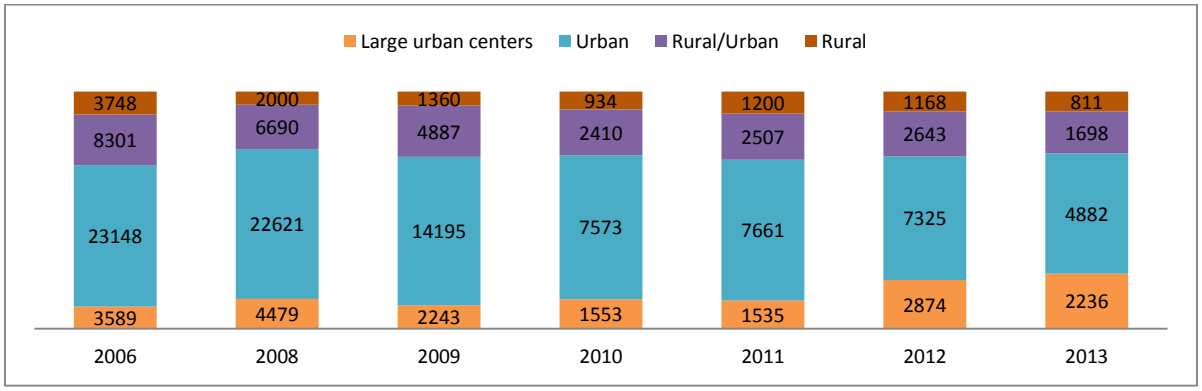
Table 18. Poverty and Consumption by Type of Residence, 2005 and 2010

	Poverty rate %		***p.c.* Consumption in PPP** *2013 Ar, capital city*	
	2005	**2010**	**2005**	**2010**
Capital city	34.4	30.1	266014	680428
Large urban centers	43.4	31.6	230112	662635
Secondary urban centers	63.4	62.1	167412	426743
Rural areas	73.5	82.2	137847	283781

Source: Household Surveys (EPM 2005, 2010).

67. **Expenditure shares by type of residence have evolved in favor of the large urban centers (+14 percent), mostly at the expense of other urban areas and peri-urban rural areas** (Figure 25, Table 19). Rural areas (including the peri-urban areas) received less than a third of expenditures. Considering that approximately two- third of the population lives in rural areas, this represent a very unequal distribution. The most rural communes received less than 10 percent of government current expenditures throughout the period, and a low of 5.6 percent in 2008.

Figure 25. Rural/Urban Shares of Non-wage recurrent expenditures directly assigned to communes



Data sources: SIGFP and Décret-n°2011-0042 (MFB).

[33] *Décret-n°2011-0042-portant-classement-des-Communes-en-Communes-urbaines-ou-en-Communes-rurales, MFB.*

Table 19. Share of Expenditures to Rural Areas vs Share of the Population

In percent	2006	2008	2010	2011	2012	2013
share of rural* in total expenditure	9.7	5.6	6.0	7.5	9.3	8.3
share of rural-extended* in total expenditure	31.1	24.3	27.5	26.8	28.7	27.2
Approximate share of rural population	70.6	69.3	68.7	68.1	67.4	66.8

*Note: Rural only includes the most rural communes (category 2 rural). Peri-urban communes (category1 rural) are included in the rural-extended category.
Data source: WDI, SIGFP.

D.2 Direct household expenditures on education and their impact on regional and income inequalities

1. Distribution of household expenditure by income levels and regions

68. **In the recent years, private spending on education has generally increased, with some direct impact on enrollment.** Since the crisis, a greater number of households with a child in Grade 2 has had to pay enrollment fees, PTA contributions and monthly school fees (Table 20). The share of households paying enrollment fees has increased the most, by 7 percentage points, against 4 percentage points for the share paying PTA contributions and one percent for those paying school fees. In addition to be more frequent, the amount paid in school fees have generally increased. Average household per pupil spending increased from Ar 6,561 to Ar 8,277, representing a 26 percent increase over three years.[34] This has had direct repercussions in terms of enrollment. Indeed, financial problems are the first reason given by household to explain dropout, and this has only worsened since the beginning of the crisis in 2009.

Table 20. Share of Households in the Southern Districts that Paid Enrollment Fees, PTA Contributions and Monthly School Fees, 2009 and 2012 (Sample Selection)

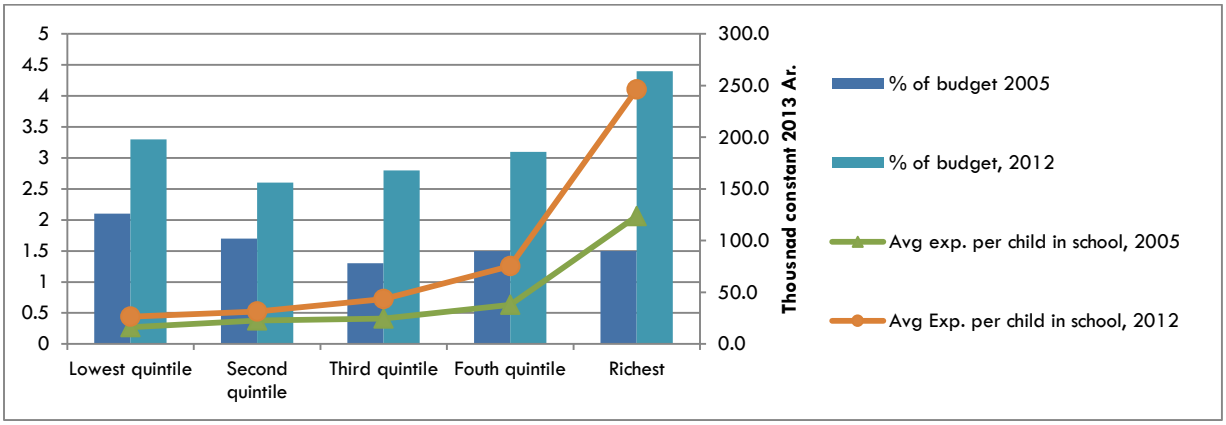
Percent	**2009**	**2012**	**2009-12 Gap (% Points)**
Households having paid enrollment fees	34.6	41.5	6.9
Households having paid PTA contributions	36.5	40.9	4.4
Share of parents having paid late	71.4	85.2	13.8
Parents exempt from PTA contributions	20.0	14.5	-5.5
Households having paid monthly school fees	12.5	13.8	1.3
Source: South Survey in the Districts of Amboasary and Betioky, 2009 and 2012.			

69. **The share of household budget spent on education increased more for the richest.** To interpret this data, it is important to note that, in Madagascar, the poverty level is situated around the average level of consumption in the fourth quintile (and even closer to the high end of the fourth quintile in 2010). The

[34] Annex B explains the difference between the two groups: Sample Selection and Tracer Study.

distribution in 2005 was U-shaped, with the poorest spending a higher share of their income than households in the second, third and fourth quintiles. The situation was more clearly progressive in 2010, with shares of income increasing for the richer households, but this came with an increase in household expenditures on education for all but the bottom two quintiles, with all quintiles paying a higher share of their budget in 2010.[35] Looking at average education expenses per child in school, there was a slightly higher cost in the third and fourth quintiles in the bottom two and richest quintiles (Figure 26).

Figure 26. Household Direct Education Expenditure, 2005 and 2012



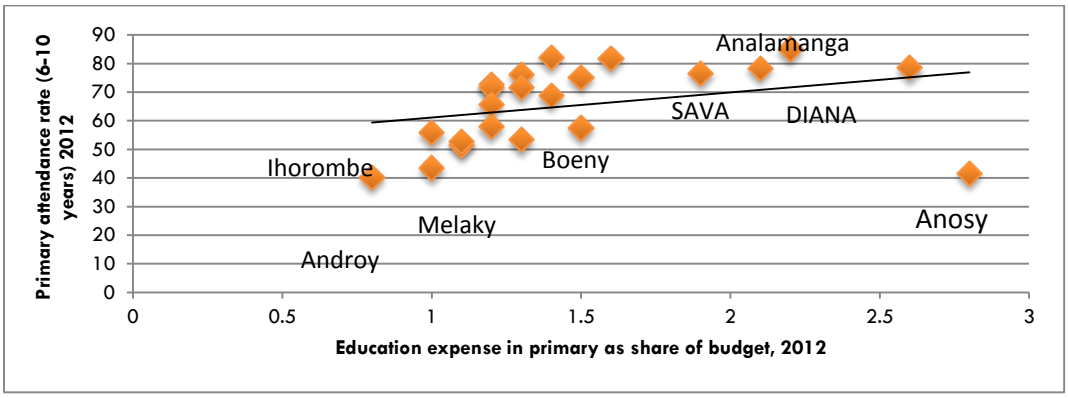
Source: EPM 2005 and ENSMOD 2012.

70. **The cost per child in school differs significantly by region, and is inversely related to poverty rates.** Correlation coefficients with contemporaneous poverty are negative and significant (-0.70 in 2005 and -0.90 in 2010), after adjusting for regional price variations. The strong correlation results hide some important variance across regions, however, especially when looking at changes in costs between 2005 and 2010 (Figure 27). Changes across time show that all regions experienced an increase in cost in real terms, except for Ihorombe. Regions with the highest poverty rate in 2005 also experienced some of the highest increases in expenditure per child in school (Sofia and Atsimo Andrefana, in particular).[36]

[35] A lower budget share in the poorest quintile would not have led to a positive interpretation, however, as it would have likely meant that the poorest students do not go to school altogether, which is not desirable.

[36] The correlation coefficient between the change in cost and poverty rates are, however, not significant.

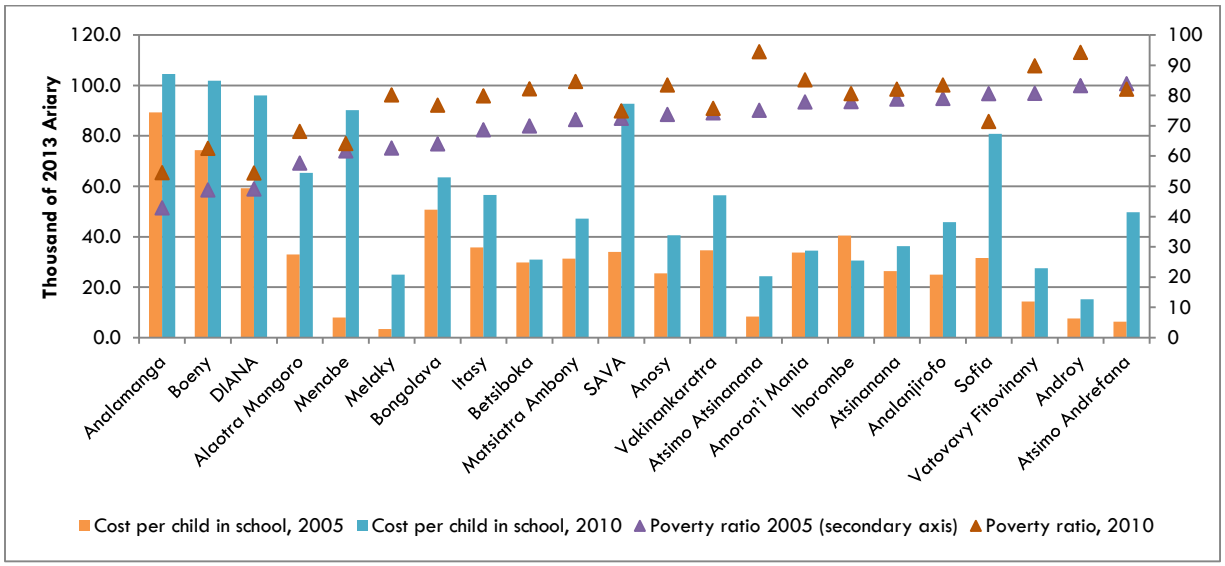
Figure 27. Primary Attendance Rate and the Share of Household Budget on Education by Region, 2012



Source: ENSOMD 2012.

71. **The share of primary education in the household budget is weakly related to primary attendance rates, indicating that the private cost of public education can be higher for families living in regions where attendance is low.** According to 2012 Household Survey data, the share of education in household expenditure increases with primary attendance, but the correlation coefficient is weak (0.34). Figure 28 shows differences across regions. The regions of Analamanga, Diana and Sava stand the highest attendance rate with greater share of household expenditure on education, whereas the region of Anosy has a high household expenditure with less attendance primary rate.

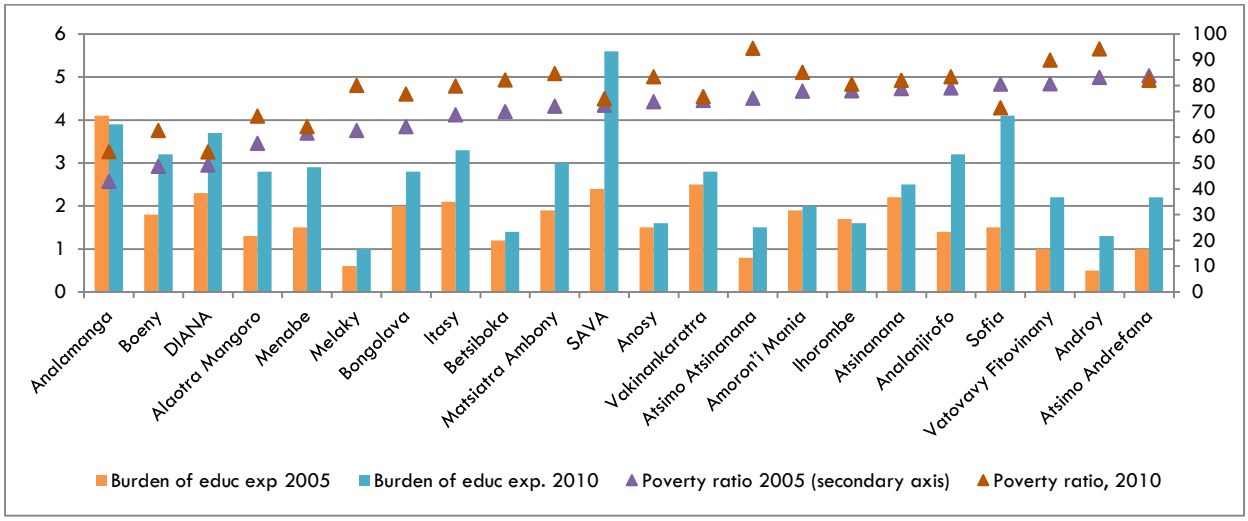
Figure 28. Cost per Child in School by Region, Ranked by Poverty Level, 2005 and 2010



Note: Cost per child is adjusted to reflect prices in the capital.
Data source: Household Surveys 2005 and 2010.

72. **The share of education expenditure in the household budget is also negatively correlated with poverty levels**.[37] Correlation coefficients are negative and significant in both years (-0.51 in 2005, and -0.59 in 2010), although confidence intervals do not allow for establishing whether the relationship is indeed stronger in 2010. Figure 29 also shows that the strong correlation result hides significant variance across regions with a similar pattern as noted above.

Figure 29. Burden of Education Expenditures by Region, Ranked by Poverty Levels, 2005 and 2010



Note: Burden=share of education expenditure in household budget averaged by region.
Data source: EPM.

2. Relationship between OOP and public expenditures on education

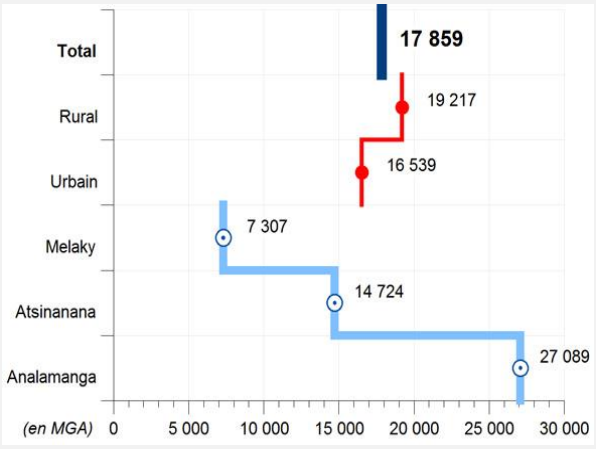
73. **Households are financing an increasing share of the total costs of education** (Box 9). In order to refine the analysis on how education is financed in Madagascar, it is important to compare public and household expenditure. Over 2006-2008, current public expenditure contributed, on average, to 73 percent of expenses of one child enrolled at school, whereas household expenditure represented, on average, 27 percent (Figure 30). In some regions (Vatovavy-Fitovinany, Melaky, Atsimo Atsinanana, Androy and Atsimo Andrefana), the share of public expenditure per child in school reached more than 80 percent over this period. However, from 2009 to 2013, the share of current public expenditure was, on average, 59 percent of total spending per child enrolled. This reflects a substantial increase in the share of the costs per child enrolled financed by household. The increase was higher in Atsimo Andrefana, Menabe and Vatovavy Fitovinany, three regions that are particularly vulnerable.

[37] The burden was also measured as the average household expenditure per child in school relative to per capita expenditures in the region, giving similar results (corr -0.55 in 2005 and -0.59 in 2010)

Box 9. Parents' Contribution to School Financing: Results from a Field Study

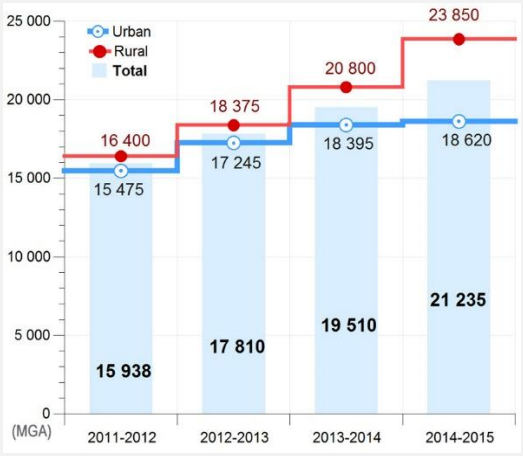
The results of the survey carried out for this study (non-nationally representative) show that household expenditures averaged 18,000 MGA for a child in primary school, ranging from 27,000 MGA in Analamanga to 7,300 MGA in Melaky. Parental contributions to school expenditures averaged more than 21,000MGA in the regions of Analamanga and Atsinanana. A survey conducted by MEN in 2013-2014 in 30 schools of the Antananarivo Renivohitra CISCO showed comparable results, included an average contribution of parents to the school budget of 18,410 MGA, varying from 5,000 MGA to 28,000 MGA. In 30 surveyed schools, the collected resources reached a total of 128 million MGA, an average budget of 5.3 million MGA per school.

Parental contribution for a child enrolled in primary school (EPP)



Source : Survey conducted during the study

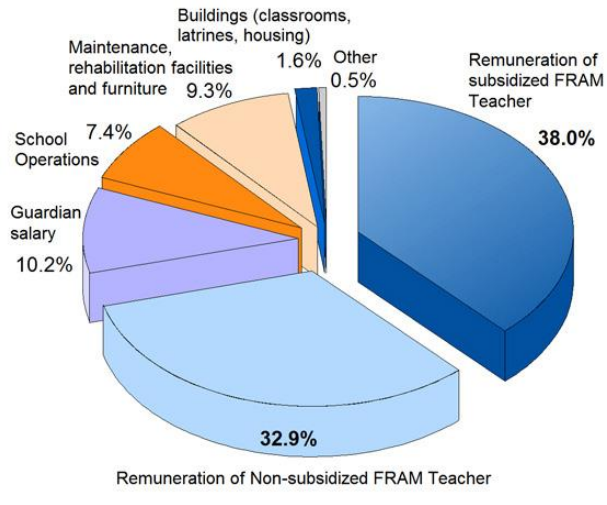
Parental contribution to school expenditures : distribution by area –(in MGA/parent/year)



Source : survey conducted during the study

Parental contributions are essentially used to pay community teachers and the school keeper, purchase supplies, pay for repairs, and finance report cards and school sports. With the contribution of parents, the surveyed schools provide a monthly subsidy to subsidized and non-subsidized community teachers. The amounts are almost equivalent, 63,500 MGA/ month for the non-subsidized community teachers and 61,150 MGA/month for subsidized community teachers. Nearly 72 percent of parents consider that the level of the subvention is more than they can afford (52.6 percent) or is rather high (19.2 percent). Moreover, parents' satisfaction with the performance of teachers differs according to their status. The highest satisfaction rates go to the subsidized community teachers (92 percent) surpassing the satisfaction rates of the civil servants (less than 86 percent), and largely surpassing the satisfaction rates for the performance of non-subsidized community teachers (37 percent).

Breakdown of the use of school budget realized through parental contributions



Source : survey conducted during the study

Figure 30. Average Household Expense per Child Compared to per Pupil Government Education Expenditure, 2005 and 2010

Note: The expenditure data is averaged over 2006-2007 for salaries by region and 2006 and 2008 for other current expenditure.
Data sources: EPM 2005 and 2010, MFB.

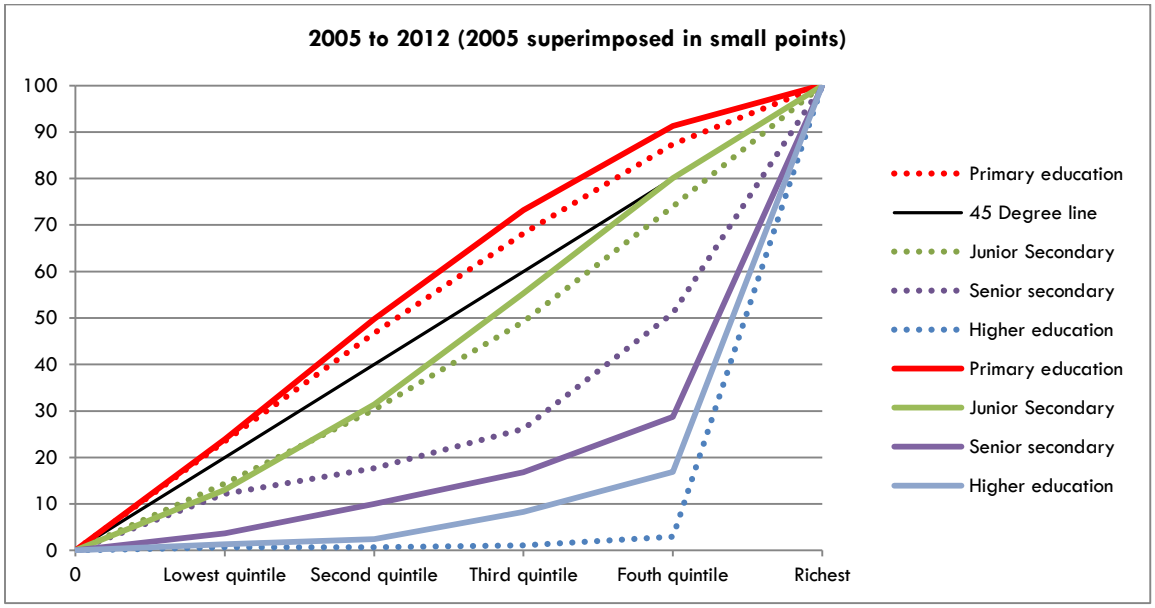
D.3 Distribution of Expenditures by Socioeconomic Category of User: BIA

74. Benefit Incidence Analysis (BIA) can be carried out using the simple utilization (or usage) approach. The method assumes that all individuals using the service receive the same benefits. This is the approach used in Glick & Razakamanantsoa (2002) in their BIA for health and education using 1990 data. Another assumption implied by this method is that the quality in schools does not depend on average income levels; this is not a realistic assumption but allows the use of data that is more reliable than other approaches (Glick & Razakamanantsoa 2002).

1. Marginal benefit of government expenditure by level of education

75. **Looking at the utilization of public schools across household expenditure quintiles, additional spending in primary education is clearly pro-poor,** while spending on lower secondary schools is reasonably equal and spending on higher education has no direct benefit on the poor. The utilization of public schools by welfare group presents a picture of who currently uses the public service and how public spending can affect the distribution of resources to the poor. Figure 31 gives the Lorenz curves[38] by quintile for the entire population for 2005, 2010 and 2012. Looking at each year independently, they clearly show the pro-poor aspect of primary education, while inequalities by income increase along the education cycle. In 2005, more than 22 percent of children in primary school are from the poorest quintile, and this increases to 24 percent in 2012. Higher education is not accessible for anybody under the fourth quintile, and—recalling that the poverty threshold is into the fourth quintile in Madagascar—this means that almost none of the poor can access universities (only 1.3 percent of students are from the poorest quintile in 2012). Visual comparison of the 2005 and 2010 data shows increasing inequalities at the secondary level, and this inequality is most apparent in 2012.[39] The result that is most likely significant statistically is for secondary education, indicating that the number of school dropouts in teenage years has increased among the poor.

Figure 31. Lorenz Curves by Quintile for Utilization of Public Education, 2005-2010, 2010-2012 and 2005-2012



Data source: EPM 2005, EPM 2010 and ENSOMD 2012.

[38] The figure shows the case of public primary, secondary and higher education enrollments using Household Surveys. The cumulative shares of individuals in the population, ranked by per capita household expenditures, are shown on the x-axis, while the y-axis presents the cumulative share of enrollments for public primary, secondary and higher education. The degree of convexity of the Lorenz curve indicates that the enrollment distribution is quite unequal. If the benefit curve lies above the 45-degree line, it insures that the poor receives a disproportionate share of the benefit, which indicates that the public service is pro-poor.

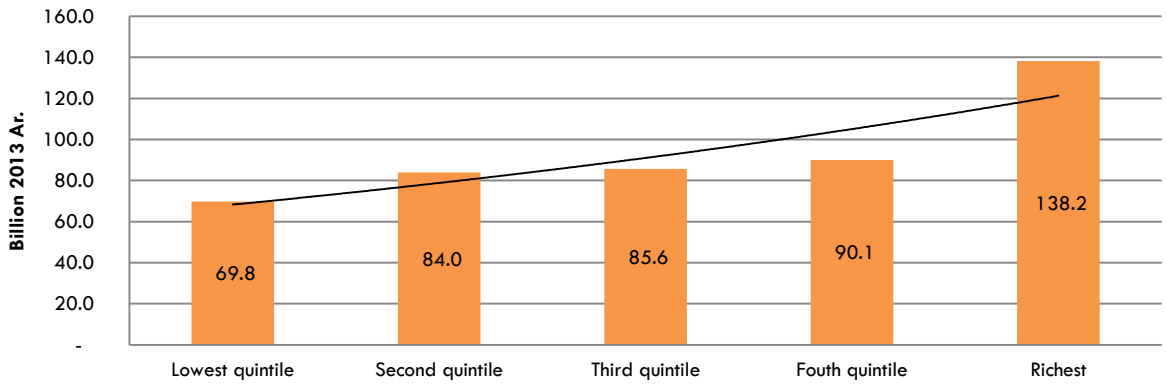
[39] Statistical significance of the differences has not been established.

2. Average benefits of education expenditures (BIA)

76. **On average between 2010 and 2013 the government spent per year about 468 billion 2013 Ar.** on the different education levels (excluding all administrative units, general research, and investment).[40] How much of this money benefited the poor? The goal of the BIA is to give an estimate of average benefits across consumption quintiles taking account of utilization of the services provided. In order to assess average benefits, the average of current government expenditures by levels between 2009 and 2013 is combined with the utilization data from the 2010 EPM presented above.

77. **The richest quintile benefits twice as much as the poorest quintile, the lowest quintile benefits the least, but the middle three quintiles benefit approximately equally** (Figure 32). Looking at all education levels combined, the richest quintile receives 30 percent of current public expenditures (which represents, on average, 138.2 billion Ar. per year), whereas the lower quintile receives only about 15 percent. Regarding the share of enrollment in 2010, the richest quintile enrolled far fewer children at the public primary level (10.6 percent of total primary enrollment, which represents, on average, 29 billion Ar.), but its shares of enrollment in senior secondary and higher education are higher (respectively, 55 and 92 percent of students). With only senior secondary and higher education, they receive, on average, 89 billion Ar. Conversely, although the poorest quintile receives 60.3 billion Ar. from the primary budget, it receives a smaller subsidy than other levels, as the poor quintile's enrollment in secondary and higher education is marginal.

Figure 32. Government Subsidy to Education from Current Expenditure, by Quintile, 2011-2013

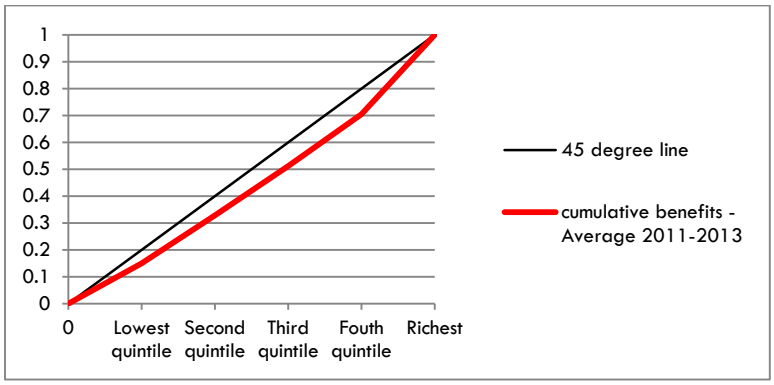


Note: Current expenditures from SIGFP data, using fixed salary weights for wages up to upper secondary based on PIE estimates. Expenditures do not include general administration. Utilization by quintile is based on 2010 EPM.
Data sources: MFB (SIGFP), MEN (PIE), EPM.

78. Focusing on the distribution of expenditures rather than actual amounts, benefits can be presented in a Lorenz-curve type graph that cumulates benefits across quintiles, the 45 degree line being the line of perfect equality (Figure 33). The graph shows a mild pro-rich bias resembling the level found in utilization of lower secondary schools.

[40] See section C2 for the functional breakdown of expenditure. The amount for Post-secondary and research was reduced to better reflect expenditures directed to students of universities using estimates from the PIE (92 percent).

Figure 33. Estimated Distribution of Benefits from Education Expenditures for All Levels Combined (primary, secondary and higher education)

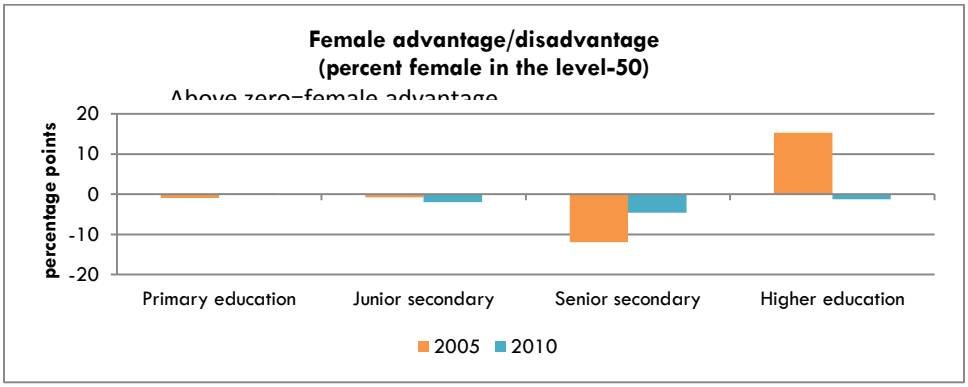


Data sources: MFB (SIGFP), MEN (PIE), EPM.

D.4 Distribution of Expenditures by Gender: BIA

79. **Overall, gender does not appear to be an issue for public education in Madagascar.** Figure 34 implicitly assumes that equality of utilization is the desired outcome and traces differences between equal utilization and actual utilization of female in the different education levels in 2005 and 2010 using Household Survey data.[41] Madagascar has achieved perfect equality at the primary level in 2010. The junior secondary level is also used equally by boys and girls, although the 2010 result shows slightly lower usage among girls.[42] The significant gender difference at the senior secondary level was reduced in 2010, although boys still have an advantage of about 5 percent. At the university level, the survey data showed a strong advantage to girls in 2005 that is no longer present in the 2010 results.

Figure 34. Gender Equality in the Public Schools



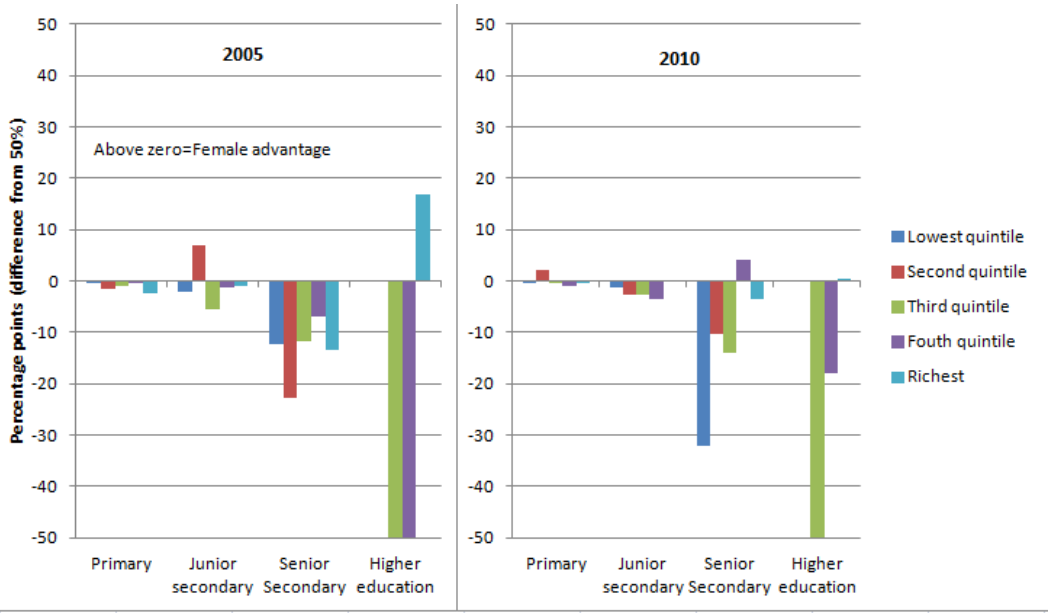
Data Source: EPM2005 and 2010.

[41] Note that the gender differences identified in the data could emanate from supply or demand effects. The source of difference has not been tested for this exercise.

[42] Statistical significance has not been established, and the standard errors are still also low.

80. **The good results in terms of gender equality in primary school extend to all quintiles of consumption.** In lower secondary, while some difference is noticeable in the third and fourth quintiles (with a female disadvantage in the second quintile and a female advantage in the third), they are likely not statistically significant and disappear in 2010. Gender differences in senior secondary exist in all quintiles in 2005 and remain in the lowest three quintiles (all under the poverty line in Madagascar) in 2010. The poorest fair the worst in terms of female disadvantage in senior secondary in 2010. Finally, the female advantage in higher education in 2005 is fully explained by differences in the richest quintile. The difference in lower quintiles appears strong in 2010 but is based on very small numbers of students, as shown in Figure 35.

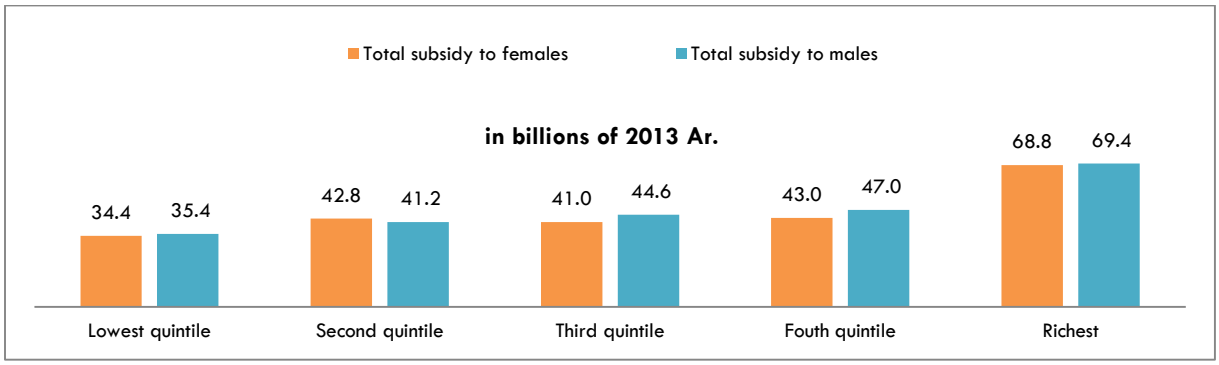
Figure 35. Gender Equality in the Public Schools by Quintile, 2005 and 2010



Note: No bar implies zero utilization for both male and female (higher education, first two quintiles in 2005 and second quintile in 2010).
Data source: EPM.

81. **Based on utilization of public schools by quintiles, females benefit 49 percent of government education expenditures in the different levels of educations, which is equivalent to equality.** The repartition across quintiles is also fairly even (Figure 36).

Figure 36. Government Subsidy to Education from Current Expenditure by Gender and Consumption Quintile, 2011-2013



Note: Current expenditures from SIGFP data using fixed salary weights for wages up to upper secondary based on PIE estimates. Expenditures do not include general administration. Utilization by quintile is based on 2010 EPM.
Data sources: MFB, MoE (PIE), EPM.

D.5 Key Findings and Policy Implications

Key Findings

Although the distribution of public spending appears overall equitable, the large increase in household spending over the past five years has had far-reaching consequences in terms of enrollments, and even more in terms of quality and learning outcomes.

Distribution of public spending

- Based on access, public spending on primary appears largely pro-poor, public spending on secondary appears broadly equal, and public spending on higher education has no direct benefit to the poor. There is, however, increasing inequity in secondary education.
- The distribution of public spending across regions show signs of regressivity, with some evening out recently due to the overall increase in poverty across regions.
- The distribution of wage expenditures reflects the highly inequitable distribution of civil servants across regions. Some of the most vulnerable regions seem clearly disadvantaged.

Household spending

- The last 5 years have witnessed a rapid increase in the share of education costs financed by households.
- The share of household budget going to education increased more for the richest, indicating a possible transfer of these children to private schools.
- The poorest spent, on average, 3.5 percent of their budget on education in 2012, against 2 percent in 2005.
- The distribution of regular teachers seems to have a direct impact on household spending, with the regions receiving less than average in terms of wage expenditure having the higher share of household contributions to the total costs of education per child enrolled.

Policy Implications

Better equity in the distribution of spending will require that regular teachers are equally distributed across the country, which will reduce the pressure on household spending as well as promote equitable access to quality education.

More equitable repartition of resources

- In the current context, where the allocation of human resources drives the distribution of spending, it is key to ensure that ongoing and future recruitments serve areas currently suffering from severe shortages of teachers.
- Beyond the evening out of inequality in the distribution of spending, the focus needs to be on the equal distribution of quality, which will heavily rely on qualified and trained teachers in the short term.
- This again points to the importance of using the ongoing regularization of community teachers as a strategic tool to ensure the equitable repartition of resources and of education quality.

Further reducing the financial burden on the poorest

- Government support to schools and families in terms of learning materials and school furniture could be scaled up and better targeted.
- Support to children and families with high opportunity costs of schooling could be achieved through various interventions such as conditional cash transfers or vouchers.

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ANNEXES

ANNEX 1. TABLE SUPPLEMENT

Table A1.Annual salaries by provinces as a ratio to SIGFP remunerations by provinces

	2006	2010	2011	2012	2013
All education missions					
Total salaries in wage data/ total remunerations in SIGFP	1.45	0.84	0.92	0.89	0.90
ANTANANARIVO	2.90	1.93	2.13	2.21	2.28
ANTSIRANANA	2.73	0.96	1.58	1.59	1.58
FIANARANTSOA	2.02	1.39	1.44	1.42	1.47
MAHAJANGA	2.32	1.16	1.23	1.23	1.30
TOAMASINA	2.06	1.21	1.41	1.35	1.45
TOLIARA	1.73	1.45	1.43	1.38	1.51
Basic and secondary education only					
Total salaries in wage data/ total remunerations in SIGFP	1.28	0.84	0.92	0.89	0.91
ANTANANARIVO	2.30	1.52	1.67	1.70	1.75
ANTSIRANANA	2.42	0.83	1.43	1.40	1.40
FIANARANTSOA	1.93	1.34	1.38	1.36	1.40
MAHAJANGA	2.17	1.09	1.16	1.13	1.19
TOAMASINA	1.94	1.15	1.34	1.28	1.38
TOLIARA	1.59	1.35	1.33	1.27	1.39
Share of total salary not assigned to a region in SIGFP					
All missions	0.34	0.38	0.38	0.41	0.41
Basic and secondary education only	0.34	0.31	0.32	0.34	0.34

Data sources: MFB, SIGFF and Direction of Remunerations (Solde)

Table A2.Share of salary by regions, 2006-2007 and 2010-2013

Region	Expenditure shares, salary only						% of total est. pop , 2013
	2006	2007	2010	2011	2012	2013	
ANALAMANGA	21.72	21.56	18.69	18.41	18.59	17.67	15.33
VAKINANKARATRA	7.22	6.46	6.93	6.87	6.80	6.63	8.26
VATOVAVY-FITOVINANY	5.36	5.96	5.05	5.27	5.67	6.03	6.48
ATSIMO-ANDREFANA	6.54	6.73	6.61	6.27	6.61	6.67	6.03
ATSINANANA	5.74	6.13	6.09	6.09	5.95	5.97	5.82
SOFIA	4.87	5.29	6.25	6.62	6.12	6.13	5.71
HAUTE MATSIATRA	7.25	7.35	9.24	6.82	6.87	6.56	5.49
ANALANJIROFO	4.37	4.79	4.99	5.34	5.14	5.41	4.74
ALAOTRA-MANGORO	5.92	4.84	6.19	5.53	4.83	5.86	4.70
SAVA	3.12	3.24	1.24	3.97	1.23	4.27	4.49
ATSIMO-ATSINANANA	2.54	2.57	2.60	2.53	2.63	2.65	4.11
BOENI	3.52	3.65	3.59	3.44	3.30	3.29	3.66
ANDROY	1.39	1.50	1.64	1.66	1.71	1.64	3.36
ITASY	2.94	2.78	3.02	3.10	3.11	3.04	3.36
AMORON'I MANIA	5.91	4.90	5.19	5.19	5.68	5.25	3.27
DIANA	2.86	3.25	3.13	3.11	5.92	3.09	3.20
ANOSY	2.15	2.24	2.46	2.38	2.48	2.46	3.08
MENABE	2.36	2.52	2.59	2.57	2.58	2.56	2.71
BONGOLAVA	1.10	1.10	1.09	1.31	1.28	1.25	2.09
IHOROMBE	1.26	1.11	1.23	1.20	1.31	1.27	1.43
BETSIBOKA	1.07	1.20	1.16	1.27	1.16	1.27	1.34
MELAKY	0.80	0.84	1.03	1.03	1.01	0.99	1.33

Data source: MFB, direction de la Solde

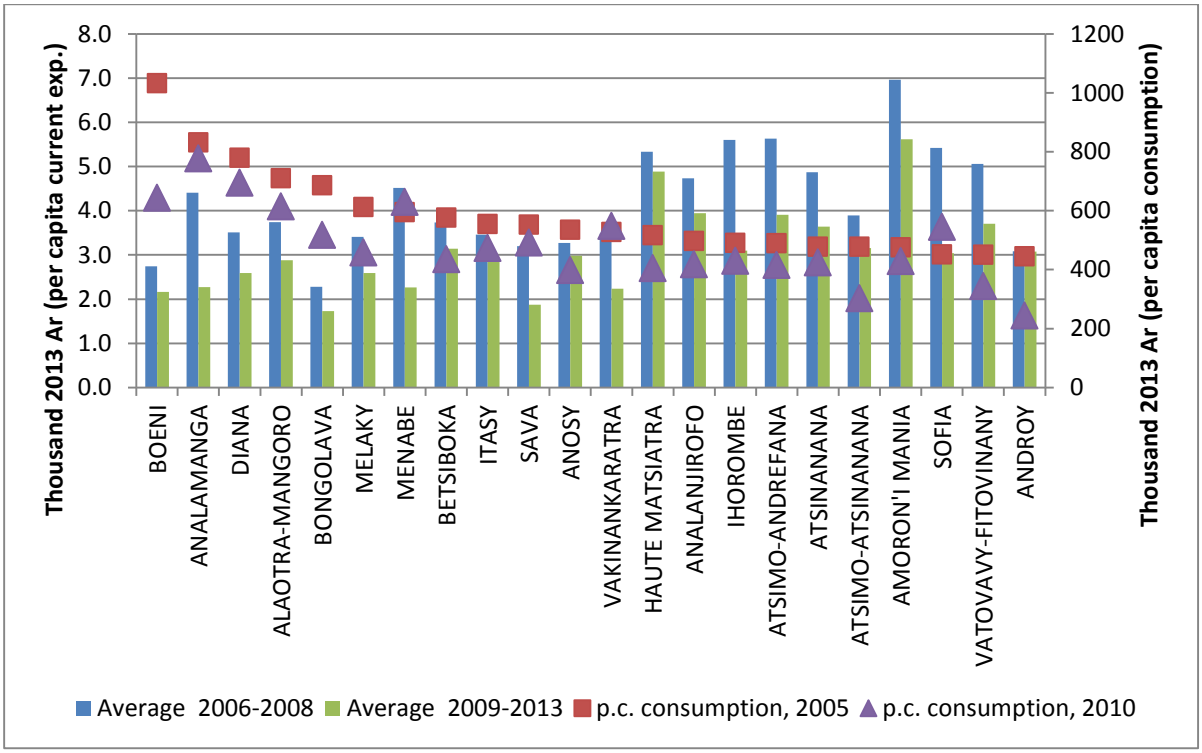
Table A3.Public school utilization by gender and quintile, 2005 and 2010

Cons. Quintile	Primary Education				Junior secondary				Senior secondary				Higher education			
	2005		2010		2005		2010		2005		2010		2005		2010	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
Lowest	12	12	11	11	6.9	7.5	4.8	5.1	4.6	7.6	0.4	1.8	0.4	0.4		
Second	11	12	13	12	9.1	6.9	7.9	8.9	1.5	4.0	1.7	2.5	0.0	0.0		
Third	11	11	11	11	8.4	10	9.4	10	3.3	5.3	6.3	11	0.0	0.4		1.0
Fourth	9.5	9.7	9.6	10	12	13	13	15	11	14	12	9.9	0.0	1.9	2.3	4.8
Richest	6.0	6.6	5.3	5.4	13	13	13	13	18	31	25	29	65	32	47	45

Data source: EPM

ANNEX 2. FIGURE SUPPLEMENT

Figure A.1. Current public Expenditure per Capita in Education by region and per capita consumption



Data sources: MoF, INSTAT (population), EPM (poverty)

A.3.1 Overall Public Expenditure Performance

1. Structural efficiency analysis

Methodology

The analysis relies on the full panel of countries in the UNESCO/IS database creating a panel of 144-176 countries (depending on the indicator used) with data from 1995 to 2012.[43] The panel structure of the data is exploited to identify an average "Madagascar effect". The country specific residuals are the u_i 's obtained from a random effect GLS regression on GDP per capita, income group, region, population and size.

Results

Madagascar places among the most efficient (spending less than expected and achieving more than expected) when using Primary and Secondary Combined Enrollment Ratios as the outcome measure. It also places in the efficient quadrant for youth literacy rates, although mostly due to lower expenditures, and places as a slight underachiever using Primary Completion Rates. Table xx sows the deviations from expected outcome relative to the standard error of the deviation in the full sample. Figure xx to xx graphically shows the results.

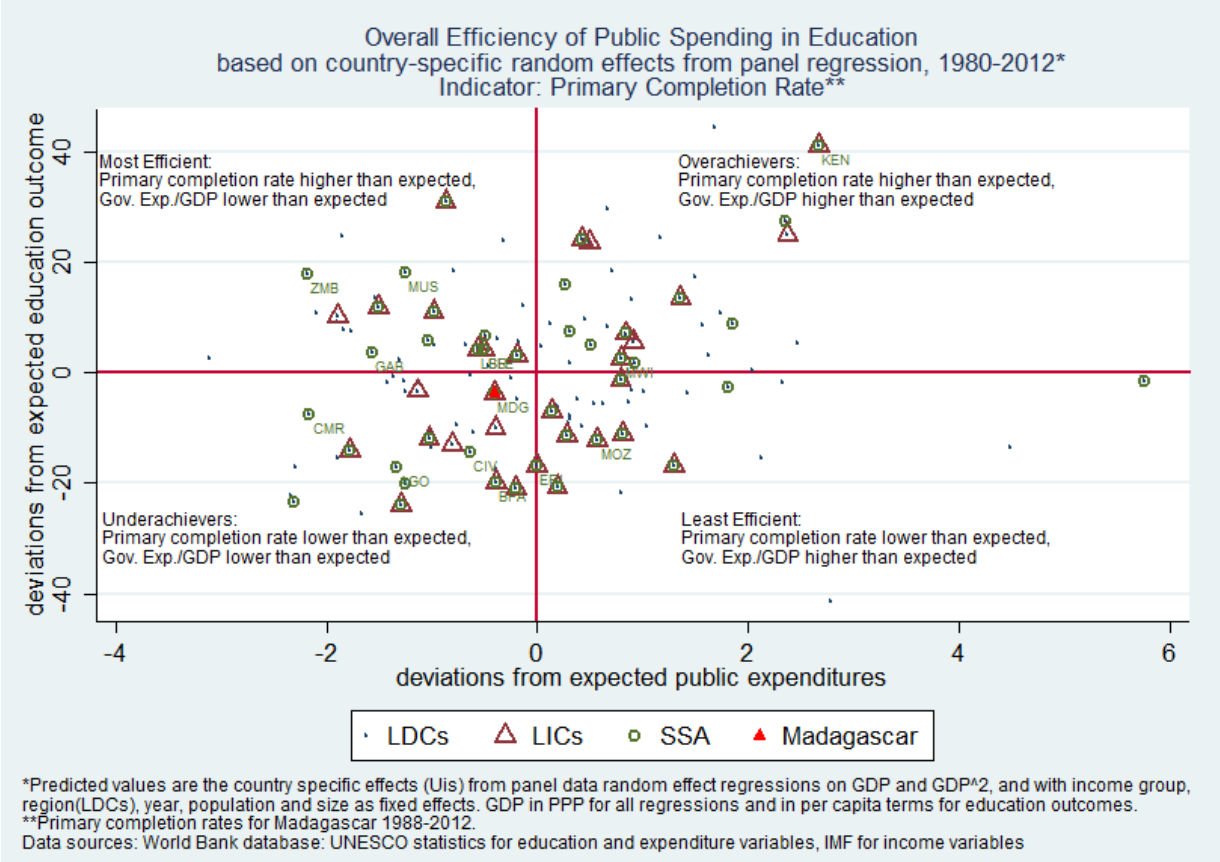
Table A4.Madagascar's deviations from expected education outcomes and expenditure, panel data results

	Madagascar "effect"	Madagascar's effect /standard deviation of the random effects
Primary completion rates	-3.8	-0.29
Gross enrollment ratio, Primary and secondary combined	15.4	1.27
Youth literacy rate	3.1	0.31
Public expenditure	-0.41	-0.30

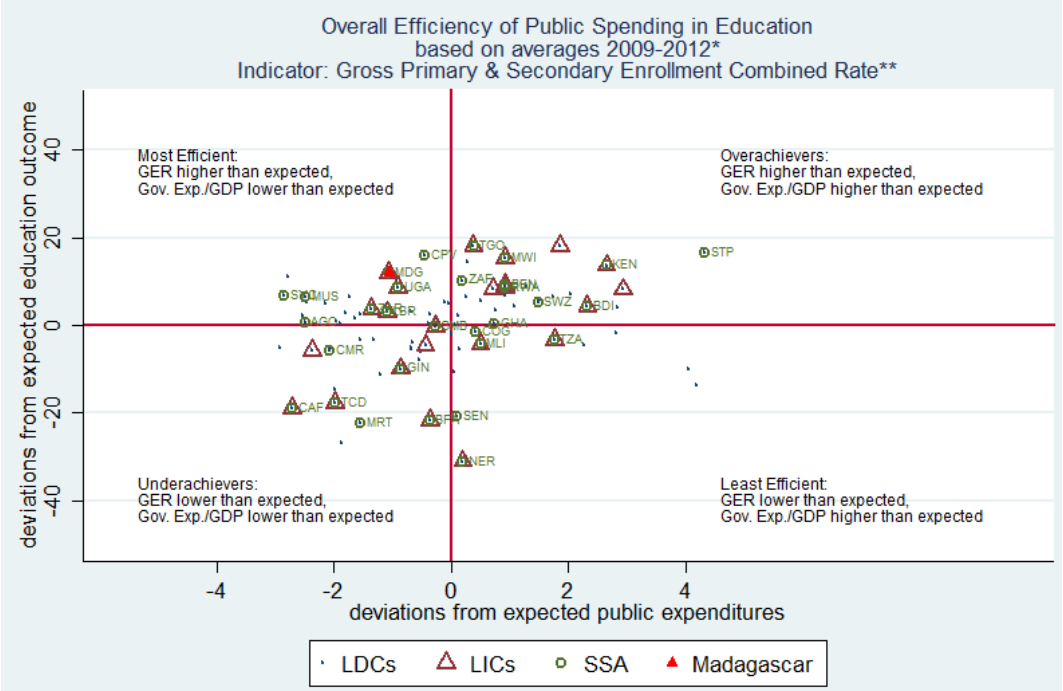
Source: Authors – data from UNESCO/IS and IMF

[43] The 1980-2012 range is determined by education expenditure data availability. The panel is very much unbalanced due to uneven reporting across years, especially for youth literacy rates.

Figure A.2. Structural efficiency of education expenditure based on Primary Completion Rates, 1980-2012

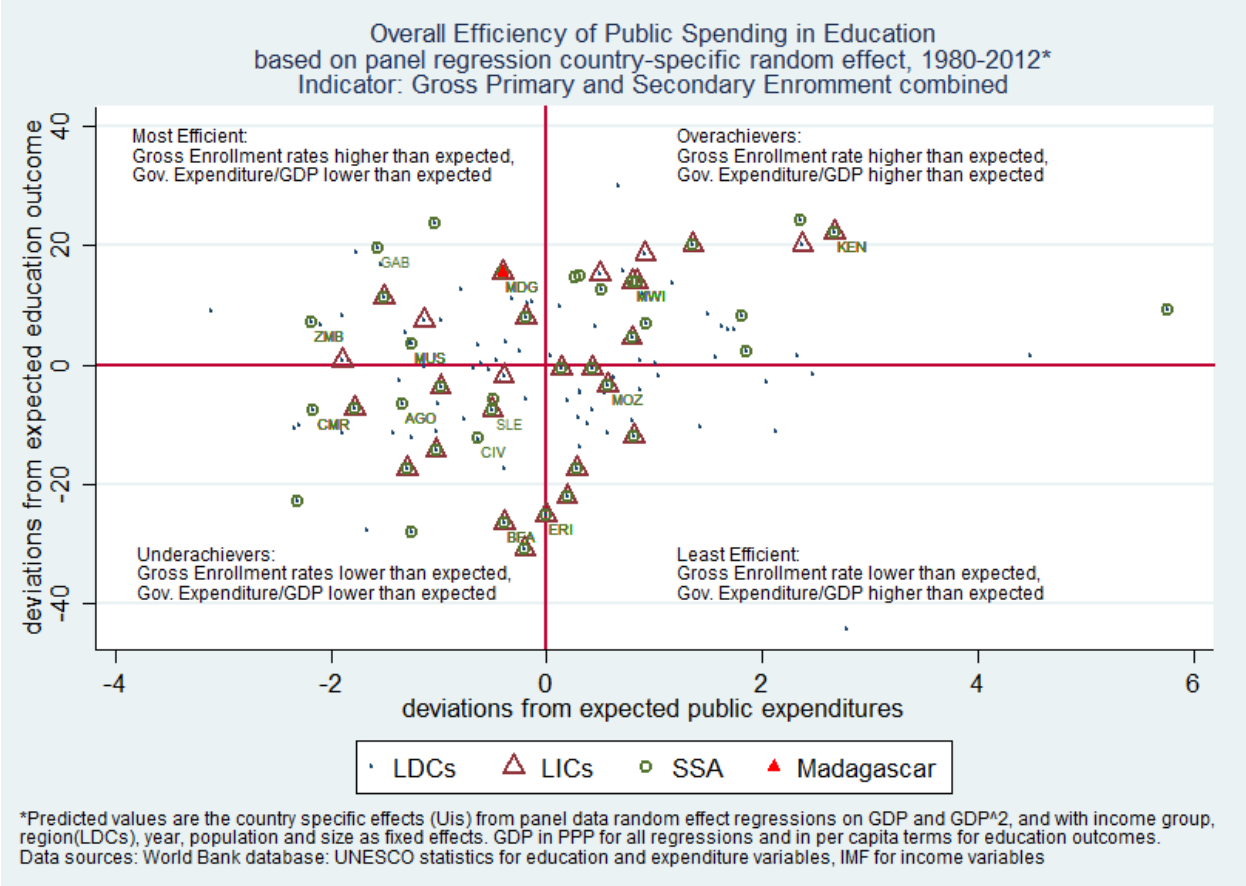


*Predicted values are the country specific effects (Uis) from panel data random effect regressions on GDP and GDP^2, and with income group, region(LDCs), year, population and size as fixed effects. GDP in PPP for all regressions and in per capita terms for education outcomes.
**Primary completion rates for Madagascar 1988-2012.
Data sources: World Bank database: UNESCO statistics for education and expenditure variables, IMF for income variables



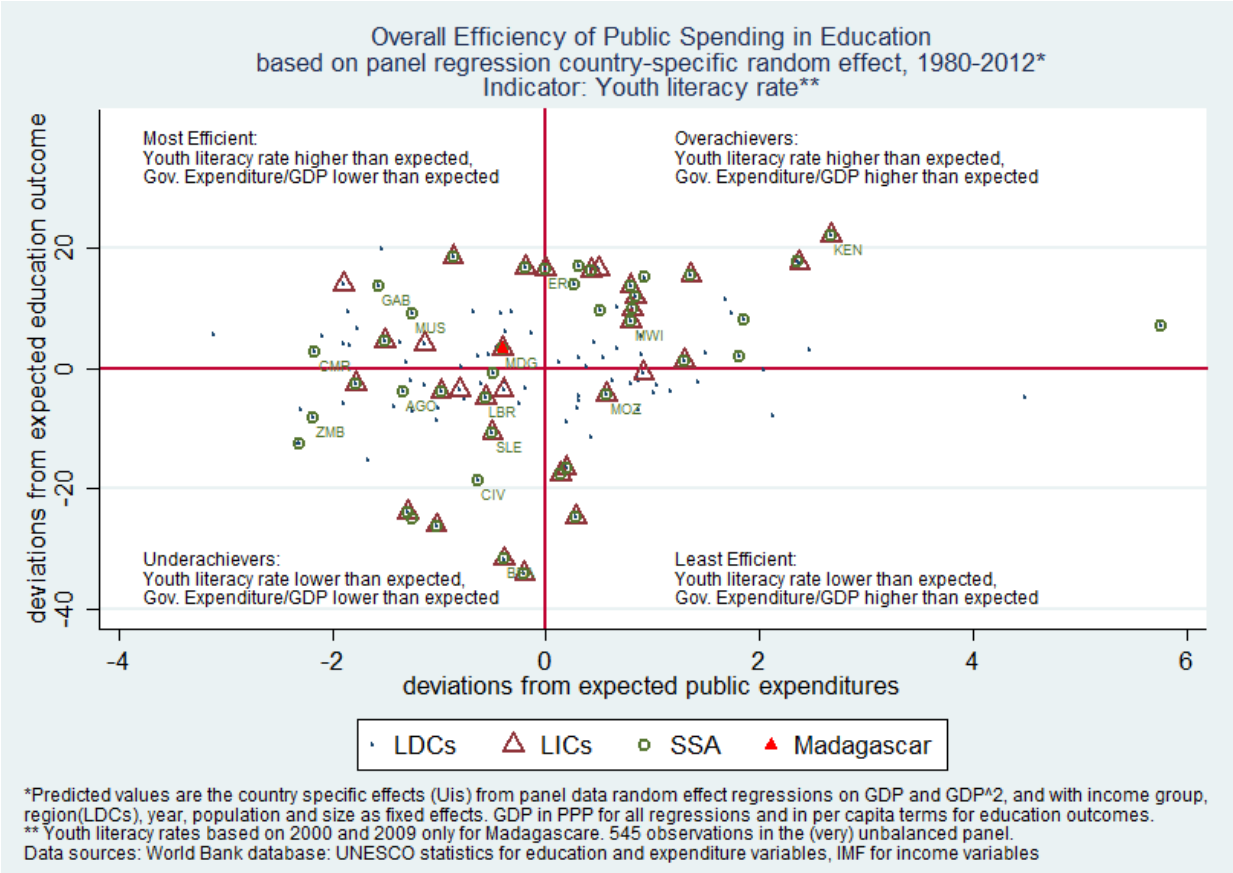
*Predicted values based on OLS regressions on GDP/c, GDP/c^2 with group effects for income and region (LDCs), population and size GDP in PPP per capita for all regressions.
Data sources: World Bank Edstats based on UNESCO statistics for education variables, including expenditures, IMF data for income variables

Figure A.3. Structural efficiency of education expenditure based on Gross Enrollment in Primary and Secondary combined, 1980-2012



*Predicted values are the country specific effects (Uis) from panel data random effect regressions on GDP and GDP^2, and with income group, region(LDCs), year, population and size as fixed effects. GDP in PPP for all regressions and in per capita terms for education outcomes.
Data sources: World Bank database: UNESCO statistics for education and expenditure variables, IMF for income variables

Figure A.4. Structural efficiency of education expenditure based on Youth literacy Rates, 1980-2012



*Predicted values are the country specific effects (Uis) from panel data random effect regressions on GDP and GDP^2, and with income group, region(LDCs), year, population and size as fixed effects. GDP in PPP for all regressions and in per capita terms for education outcomes.
** Youth literacy rates based on 2000 and 2009 only for Madagascare. 545 observations in the (very) unbalanced panel.
Data sources: World Bank database: UNESCO statistics for education and expenditure variables, IMF for income variables

2. Current efficiency: pre- and post-crisis expenditure performance

Methodology

The analysis is based on methodology presented in the 2006 Djibouti PER although it includes additional variables in the estimation to calculate expectations (as for the structural analysis above). It relies on cross-country regressions on average levels of expenditures and average outcomes for 2000-2008 and for 2009-2012 to correspond to the pre- and post-crisis periods. For each period, averages outcomes and average expenditures are calculated for all countries in the sample. The number of countries with available data varies between 114 and 166 depending on the indicator and the time period considered. Deviations from expected values are based on residuals in a simple OLS regression using average GDP/c and its square in PPP, income group, region (for LDCs only), population and size on the right hand side. The analysis is done using primary completion rates, primary and secondary combined enrollment ratios, and youth literacy rate, although the youth literacy rate is based on 2000 and 2009 data only so the later period cannot be considered post-crisis.

Results

Comparing the relative expenditure performance of Madagascar during the pre-crisis years (2000-2008) and the post crisis years (2009-2012) shows that Madagascar has dropped its level of expenditure further below expectations but has been able to increase its advantage for completion rate. Its advantage in gross enrollment ratios was reduced but remains above expectations. Changes in youth literacy rates have pushed Madagascar in the under-achieving group but the result is only based on 2009 youth literacy data and can

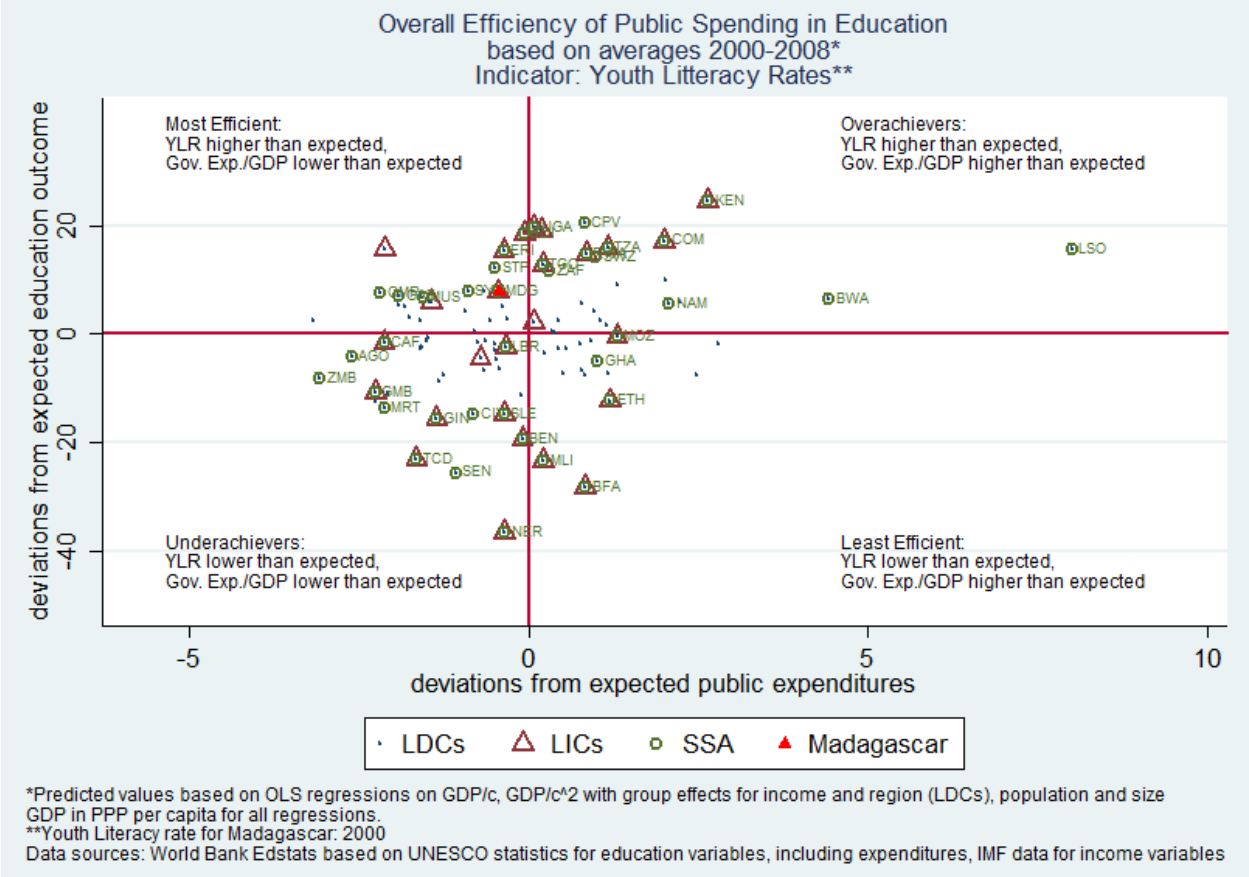
therefore not be attributed to the crisis. Table xx presents Madagascar's deviation from expectations relative to the standard deviations in the sample and their evolutions between 2000-2008 and 2009-2012. The greatest loss has been in Youth literacy, although the estimation is only based on 2000 and 2009 data for Madagascar. The gain in advantage in completion rates is almost 1 standard deviation. Results for primary completion rates and gross enrollment ratios are presented in the text. Figures xx to xx present the youth literacy results.

Table A5.Madagascar's deviations from expected education outcomes and expenditure, panel data summary results

	Madagascar deviation/standard deviation		
	2000-2008	2009-2012	Change (a)
Primary completion rates	-0.20	0.73	0.93
Gross enrollment ratio (primary and secondary combined)	1.39	1.17	-0.22
Youth literacy rate	0.77 (2000)	-0.85 (2009)	-1.62
Public expenditure	-0.28	-0.66	-0.38

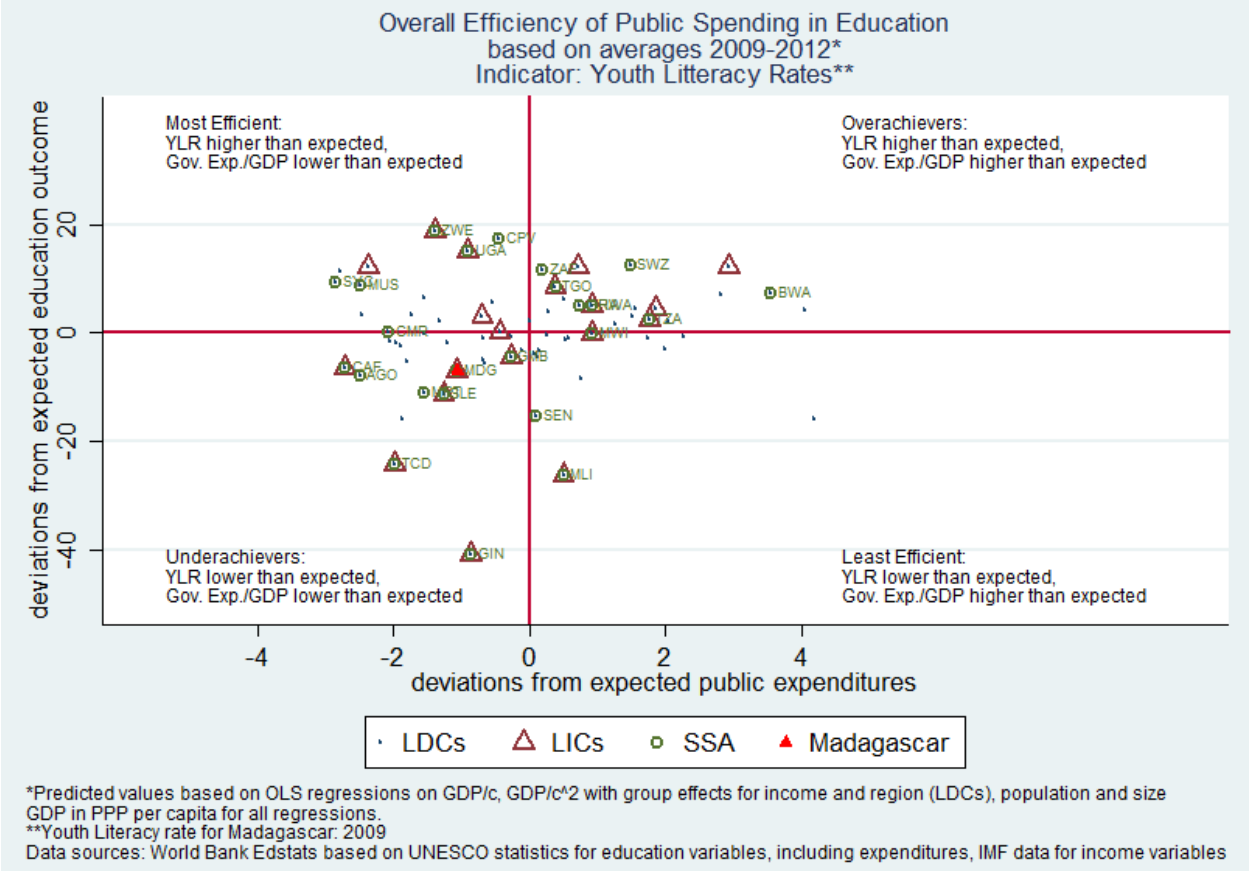
(a) A negative number in the outcome dimension indicates that Madagascar is losing its advantage in that dimension.
Source: Authors – data from UNESCO/IS and IMF

Figure A.5. Current Efficiency of 2000-2008 Government Expenditures based on 2000 Youth Literacy Rate



*Predicted values based on OLS regressions on GDP/c, GDP/c^2 with group effects for income and region (LDCs), population and size GDP in PPP per capita for all regressions.
**Youth Literacy rate for Madagascar: 2000
Data sources: World Bank Edstats based on UNESCO statistics for education variables, including expenditures, IMF data for income variables

Figure A.6. Current Efficiency of 2009-2012 Government Expenditures Based on 2010 Youth Literacy Rate



*Predicted values based on OLS regressions on GDP/c, GDP/c^2 with group effects for income and region (LDCs), population and size GDP in PPP per capita for all regressions.
**Youth Literacy rate for Madagascar: 2009
Data sources: World Bank Edstats based on UNESCO statistics for education variables, including expenditures, IMF data for income variables

3. Regression results

Following are sample regression results for Completion and expenditure.

Completion rates

Completion Rates: Structural regression results

The variables in the model explain 32 percent of the within variance and 60 percent of the between variance. RE_pcr1 (Single value per country) is the value of the country specific random effect responsible for explaining 71 percent of the unexplained variance in primary completion rates. Its value is -3.82 for Madagascar. Stata 10 regression results and a summary of the random effects are presented below.

. xtreg ed_pcr ppppc ppppc2 year pop size SSA ECA SA EAP MENA LAC LIC LMI

Random-effects GLS regression Number of obs = 3007
Group variable: cid Number of groups = 171

R-sq: within = 0.3161 Obs per group: min = 2
between = 0.5979 avg = 17.6
overall = 0.6105 max = 33

Random effects u_i ~ Gaussian Wald chi2(13) = 1559.60
corr(u_i, X) = 0 (assumed) Prob > chi2 = 0.0000

```
     ed_pcr |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------+----------------------------------------------------------------
      ppppc |  -.0009019   .0001177    -7.66   0.000    -.0011327   -.0006712
     ppppc2 |   7.30e-09   1.89e-09     3.87   0.000     3.60e-09    1.10e-08
       year |    .876639   .0282828    31.00   0.000     .8212058    .9320721
        pop |   1.90e-09   9.57e-09     0.20   0.843    -1.69e-08    2.07e-08
       size |  -2.90e-07   6.81e-07    -0.43   0.670    -1.62e-06    1.04e-06
        SSA |   -22.5266   4.385146    -5.14   0.000    -31.12133   -13.93187
        ECA |  -3.869631   4.229748    -0.91   0.360    -12.15978    4.420524
         SA |  -5.319994    6.77654    -0.79   0.432    -18.60177     7.96178
        EAP |  -2.741014   5.052243    -0.54   0.587    -12.64323      7.1612
       MENA |  -15.43923   5.105525    -3.02   0.002    -25.44587   -5.432581
        LAC |  -10.48159   3.723563    -2.81   0.005    -17.77964    -3.18354
        LIC |  -39.97556   4.170106    -9.59   0.000    -48.14881    -31.8023
        LMI |   -21.2268   3.296154    -6.44   0.000    -27.68714   -14.76645
      _cons |  -1640.985   55.40475   -29.62   0.000    -1749.576   -1532.393
------------+----------------------------------------------------------------
    sigma_u |  14.184202
    sigma_e |   9.101526
        rho |   .70834785   (fraction of variance due to u_i)
------------------------------------------------------------------------------


. sum  RE_pcr1

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
    RE_pcr1 |       171    5.58e-09    13.86423  -52.29763   44.53711
```

Completion rates: cross-country regression using 2009-2012 averages

Completion rates are available yearly. They are averaged over 2009-2013 before running the OLS regression. The variables in the model explain 58 percent of the variation in completion rates (Adj R2). Madagascar's deviation from expected outcomes based on this regression (residual) is -2.8. Stata 10 regression results and a summary of the residual variable are presented below.

```
. reg ed_pcr ppppc ppppc2 pop size SSA ECA SA EAP MENA LAC LIC LMI

      Source |       SS       df       MS              Number of obs =     161
-------------+------------------------------           F( 12,   148) =   19.61
       Model |  49431.2023    12  4119.26686            Prob > F      =  0.0000
    Residual |  31095.2133   148  210.102793            R-squared     =  0.6139
-------------+------------------------------           Adj R-squared =  0.5825
       Total |  80526.4157   160  503.290098            Root MSE      =  14.495

------------------------------------------------------------------------------
      ed_pcr |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       ppppc |   .0012175   .0006249     1.95   0.053    -.0000174    .0024523
      ppppc2 |  -1.28e-08   9.34e-09    -1.37   0.173    -3.12e-08    5.66e-09
         pop |  -4.97e-09   1.44e-08    -0.35   0.730    -3.34e-08    2.34e-08
        size |  -8.03e-07   7.46e-07    -1.08   0.283    -2.28e-06    6.71e-07
         SSA |  -1.576453   7.202508    -0.22   0.827    -15.80949    12.65659
         ECA |   20.88661   7.018098     2.98   0.003     7.01799    34.75523
          SA |   22.45718   9.128703     2.46   0.015     4.417743    40.49662
         EAP |   19.81402   7.488931     2.65   0.009     5.014979    34.61307
        MENA |   7.922435    7.86529     1.01   0.315    -7.620342    23.46521
         LAC |   13.24642   6.282909     2.11   0.037     .8306185    25.66221
```

```
       LIC |  -22.59437   5.908889    -3.82   0.000    -34.27105   -10.91768
       LMI |  -9.615214   4.404162    -2.18   0.031    -18.31838   -.9120499
     _cons |   74.84384   10.30335     7.26   0.000     54.48315    95.20453
------------------------------------------------------------------------------

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
   RES_pcr1 |       161    5.46e-09    13.94077   -46.7936   58.83405
```

A3.2. Robustness analysis for functional classifications of Expenditures in Education since 2006

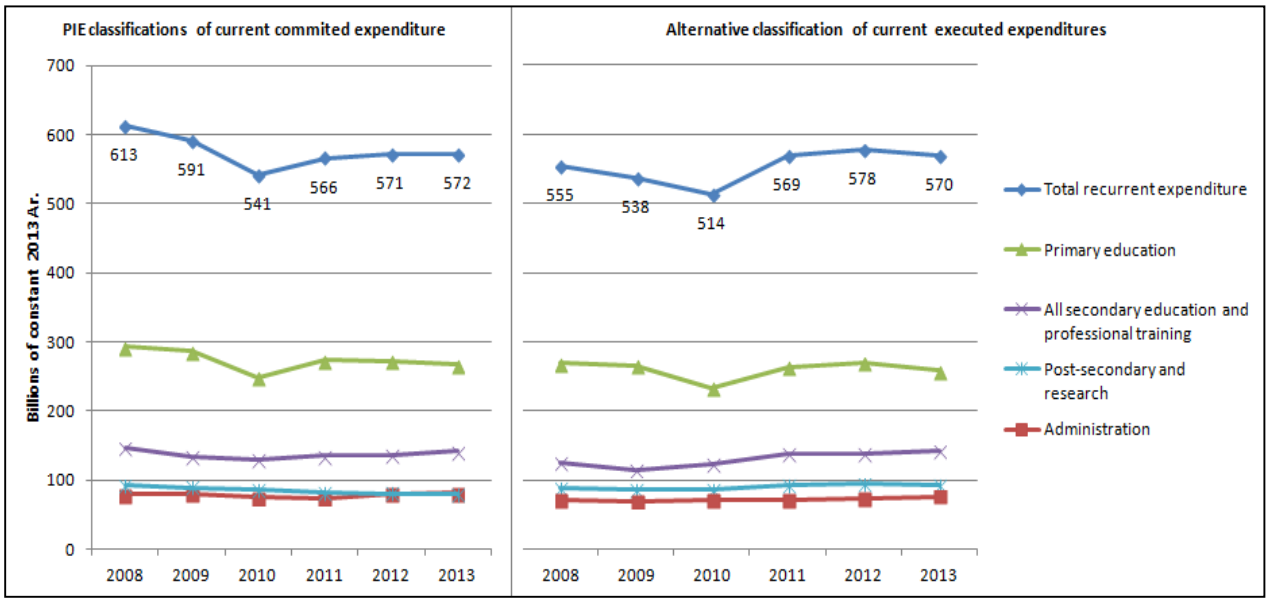
Without the raw data for the period prior to 2006, it was not possible to identify how the classifications into levels were re-constructed for the period 2002 to 2005 in the PIE. Moreover, because of the many and frequent administrative changes mentioned above, the MoF data could not be reconciled with the PIE results for the period 2006-2010. In order to provide an alternative means of classification more stable over time, another series was constructed using classifications of expenditures by sub-administrative units (SoA) which were classified according to their main function.[44]

This new classification offers the advantage of being completely independent of other differences in budget accounting and takes into account the administrative changes. As above the analysis is limited by data availability on regular salaries. The SIGFP separates salaries for practical training, post-secondary education and research so actual totals could be used for these levels. Assignments within primary and secondary education, however, had to be estimated using fixed proportions as in the PIE. Expenditures at the executed level were used for this exercise (as opposed to commitments in the PIE analysis).

Figure A.7 shows that results are quite robust to the changes in methodology. The new classification dampens the drop in total recurrent expenditures from 2006 to 2010 and reduces the amounts attributed to primary education overall but differences in general are small, thus confirming results discussed in the text.

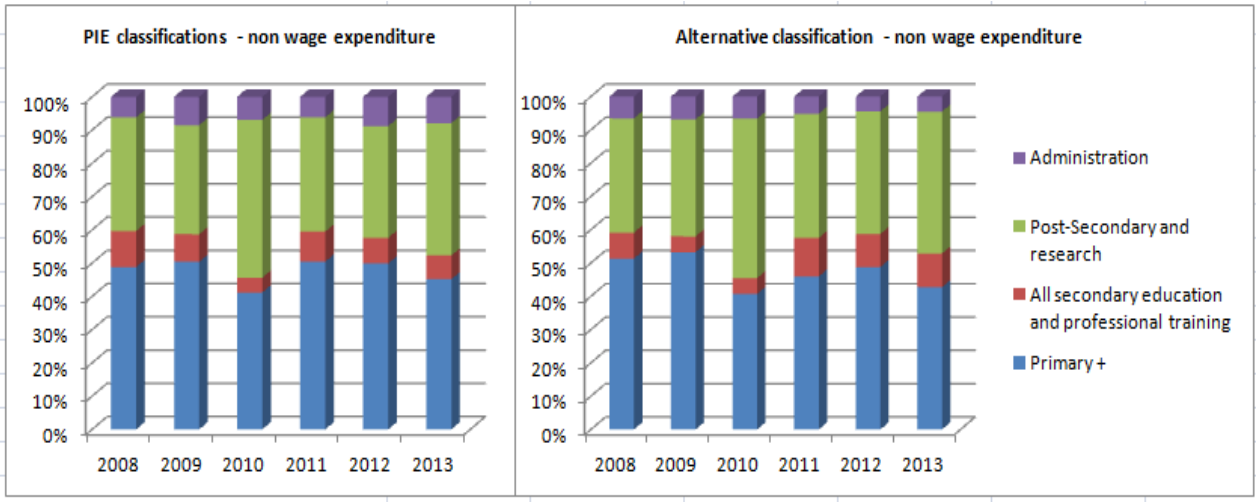
[44] SoAs labeled as serving the ministry as a whole were all included in administration. Intermediary classifications were created for SoAs that had functions across two or more levels. These did not represent a large part of total expenditure and the total could be added to the administrative function. In cases when expenditures from a single SoA were assigned to different programs by levels of education in the SIGFP, the program was used to refine the estimation.

Figure A.7. Trends in Education expenditures by level of education using different stages of expenditures and classification methods (2008-2013)



Data sources: SIGFP (MFB) and PIE spreadsheet (MEN). The second graph is entirely based on SIGFP.

Figure A.8. Trends in Education expenditures by level of education using different stages of expenditures and classification methods (2008-2013)



Data sources: SIGFP from MoF and PIE spreadsheet from MoE. The second graph is entirely based on SIGFP.