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Improving the Efficiency and Equity of
Public Education Spending: The Case of Moldova

by Hui Jin, La-Bhus Fah Jirasavetakul, and Baoping Shang

I N T E R N A T I O N A L M O N E T A R Y F U N D

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Fiscal Affairs Department

Improving the Efficiency and Equity of Public Education Spending: The Case of Moldova

Prepared by Hui Jin, La-Bhus Fah Jirasavetakul, and Baoping Shang*

Authorized for distribution by David Coady

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Abstract

This paper, using Moldova as an example, presents a systematic approach to assess the efficiency and equity of public education spending, identify sources of inefficiencies and inequality, and formulate potential reform options. The analytical framework combines international benchmarking with country-specific analysis—such as microeconomic analysis based on household survey data—and can provide important insights into diagnosing and reforming education systems. The analysis finds significant scope to improve both efficiency and equity of the education sector in Moldova. Potential reform measures include further consolidating the oversized school network, reducing overstaffing, and better targeting government subsidies. The current remuneration policy could also be improved to attract high quality teachers and incentivize performance.

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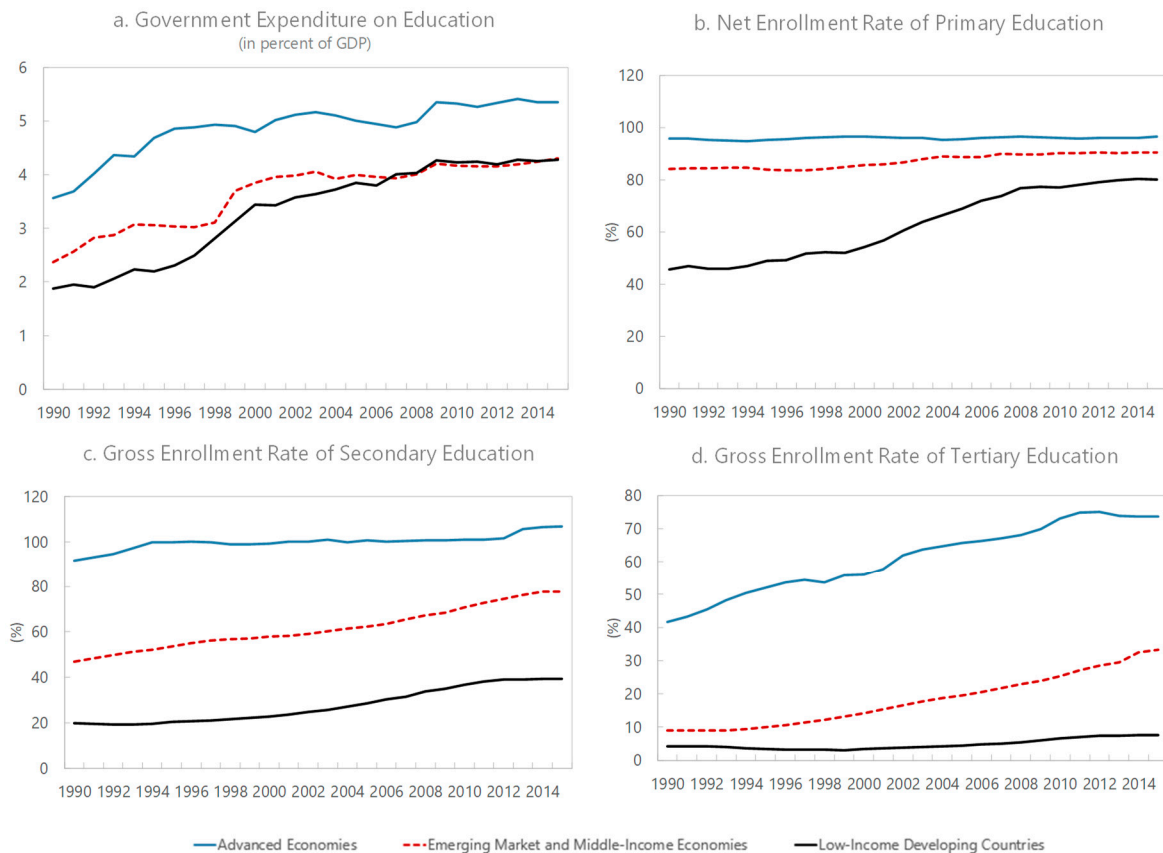
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I. INTRODUCTION

It is well established in the literature that education is critical to both individual well-being—through its impacts on human capital, employability, productivity, income and health—and overall economic growth. For example, one extra year of schooling on average leads to 8 - 10 percent higher in earnings and 0.18 years longer in life expectancy (Montenegro and Patrinos 2014; Cutler and Lleras-Muney 2008); countries with more education tend to grow faster, with estimates varying by study (Glewwe, Maiga and Zheng 2014; Cohen and Soto 2007; Jones 2014). Furthermore, more recent studies indicate that it is not school enrollment or years of schooling that matter the most, it is learning and skills that drive the difference (Hanushek and Woessmann 2012; Hanushek and others 2015; World Bank 2017). In addition, further expansion of education could help reduce income inequality (Coady and Dizioli 2018). Recognizing the vital role of education, one of the United Nations' Sustainable Development Goals (SDGs) is to ensure inclusive and quality education for all and to promote lifelong learning.

Figure 1. Public Education Spending and School Enrollment: 1990–2015



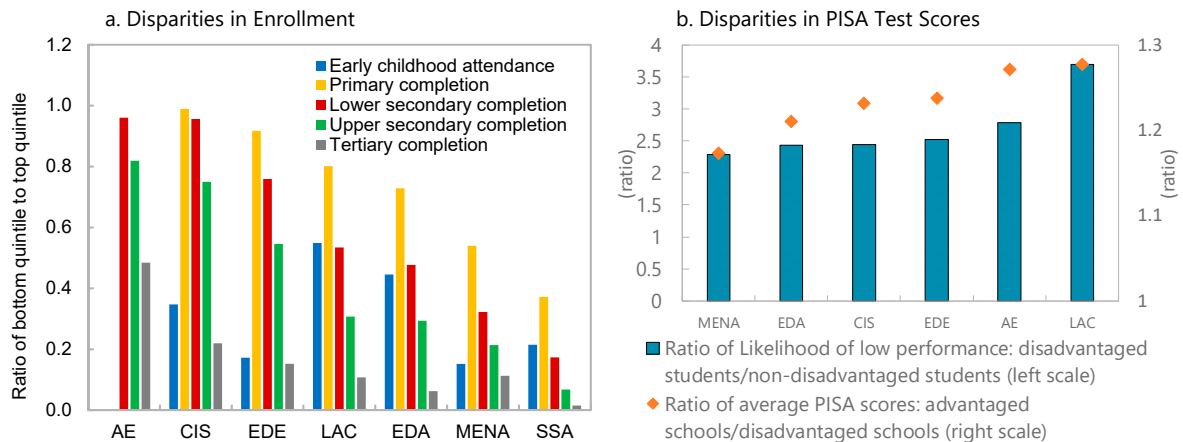
Source: World Bank, and IMF staff calculation

Significant progress has been made in improving access to education (e.g., school enrollments) over the recent decades, in developing economies in particular. Investments in education have increased across all income groups, with public spending as a percent of GDP in low-income developing economies rising the most, from 1.9 percent in 1990 to 4.3 percent in 2015 (Figure 1a). As a result, enrollment rates have increased. In low-income countries, average net enrollment

rates at the primary level have surged from 45 percent in 1990 to over 80 percent in 2015 (Figure 1b). Average gross enrollment rates for secondary and tertiary education have also increased in all income groups (Figure 1c and Figure 1d). Gender equality has notably improved, with the ratio of girls to boys in primary and secondary education in low-income countries increasing from 74 percent to 90 percent over the same period.

However, education is still facing several important challenges in many economies. Despite the improvements, large gaps in enrollment rates remain. Enrollment rates in primary and secondary education are still low in a large number of developing economies and there is scope to increase enrollment in early childhood and tertiary education in many economies. What is more striking is the slow progress in learning. Children learn very little in many education systems of the developing world and many of them lack basic literacy and numeracy skills even after several years in school (World Bank 2017). Even in OECD countries, about 20 percent of students do not attain the baseline level of proficiency in PISA science, reading and mathematics tests and improvements have been slow (OECD 2016a). In addition, enrollment and outcome gaps between advantaged and disadvantaged groups are substantial (Figure 2; OECD 2016a; IMF 2017). The education systems also need to adapt to a fast-changing world with rapid technological advances and demographic shifts (OECD 2016b).

Figure 2. Disparities in Access to Education and Test Scores by Socioeconomic Status

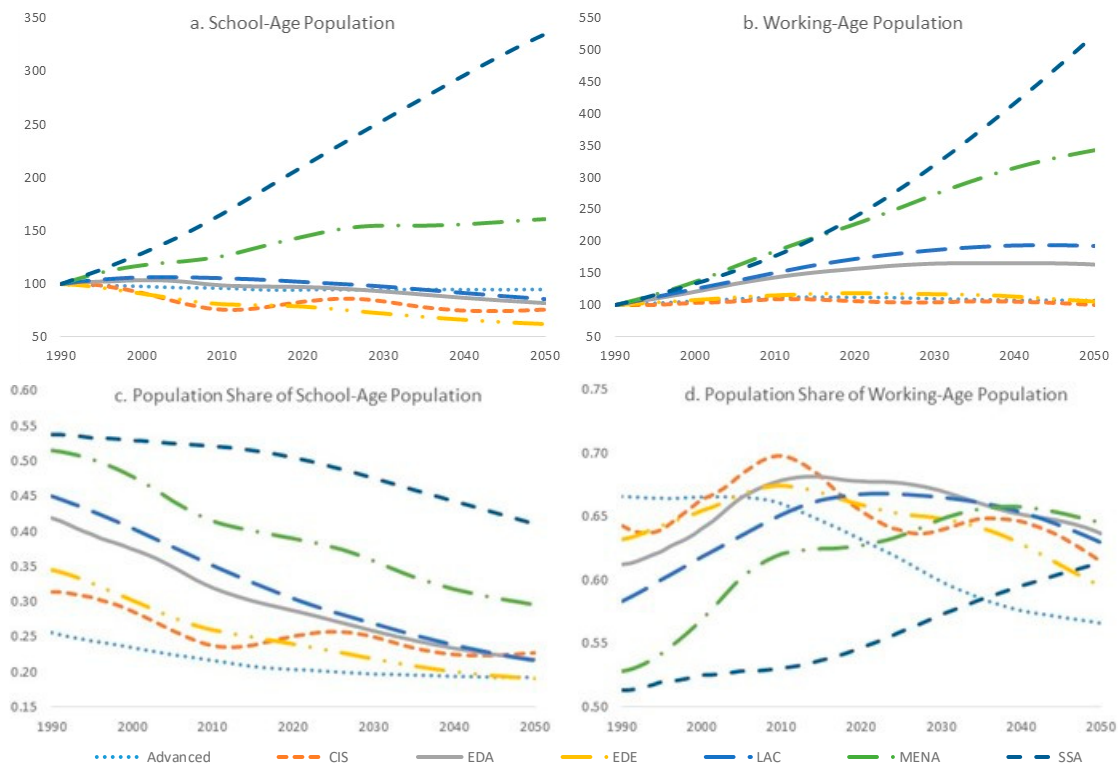


Sources: United Nations Educational, Scientific, and Cultural Organization (UNESCO); and IMF staff calculations.
 1/ The number of countries covered in each region are 6 in MENA, 4 in EDA, 3 in CIS, 9 in EDE, 35 in AE, and 10 in LAC. AE = Advanced Economies; CIS = Commonwealth of Independent States; EDA = Emerging and Developing Asia; EDE = Emerging and Developing Europe; LAC = Latin America and Caribbean; MENA = Middle East and North Africa; PISA = Program for International Student Assessment; SSA = Sub-Saharan Africa.

The demographic challenges vary substantially by region (Figure 3). In Sub-Saharan Africa (SSA) and Middle East, North Africa, Afghanistan, and Pakistan (MENA), school-age populations will continue to grow over the coming decades, highlighting the pressure to expand the school systems. This will lead to higher spending in the education sector, through both building new schools and increasing employment. In most other regions, especially Emerging and Developing Asia (EDA), Emerging and Developing Europe (EDE), and Latin America and the Caribbean (LAC), school-age populations will decline by over 15 percent by 2050. This suggests the potential need for school network consolidation and employment reduction in the education sector. In addition,

as populations age, the shares of both school-age populations and working-age populations will decline in most regions, which will put additional pressure to reduce employment in the education sector as the competition for workers across sectors intensifies. For example, while the school-age population will remain largely stable in advanced economies, the working-age population as a share of total population will decline from 64 percent in 2017 to 57 percent in 2050.

Figure 3. Trends of School- and Working-Age Population: 1990–2050



Source: United Nations.

Addressing many of these challenges requires continued public investments in education. However, as many countries are facing large fiscal pressures from high levels of public debt and competing spending needs from infrastructure, health and social protection, improving spending efficiency has become essential, which can help achieve better outcomes without increasing spending (IMF 2016). The literature typically finds large inefficiencies in the education sector and there is room for significant improvements (Grigoli 2015; Sutherland, Price and Gonand 2009). For example, the literature indicates that small (especially very small) class size—relative to moderate class size—is associated with little additional educational benefits, and realigning the number of teachers to the declining number of students in many economies could lead to significant fiscal savings with little effect on outcomes (Rivkin, Hanushek and Kain 2005; Chingos 2013; Glewwe and Muralidharan 2015; Coupé, Olefir, and Alonso 2016). There is also scope in many economies to reallocate spending toward disadvantaged students and schools, which can help improve both efficiency and equity (IMF 2017).

This paper presents a systematic approach to assess the efficiency and equity of public education spending, identify sources of inefficiencies and inequality, and formulate potential reform options. Moldova is chosen as an example because it is a low-income economy but also is facing some of the challenges by middle- and high-income countries such as the potential need to consolidate the school network and reduce employment in the education sector. In addition, Moldova has attempted various education reforms over recent years and has relatively good quality of data.

The rest of the paper is organized as follows. Section II presents the general approach and analytical framework; Section III provides an overview of Moldova's educational system and recent reform efforts; Section IV focuses on the efficiency of public education spending, while Section V focus on equity; Section VI illustrates the design of an effective reform strategy; and Section VII concludes with a discussion.

II. ANALYTICAL FRAMEWORK

This section discusses the key methodologies for evaluating the efficiency and equity of public education spending. The analytical framework combines international benchmarking with country-specific analysis (including microeconomic analysis based on household survey data).

A. Assessing Efficiency and Equality

International benchmarking of broad spending levels and composition provides a first check on spending efficiency. Comparisons of a country's spending level and composition with those of its peers—countries that are at a similar level of development or in the same region—can help identify spending areas where more thorough analyses are needed. This can be based on both economic (e.g., current and capital spending) and functional (e.g., levels of education) classifications of education spending. For example, if a country has high spending on secondary education, further analysis would be needed to understand whether the high spending is justified, for example, by a large school-age population or better education outcomes. If wage spending is high in the education sector, it would warrant a close examination of wage level and size of employment.

For basic levels of education (such as primary and secondary), efficiency frontier analysis (EFA) is often used to assess spending efficiency relative to that of the best performing countries. EFA relates the outputs (education outcomes such as school enrollment rates or test scores) to inputs (drivers of education outcomes such as education spending, income level and other socioeconomic factors). Efficiency scores from EFA indicates the relative efficiency of a country to that of the best performing countries and the potential for improvements in outcomes if the inefficiencies are eliminated. EFA, however, does not provide insights on the sources of inefficiencies. EFA typically is performed at a given level of education for which both outputs and inputs are clearly defined. In addition, because a single outcome indicator may not fully capture the overall performance (for example, enrollment rates do not incorporate quality of education and test scores do not reflect coverage), results should be interpreted with caution.

For tertiary education, outcomes and efficiency are more difficult to assess. The degree of labor market mismatches (qualification mismatch, field of study mismatch, and skill mismatch) can help reveal inefficiencies in the education systems (OECD 2014a):

- Qualification mismatch arises when workers have an educational attainment that is higher or lower than that required by their job.
- Field of study mismatch arises when workers are employed in a different field from what they have specialized in.
- Skill mismatch arises when workers have a level of skills that is higher or lower than that required by their job.

Qualification mismatch may indicate over or under investment in tertiary education and field of study mismatch may indicate misallocation of resources among different fields of study.

Return to education measures the rate of return to investment in education and is conceptually the most direct and informative indicator of education efficiency. Different returns to education could be estimated depending on whether the return is based on private earnings or social benefits (including earnings, taxes, and externalities) or is for private, public or total investment. The return to education indicator to measure public spending efficiency should be primarily based on social benefits from public investment. Social benefits from total investment could also be useful, particularly if at least some private investment is driven by laws and regulations such as mandatory school enrollment. Return to education, however, is often difficult to estimate and is not readily available.¹ In addition, because of lagged effect of education on earnings, the return to education estimates more likely reflect past rather than current spending efficiency.

Disparities in education outcomes (e.g., school enrollment rates and test scores) by socioeconomic backgrounds are strong indicators of potential inequality in public education spending. While education outcomes are determined by many factors in addition to public education spending (such as family background), public education spending plays a key role in achieving universal access to basic education and ensuring equal opportunity to attending tertiary education. Intergenerational mobility—for example, measured as the correlation of earnings between parents and children—is another useful indicator.

Benefit incidence analysis can help directly assess inequality in public education spending. It estimates the share of public education spending captured by households at different levels of income. Benefit incidence of public education spending often varies substantially across countries, reflecting differences in enrollment rates at different levels of education, differences in resource allocation to schools that are attended by children from different socioeconomic backgrounds, and differences in designs of subsidy and transfer programs in the education sector. Existing studies indicate that, on average, public education spending tends to be pro-poor in advanced economies (except for tertiary education), but pro-rich in emerging and low-

¹ The World Bank has published estimates on private return to education for 139 countries (Montenegro and Patrinos 2014). Even in this report, because of data limitations and for simplicity, private investment only includes forgone earnings and other costs (such as tuitions, fees, and school supplies) are assumed to be zero.

income countries (Paulus, Sutherland, and Tsakloglou 2010; Davoodi, Tiongson, and Asawanuchit 2010; Lustig and others 2011).

B. Identifying Sources of Inefficiencies and Inequality

Wage spending typically accounts for a large share of education spending, and wage levels and the size and composition of employment are often sources of inefficiencies. International benchmarks—such as student-teacher ratio or the ratio of teaching to non-teaching staff—typically provide good anchors on employment level and composition of teaching staff and non-teaching staff. Further analysis can examine whether these high ratios are driven by the number of schools (too many small schools), small class size, low workload (teaching hours) or functions that may be unnecessary. The economic literature, including studies by the OECD (such as *Education at a Glance*) and the World Bank (education sector public expenditure reviews), can also provide useful guidance in these areas.

In determining the right wage level, international benchmarking based on, for example, the ratio of total compensation to per capita GDP or the ratio of total compensation in the education sector to that in the manufacture sector—is likely insufficient. Microeconomic analysis using labor force survey data can provide important insights into public wage premiums or deficits. One important advantage of microeconomic analysis is that, in addition to the averages, it can also examine wage levels by various factors such as age, skill level, and type of position.

International benchmarking can provide useful guidance on spending on goods and services, and capital spending in the education sector.² On subsidies and transfers in the education sector, it is important to look into the specific designs of these programs including the rationales, targeted population (e.g., means tested or universal) and methods of delivery (e.g., cash or in-kind). Microeconomic analysis of survey data—such as those from household expenditure surveys—can help inform the efficiency and inequality of these programs: whether the benefits reach the targeted population and the distributional impacts of these programs.

C. Designing an Effective Reform Strategy

An effective reform strategy needs to balance its implications for efficiency, equity, and fiscal cost. It should also reflect a country's specific economic conditions and social preferences. When administrative capacity allows, a targeted approach would in general lead to lower fiscal cost and better equity. It could also improve efficiency of public spending in the sense that public resources go to the students most in need while the better-off families have the ability to increase private spending to offset the reduction in public spending for their children. The design, however, should also take into account the potential labor market disincentives of these policies.

² As public investment is typically governed by the same laws and procedures in education as in other areas, the efficiency of overall public investment is typically assessed, for example, through the Public Investment Management Assessment (PIMA) (Jirasavetakul and Kirabaeva 2017; IMF 2015). There is thus little additional value from specifically assessing the efficiency of public investment in the education sector.

Fiscal sustainability is an important factor in determining the appropriate level of education spending. When a country is fiscally stressed, and fiscal consolidation is required for long-term fiscal sustainability, reform targets such as student-to-teacher ratio may need to deviate from international benchmarks. Even for countries on the efficiency frontier, it does not necessarily mean that the current resource allocation is optimal from the perspective of the entire public sector, which requires that the marginal social benefit from education spending equals the marginal social benefit from other public spending and the marginal social cost of financing the spending. While the resources in the education sector may be used in the most efficient way possible, it could be the case that reallocating resources from education, for example, to health could lead to higher social welfare.

An effective reform strategy should go beyond a narrow focus on spending policies—the focus of this paper—and getting incentives right is critical. For example, the adoption of conditional cash transfers in social assistance can help incentivize school enrollment (e.g., Brazil and Mexico). Better selection and retention policies can result in better teachers and education outcomes. Financial and non-financial incentives to teachers have been shown to be effective in promoting effective learning and the design details are the key to success (World Bank 2017). Korea has improved the quality of education for disadvantaged students by providing various incentives for teachers to work in high-need schools, including additional pay, less instructional time, additional credit towards future promotion, and the ability to choose next school assignment (OECD 2014b).

III. MOLDOVA'S EDUCATIONAL SYSTEM AND RECENT REFORMS³

Moldova has a predominantly public education system. Early childhood education, primary and secondary education, and secondary vocational education (aged 3–18) is almost exclusively provided by the government under the administration of Ministry of Education (MOE) and local governments. Some local governments also provide childcare services for children of 0–2 years old. Local governments are responsible for operating schools and maintaining school facilities, and the support of local governments is thus crucial for the success of education reforms. Post-secondary education is also dominated by public vocational colleges and universities, with private schools enrolling only a small share of the student population. Student meal programs are available in early childhood, primary and secondary education, and a large share of students in post-secondary education receive tuition support and a stipend.

Most funding comes from state and local budgets. Local governments receive transfers from the central government and provide additional funding from their own revenues or the discretionary transfers of the central government. Additional sources of funding include donations and fees which account for only a very small portion of total education spending. For example, in the 2016 budget, out of the 6.9 percent of GDP in total spending, 6.6 percent of GDP was from the central government, with 4.7 percent transferred to local governments. Only 0.3 percent of GDP was raised by local governments from their own revenue sources.

³ The GDP estimates used in the paper do not incorporate the revisions by the National Bureau of Statistics in 2018.

Public education spending in Moldova has gradually increased from just below 6 percent of GDP in 2000 to over 9 percent in 2010 but has since declined (Table 1). Wage bill spending accounts for the largest share of education spending. Wage levels and employment numbers are typically centrally determined through norms. The wages of teachers and non-teaching staff consist of a base pay and supplements. The base pay is determined by pay grades, which reflect years of experience and education attainment, among others. In addition, teachers are entitled to various supplements, such as supplement for tasks with high levels of responsibilities, management allowance, years-in-service supplement reflecting qualifications, years of service, and levels of responsibility. Non-teaching staff can also receive supplements. The number of teachers and non-teaching staff is determined by, for example, norms on class size, teaching hours, and non-teaching staff positions.

Table 1. Public Education Spending on Education

In percent of GDP	2010	2011	2012	2013	2014	2015	2016 budget
Functional Classification							
Total public expenditure in education	9.1	8.3	8.4	7.0	7.0	7.0	6.9
Early childhood education	1.8	1.7	1.9	1.7	1.8	1.9	1.6
Primary and secondary education	4.8	4.3	4.3	3.7	3.7	3.5	3.7
<i>of which secondary vocational education</i>	<i>0.4</i>	<i>0.4</i>	<i>0.4</i>	<i>0.4</i>	<i>0.3</i>	<i>0.6</i>	<i>0.4</i>
Post-secondary education, of which:	1.8	1.7	1.7	1.1	1.0	1.0	1.0
<i>Vocational colleges</i>	<i>0.5</i>	<i>0.4</i>	<i>0.4</i>	<i>0.4</i>	<i>0.4</i>	<i>0.4</i>	<i>0.4</i>
<i>Universities</i>	<i>1.4</i>	<i>1.3</i>	<i>1.2</i>	<i>0.7</i>	<i>0.6</i>	<i>0.6</i>	<i>0.6</i>
Other educational institutions	0.6	0.5	0.5	0.5	0.4	0.4	0.5
Administration	0.0	0.0	0.0	0.1	0.1	0.0	0.1
Economic Classification							
Total public expenditure in education	9.1	8.3	8.4	7.0	7.0	7.0	6.9
Current expenditure	9.0	8.2	8.3	7.0	6.9	6.9	6.8
<i>Compensation</i>	<i>3.8</i>	<i>3.8</i>	<i>3.7</i>	<i>2.6</i>	<i>2.5</i>	<i>2.6</i>	<i>2.6</i>
<i>Goods and services (incl. maintenance)</i>	<i>2.4</i>	<i>2.1</i>	<i>2.2</i>	<i>2.4</i>	<i>2.3</i>	<i>2.1</i>	<i>2.3</i>
<i>Other current expenditure (incl. scholarship)</i>	<i>2.8</i>	<i>2.3</i>	<i>2.3</i>	<i>1.9</i>	<i>2.1</i>	<i>2.2</i>	<i>1.9</i>
Capital expenditure	0.1	0.1	0.1	0.1	0.1	0.0	0.1

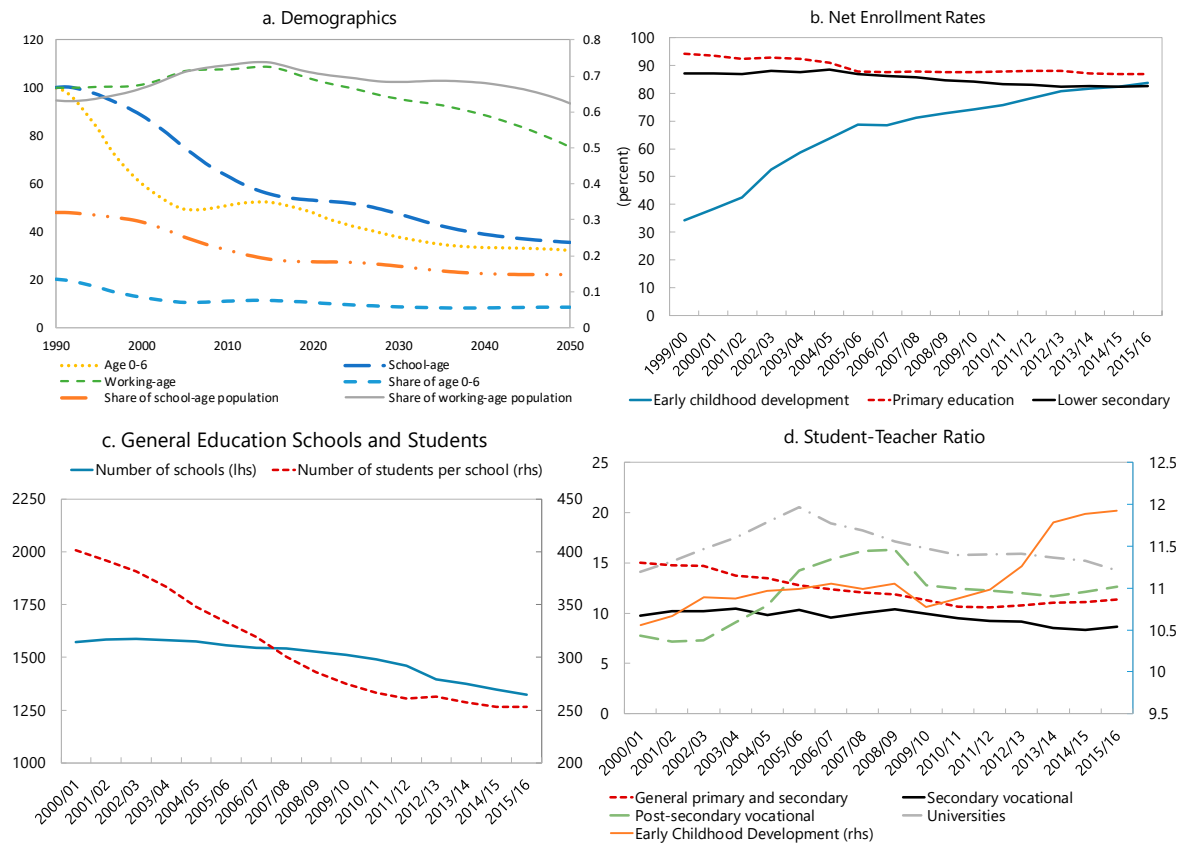
Source: Moldovan authorities.

Note: The reduction in public spending on universities from 2012 to 2013—correspondingly in total spending—reflects a structural break in the data. Tuition paid by students was no longer included in the revenue and expenditure of general government budget starting 2013, as a reform was introduced to increase the autonomy of public universities and consolidate all the previous budgetary financing into a block transfer. This led to a decline in education spending for universities, and also a decline in compensation and an increase in spending on goods and services as wage bill spending for universities was reclassified as other goods and services.

The school-age population has been declining rapidly in Moldova, owing to both low fertility and emigration. Moldova's population up to 18 years old declined by 36 percent during 2000-2016, with an even sharper drop of 43 percent in the general education age group (6-18 years old) (Figure 4a). Enrollment rates in primary and secondary education have been high in Moldova, and the slight declines during this period are likely driven by emigration of the better educated to more developed countries. While education outcomes as measured by PISA test scores were poor in 2009, they have improved by 2015, with an increase in math, reading and science of 23, 28, and 15 points respectively (OECD 2016a). Enrollment rates, on the other hand, have increased

significantly in early childhood education, due to efforts to expand early childhood education (Figure 4b).⁴

Figure 4. Moldova: Demographics, Enrollment and Student–Teacher Ratio



Source: Moldovan authorities and United Nations.

As the school network in general education did not fully adjust to the demographic shift, the education sector is characterized by an oversized network of increasingly small schools and a high number of teachers and non-teaching staff. For example, in 2013, the median school operated at about half the capacity for which it was designed (this number is lower in rural areas). Despite efforts to consolidate schools, the average number of students per school has been constantly declining, by around 40 percent between 2000 and 2016 (Figure 4c). Student-teacher ratios have also edged lower, except in early childhood education (Figure 4d). A high proportion of the education budget goes toward the financing of personnel expenditures and maintenance costs of school buildings including expenditures on heating and utilities, crowding out much needed quality enhancing investment in capital and educational materials (World Bank 2013a).

⁴ Early childhood education has expanding and includes nursery schools for children up to 3 years old, and mandatory preschools for children of 3–6 years old (including some 7 years old). According to the Education Code in Moldova, education for children below 3 years old should be carried out in the family, while receiving budget support. However, upon parents' request, local governments may provide access to nursery schools.

It has become clear after the global financial crisis that reforms were urgently needed in the education sector because of its high spending and inability to deliver quality education in an efficient manner. The need for reform was further reinforced by the sharp drop in revenues during the economic downturn and the severe fiscal distress the government was facing. In this context, several key reforms were introduced in the education sector—as part of the broader structural reform agenda—to control spending and improve spending efficiency.

Per-student financing was introduced to improve the resource allocation in light of a declining student population (World Bank 2013a). Piloted in 2010 and formally adopted in 2013 for all general primary and secondary education, the formula stipulates that each school will first receive a fixed amount, and then additional funds will be provided based on the number of students. For example, in 2016, each school was budgeted to receive a fixed amount of 449,668 lei and 9,575 lei per student.⁵ Of the formula-based transfers, the per-student component on average accounted for about 85 percent. Per-student transfers were initially calculated to reflect historical norms and then indexed to a combination of CPI and average wage increases. Such a formula provides incentives for local governments to consolidate schools and improve efficiency. The government plans to expand formula-based financing to early childhood education, vocational education, and public universities.

Two key administrative reforms were adopted to promote more efficient decision-making. The responsibility of general education was moved upward from municipalities to rayons in 2012, which have more scope to consolidate schools within a larger jurisdiction. In addition, more autonomy has been given to school principals, for example, to fire and hire teachers and non-teaching staff. This can help facilitate changes within schools.

Efforts to consolidate the primary and secondary school network contributed to a reduction in spending and improvement in efficiency. Based on a feasibility study conducted in 2010, 283 primary and secondary schools were classified as “clear-cut” cases to close down.⁶ During 2010–2015, the authorities reduced the total number of primary and secondary schools by 166, or 11 percent of total general educational institutions. This, in turn, made it feasible to reduce the number of teachers and non-teaching staff with little negative effects on quality of education (Figure 5). As a result, spending on primary and secondary education declined from 4.4 percent of GDP in 2010 to 3.0 percent in recent years (Table 1).

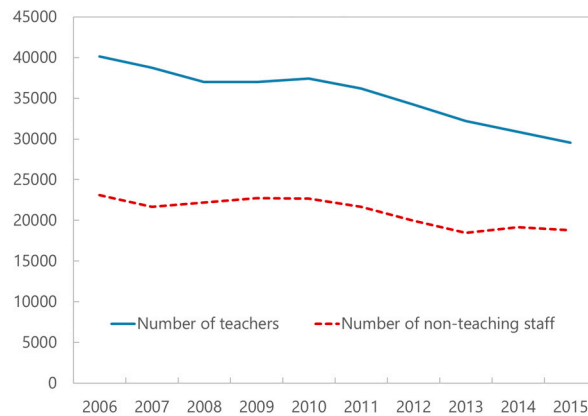
An Education Management Information System (EMIS) and school report cards have been implemented in the education sector since 2013. Three rounds of school cards with information about the institutions’ budgets and comparative performance have been developed and disseminated. The EMIS makes it possible for the Ministry of Education to make more accurate and informed decisions and to monitor progress in reforms; for schools to compare their performance with district averages and respond accordingly in order to improve their rankings;

⁵ 1 USD was about 20 Lei in 2016. It is required that 95 percent of the formula-based financing should be directly transferred to schools, while the remaining 5 percent to a fund managed by local governments to finance centralized services such as accounting.

⁶ The study was funded by the World Bank and the government of Moldova: “Policy Options to Support the School Network Optimization Process in the Republic of Moldova: Feasibility Study,” unpublished report.

and for parents to be better informed about institutions' performance and be more actively involved in decision-making by schools.

Figure 5. Number of Teachers and Non-Teaching Staff in Primary and Secondary Education



Source: Moldovan authorities.

Tightening test security was another reform initiative. To that end, enhanced security measures—such as video surveillance, access checks, and test coding—were introduced during examinations including high school graduation exam (BAC exam). Consequently, the share of students who passed the BAC exams dropped substantially in 2013 (Table 2). This has made the education system more credible and students are more motivated to learn in order to pass the exams.

Table 2: Moldova: Ratio of Students Who Passed the BAC Exams

	2010	2011	2012	2013	2014	2015
Math	99.3	98.4	96.7	71.1	51.7	66.4
Language	94.7	95.4	92.3	92.5	92.8	94.9

Source: Moldovan authorities.

Note: Surveillance was tightened in 2013, resulting in a sharp decline in the ratio of the math exam. The ratio for math in 2014 was even lower, because students who had failed in previous years could take the exam again.

Though full evaluations of these reforms are still not available, early evidence suggests that the reforms have been a success. The number of schools has been reduced; the rapid declines in student-teacher ratios have been slowed; public education spending has lowered; and education outcomes have been improving. However, questions remain on whether there is still room to improve the efficiency and equity of the education sector in Moldova; if so, what are the sources and what reform measures are needed.

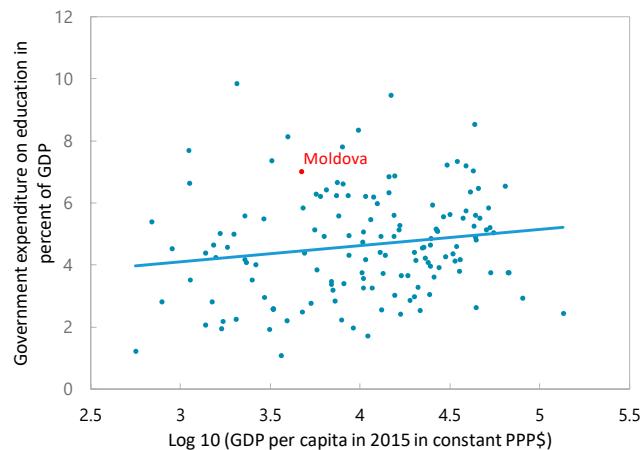
IV. ASSESSING EFFICIENCY OF THE EDUCATION SECTOR

This section starts with an assessment of total education spending and then examine the wage levels in the education sector as they are governed by a single pay scale, with the rest of section focusing on employment and non-wage spending at each level of education.

A. Total Spending Level and Composition

Moldova's public educational spending remains high, despite recent reform efforts. At 7 percent of GDP in 2015, Moldova's government expenditure on education is higher than that of most countries, in particular those with a similar level of income (Figure 6). It is also much higher than the average public education spending in EU countries, which was 4.9 percent of GDP in 2015. On composition of spending, Moldova spends more than the averages of its peers on all levels of education, especially early childhood, primary, and secondary education. In terms of economic classification, high public education spending in Moldova is mostly driven by compensation of employees and other current expenditure including goods and services (Figure 7). This suggests potential inefficiencies in all these areas.

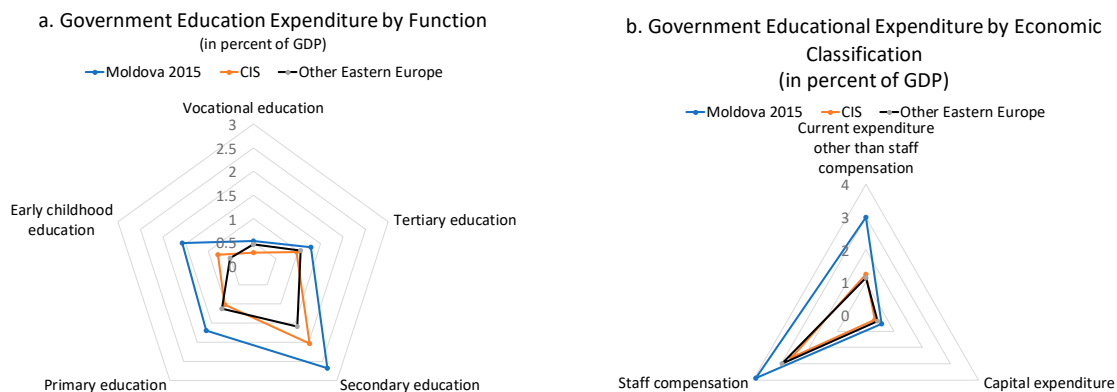
Figure 6. Public Spending on Education



Source: World Bank, Moldovan authorities, IMF staff calculation.

Note: Moldova's government expenditure on education is as of 2015, others are latest value available.

Figure 7. Composition of Public Education Spending

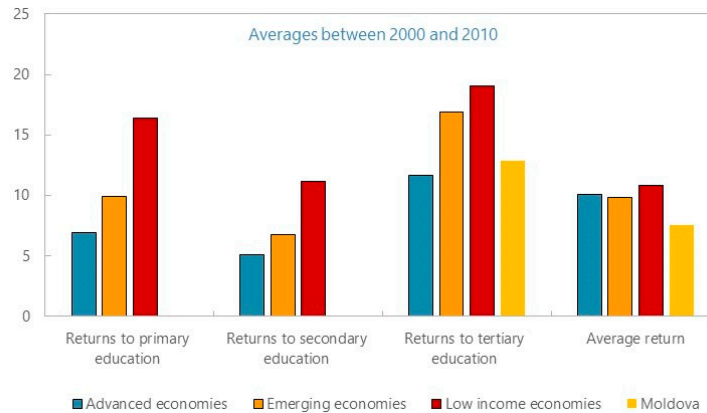


Source: World Bank Education Statistics, IMF staff calculation.

Note: On the chart by functional classification, CIS includes Moldova 2015, Ukraine 2013, Russian Federation 2012, Kyrgyz Republic 2013, Georgia 2012, Armenia 2013, and other Eastern Europe includes Czech Republic 2012, Hungary 2012, Latvia 2013, Lithuania 2012, Poland 2012, Romania 2013, Serbia 2011, Slovak Republic 2013, Slovenia 2012. On the chart by economic classification, CIS includes Russian Federation 2012, Moldova 2015, Armenia 2015, Azerbaijan 2014, Kazakhstan 2015, Kyrgyz Republic 2014, and other Eastern Europe includes Estonia 2014, Lithuania 2013, Albania 2013, Croatia 2013, Czech Republic 2013, Hungary 2014, Latvia 2014, Poland 2014, Romania 2014, Serbia 2014, Slovak Republic 2014, Slovenia 2013.

Return to education can also indicate potential inefficiencies in the education sector. Private returns to an additional year of schooling in Moldova appear to be significantly lower for both tertiary education and overall education than the averages of other emerging and low-income countries (Figure 8). Given generous public support to the education system including tertiary education, public returns to education could be even lower than those of other countries. This suggests inefficiencies in the education system and/or the labor market. Availability of estimates for primary and secondary education could help clarify the exact sources of low average return in education in Moldova.

Figure 8. Private Return to Education



Source: Montenegro and Patrinos (2014).

Note: Data for Moldova are based on estimates for 2002 and 2005 and estimates for primary and secondary education are not available.

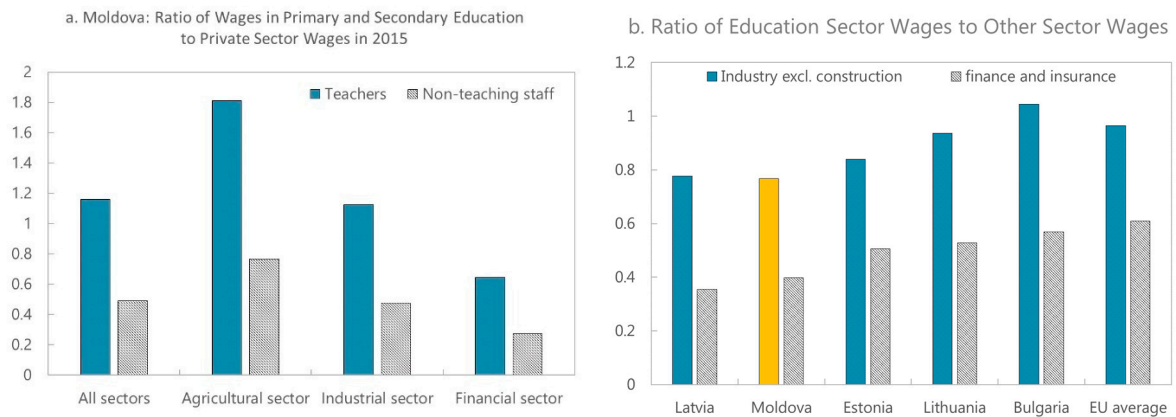
B. Wage Premiums in the Education Sector

Given that wage levels are a key determinant of the wage bill which accounts for nearly three quarters of public education spending and that the role of wage levels in attracting and retaining high quality teachers, determining the right wage levels is critically important. In Moldova, there is also the general perception that teachers and non-teaching staff are poorly paid based on simple cross-country comparisons with other European countries in level terms. These comparisons, however, do not fully take into account the level of economic development and the specific labor market conditions in Moldova. Instead, here we compare wage levels in the education sector with those in other sectors in Moldova and relative measures of wage levels in Moldova with those in other countries. Furthermore, we use Mincer regressions to estimate wage premiums in the education sector after adjusting for worker characteristics such as education, age, gender and whether residing in rural or urban areas (see Box 1 for more details).

Simple within- and across-country comparisons do not provide a clear indication whether the wage levels in the education sector are low or high (Figure 9). Teachers' wages in Moldova are 16 percent higher than economy-wide average, 12 percent higher than industrial-sector average, but substantially lower than the financial sector average. Internationally, average wages in the education sector in Moldova appear comparable to those in Latvia, but lower than the EU averages and those in regional comparators including Estonia, Lithuania and Bulgaria. However, part of the low ratios could be due to the high share of non-teaching staff in the education workforce, whose wages are much lower than those of teachers. Further analysis (section E)

presents estimates of wage premiums in the education sector in Moldova, based on the Labor Force Survey.

Figure 9. Wage Levels in the Education Sector



Source: Moldovan authorities, and Eurostat.

The Mincer regressions compare wages of workers in the public education sector (the LFS does not distinguish teachers from non-teaching staff) with wages of all workers in the private sector (it is not feasible to compare wages of workers in public education with those in private education, as the education sector is predominantly public in Moldova). Two sets of results are presented, depending on whether self-employed and unemployed are included in the regression analysis. The top panel does not include self-employed and unemployed because their wages are not observed in the LFS. The results indicate that there has been a wage deficit in the education sector though the deficit has been declining over time. However, there are large variations by education level and age. There is little wage deficit for the better educated and there is even a wage premium for those above age 35 in some years. The less educated is severely underpaid based on this specification—by 40 percent on average—with an even larger wage deficit for the young (Figure 10a).

If individuals with similar ability are indeed paid 40 percent less in the public education sector, how could this have been sustained? There could be several explanations. First, the controls in the Mincer regressions are limited to observables and some factors are omitted. For example, education and experiences may not fully capture ability, and working hours and intensity are not reflected due to data limitations. Second, the theory of compensating differentials suggests that public education employees are expected to receive lower wages as they enjoy other non-pecuniary benefits such as a higher degree of job security and relatively more generous pension schemes (Moore and Raisian, 1991). Third, there are limited number of formal private sector jobs, in particular given high unemployment. Alternatives for working in the public education sector also include being self-employed or unemployed.

Figure 10b shows the results of a second set of Mincer regressions, including those working in the informal sector and the unemployed and assuming their salaries are the legal minimum wage in the private sector (this could be a conservative assumption as income in the informal sector and reservation wage for the unemployed could be below the legal minimal wage), the wage

deficit declines substantially, from 40 to 25 percent for the less educated.⁷ Similarly, wage deficit is larger for the young than for the old.

Box 1. Regression Analysis of Wage Premiums in Education

Using microdata from Moldovan Labor Force Surveys for 2013-2015, a wage premium (or deficit) for the public education sector can be estimated with the Mincer wage regression:

$$\ln W_i = \alpha + \gamma \cdot D_i + \beta \cdot X_i + \varepsilon_i, \quad i = 1, \dots, N$$

where W_i denotes wage, D_i is a dummy variable indicating whether an individual work in the public education sector, and X_i is a vector of control variables, including age, educational attainment, gender, and an urban-rural dummy. After controlling for a range of individual characteristics, coefficient γ represents the wage premium or deficit—which cannot be explained by observable individual characteristics and is assumed to be solely due to the sector of work.

The dependent variable is the log of net monthly wages (after deducting taxes and social and health insurance contributions). The control variables include a gender dummy, age and age-squared, education dummies (which group individuals into those with primary, gymnasium, secondary vocational, secondary general, and higher education). The regressions, however, do not control for the number of hours worked, and this may lead to biased estimates if teachers on average work more or less than private sector workers. The purpose of the Mincer regressions here is to determine how wage levels for workers in the education sector compare to the wage levels set by the labor market. The regressions therefore exclude other public-sector workers because their wage setting is governed by similar systems as the education sector and is not market-based.

The average level of educational attainment among self-employed workers and the unemployed is lower than that of wage-employed workers. In 2015, around 60 percent of self-employed workers and the unemployed attained secondary or high school education (and most of the rest attained vocational education). Meanwhile nearly half of wage-employed workers attained at least college and/or university education.

The results are robust to extending the sample of wage-employed workers to include part-time workers, and/or the sample of private workers to include workers in SOEs, foreign companies, and other less-comparable economic sectors such as agricultural, mining, and the financial sector.

Figure 11 presents the results when the sample is limited to men only. The findings indicate that wage deficits are in general similar for the highly educated between men and women, and larger for men than for women among the less educated. This is consistent with the theory that women may be subject to strong discrimination in the private sector, and paid relatively less in the private sector, leading to smaller wage deficits. The results again support the finding that wage levels in the education sector do not appear high in Moldova.

⁷ The Minimum wage is in fact quite high in Moldova. It is higher than the minimum pay in the public sector and there are perceptions that the private sector often does not fully comply with the minimum wage law.

Figure 10. Wage Premiums of the Educational Sector over the Private Sector¹

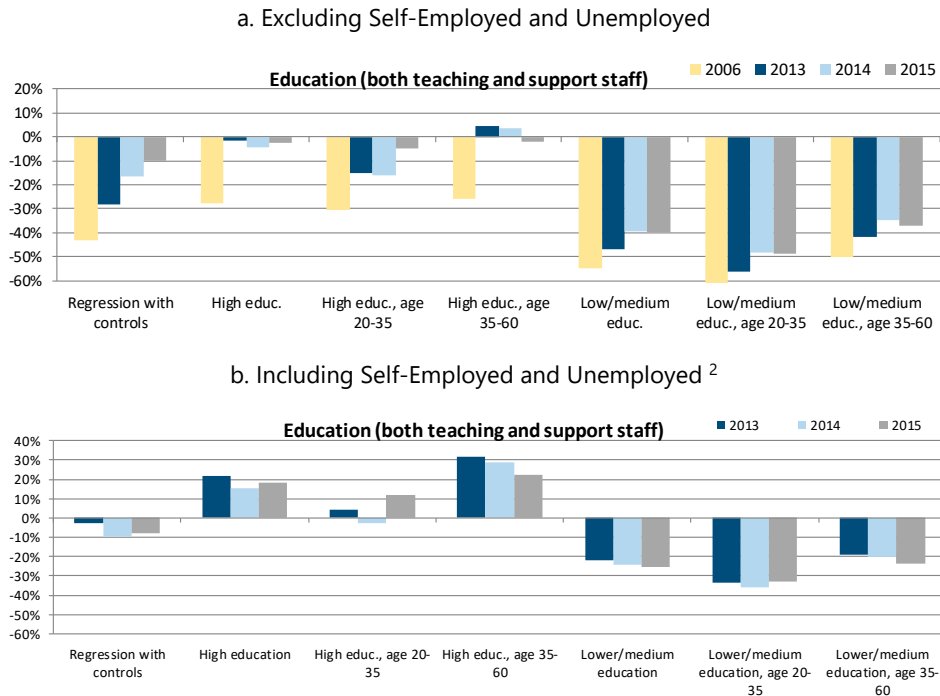
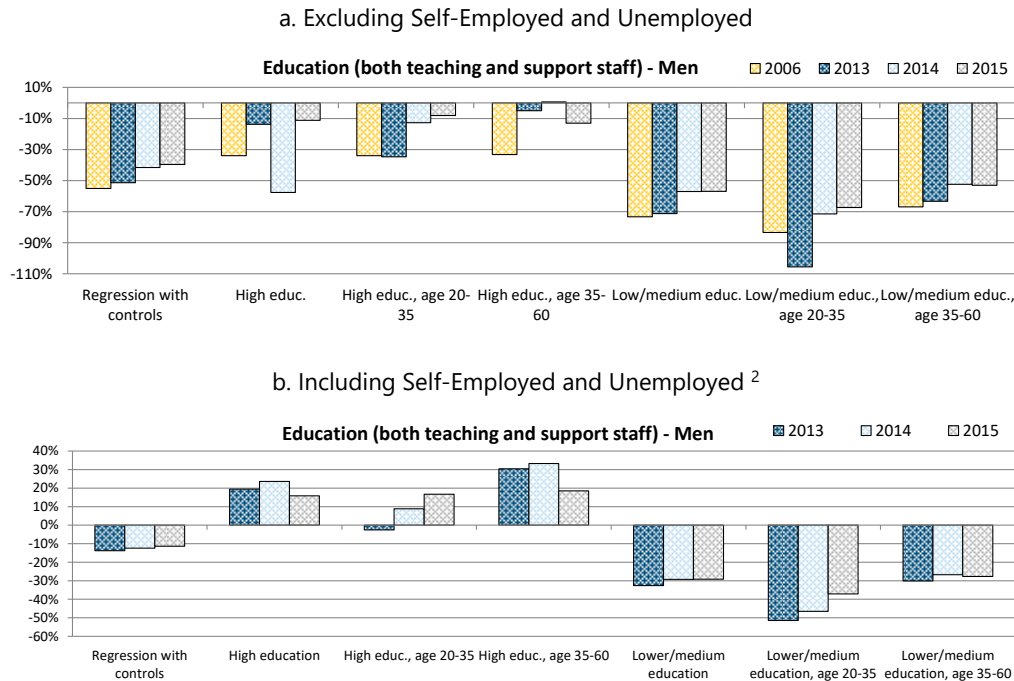


Figure 11. Wage Premiums of the Educational Sector over the Private Sector – Men¹



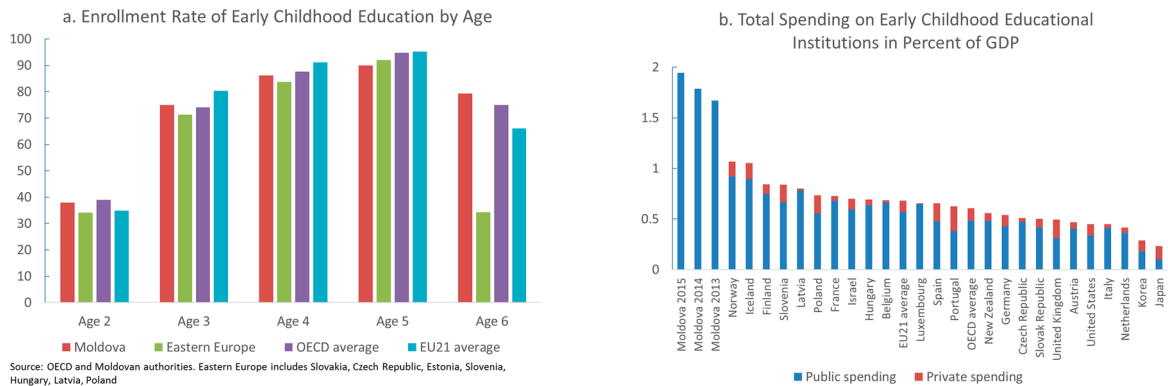
Source: Labor Force Surveys 2013-2015, and IMF staff calculations. Premium estimates for 2006 (in Panel a) are from the 2011 IMF TA report on expenditure rationalization in Moldova.

Note: 1/ As the LFS does not differentiate labor force in different levels of education, the analysis thus covers the whole public education. 2/ Self-employed and unemployed workers are included, and their wages or reservation wages are assumed to be the legal minimum wage in the private sector.

C. Early Childhood Education

Spending as a percent of GDP on early childhood education in Moldova is substantially higher than that of other countries while enrollment rate of 2–6 years old is similar. Part of the high spending could be attributed to the broader age coverage of early childhood education, from 0- 6 years old (including some 7 years old) in Moldova instead of 2-6 in other countries (Figure 12). This, however, may only explain a small share of the high spending, as 0-2 years old account for about 11 percent of the pre-school student population and 7 years old or above account only for about 1.7 percent.

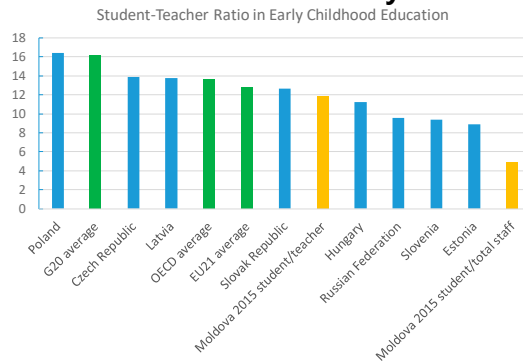
Figure 12. Enrollment and Spending in Early Childhood Education



Source: World Bank, Moldovan authorities.

Note: Moldova's data are for 2015, while data for other countries are based on the latest available.

Figure 13. Student-Teacher Ratio in Early Childhood Education



Source: World Bank, Moldovan authorities.

Note: Moldova's data are for 2015, while data for other countries are based on the latest available. For Moldova, both student-teacher ratio and student-total staff ratio are presented, where total staff include teachers and non-teaching staff. For other countries, however, it is unclear whether non-teaching staff are included in the calculation of the ratios.

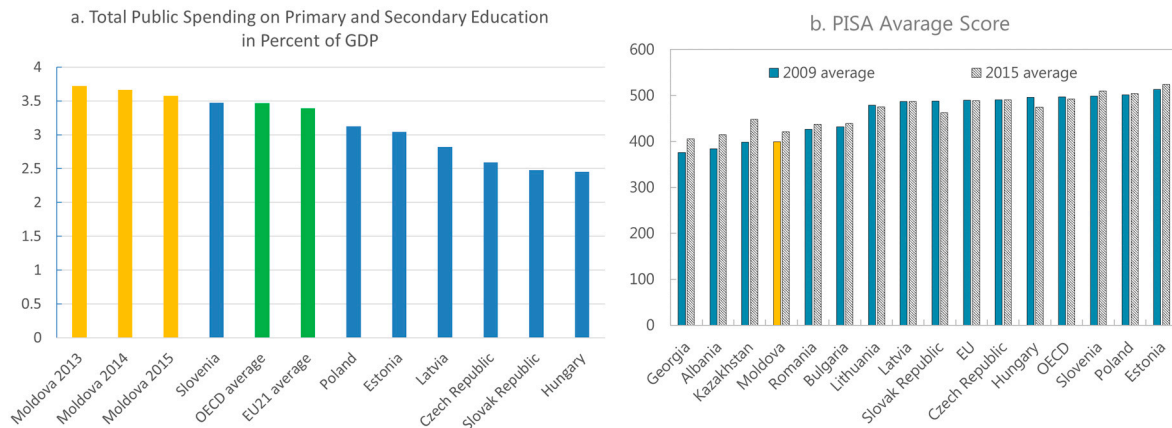
Little cost-sharing from parents and high employment likely explain the bulk of the high spending. In Moldova, parents pay no tuition and only contribute 30 percent of meal costs, and therefore private spending in early childhood education is negligible. In EU and OECD countries, the average shares of private spending are 16 and 20 percent respectively, with the highest share of 39 percent in Portugal. While the coverage of 0-2 years old may contribute to low student-teacher ratio and high non-teaching staff-teacher ratio in Moldova as children in these ages

require more intensive care, its impact is likely limited, given the small share of this age group in pre-school student population. The analysis of wage levels (in section B) does not indicate high wages in the education sector in Moldova, suggesting that high employment are likely the main source of high spending and inefficiency. Additional data on the schools and staffing for the 0-2 age group can help pin point the exact source and degree of inefficiencies in early childhood education in Moldova (Figure 13).

D. Primary and Secondary Education

Moldova's spending on primary and secondary education is high. At 3.5 percent of GDP in 2015 including secondary vocational education, Moldova's spending is higher than EU and OECD averages and that of peer countries (Figure 10). However, education outcomes are still relatively poor (Figure 14). The 2009 PISA results indicate that the 15-year-olds tested in Moldova lagged behind their peers, and students in Moldova were trailing behind those of OECD countries by around 2 years of schooling (World Bank 2013a). Moldova performed better in all three subjects—math, reading and science—in the 2015 PISA, with an average improvement of over 5 percent.

Figure 14. Public Spending and Outcomes in Primary and Secondary Education



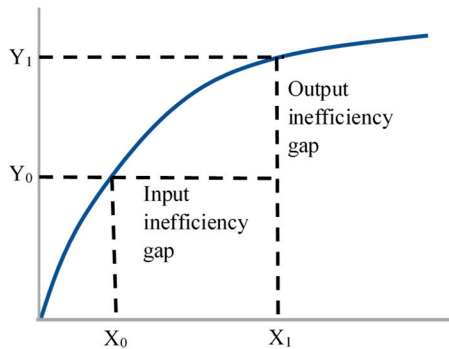
Source: Moldovan authorities, OECD and the World Bank. Note: PISA average is the average score of reading, math, and science, and each of the tests shows a very similar pattern.

Efficiency frontier analysis—as detailed in Box 2 and using stochastic frontier analysis while controlling for per capita GDP in PPP terms—suggests that there is ample scope to improve the efficiency of primary and secondary education in Moldova. When PISA test scores are used as the measure for outcome, Moldova ranks around the median and the average PISA scores could be increased by 14 points if the inefficiencies are eliminated (Figure 15).

The oversized school network is one of the key sources of inefficiencies. As the student population rapidly declined over the past two decades, the school system failed to adjust accordingly and consequently many schools are running under capacity. This has led to high personnel, maintenance and utility costs. As only a fraction of the primary and secondary schools identified as clear-cut cases for closure in the feasibility study has been closed and it is potentially cost-effective to consolidate schools beyond the clear-cut cases in particular due to the continued decline in student population since 2010, there is still large scope to further reduce the school network in primary and secondary education.

Box 2. Efficiency Frontier Analysis in Education

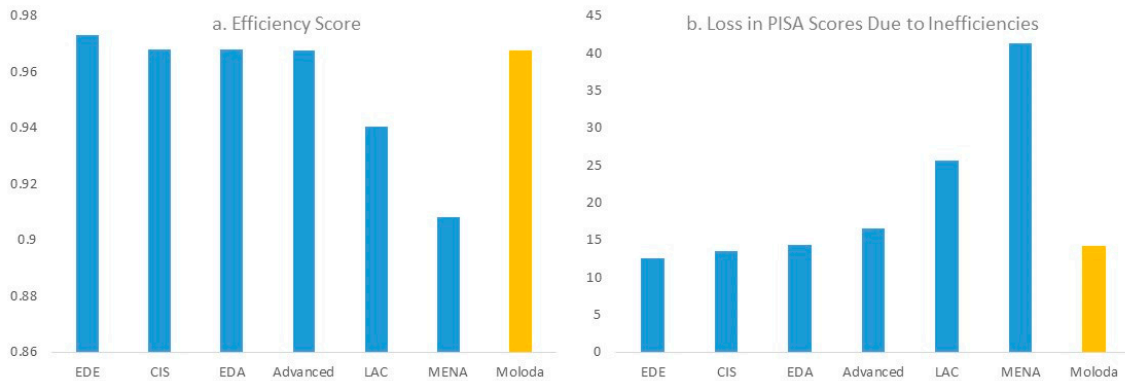
Efficiency frontier analysis (EFA), in this case, compares countries in their efficiencies of achieving education outcomes. The method is based on a production function approach which links inputs (in the case of education, such as public education spending, private education spending, and level of development) and outputs (such as school enrollment rates and test scores). An efficiency frontier is identified by the best performing countries, that is, countries that achieve the best education outcomes with same levels of inputs (output-oriented with output-efficiency gap $Y_1 - Y_0$) or countries that achieve the same outcomes with the least costs (input-oriented with input-efficiency gap $X_1 - X_0$). The efficiency frontier can be estimated using both parametric (such as stochastic frontier analysis or SFA) and nonparametric methods (such as data envelope analysis or DEA), with each having its advantages and disadvantages (Kapsoli and Teodoru 2017). For example, nonparametric methods are often difficult to converge when the number of inputs is more than two.



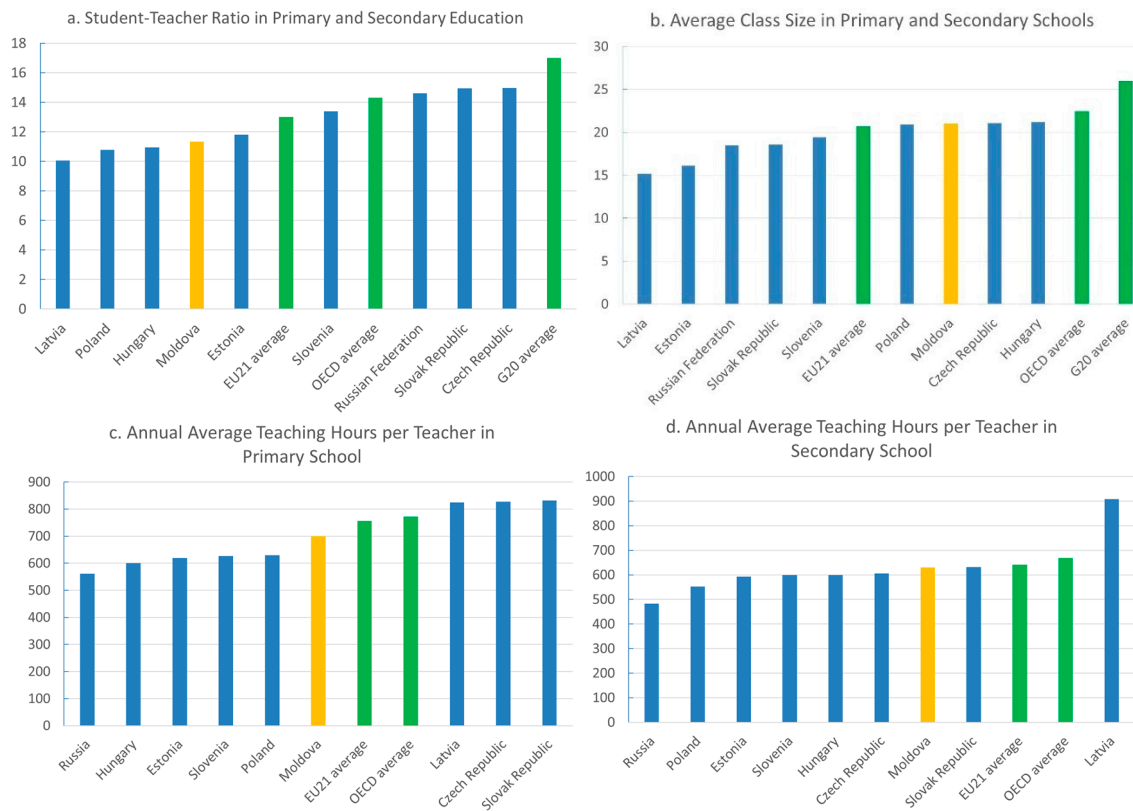
The precise estimation of input-oriented EFA requires the costs of inputs which are typically not available in the case of education (DEA approximates input-oriented EFA by estimating proportional reductions in inputs to achieve the same output), although it may provide valuable insights on the efficiency of education. For example, for countries that have achieved close to 100 percent enrollment rates, output-oriented EFA would suggest little inefficiencies regardless of inputs used, while input-oriented EFA might indicate that the same enrollment rates could be achieved with much less inputs.

Test scores such as PISA and enrollment rates are the most common education outcomes used in EFA. Test scores—which are available for Moldova—are the preferred outcome indicator as they measure the quality of education. EFA based on test scores assesses the efficiency of the education systems in promoting student learning conditional on school enrollment and therefore the proper measure of spending is spending per student in PPP terms. It, however, provides little insights on the tradeoff between enrollment and quality of education while keeping spending unchanged. Using enrollment rates as the outcome measure helps assess the efficiency of getting school-age population to schools and therefore the proper measure of spending is spending per school-age population in Purchasing Power Parity (PPP) terms. It, however, does not reflect differences in quality of education and its usefulness is therefore limited.

In addition to public education spending, other factors also affect education outcomes, including private education spending, other home study resources such as parent tutoring, culture, level of development, nutrition, among others. The analysis here focuses on EFA with PISA scores as the output—enrollment rates in primary and secondary education are high in Moldova and little insights can be gain by using enrollment rates as the output) and primary and lower secondary public education spending and level of development as the inputs (while other inputs are important, they are not available in a cross-country setting). Because of large lags of spending and levels of development on education outcomes (both education infrastructure and workforce are developed over time which have effects on students' PISA test scores at 15 years of age), average of these variables over the last 15 years are used. Levels of development are approximated by GDP per capita in PPP terms.

Figure 15. Moldova's Efficiency in Primary and Secondary Education

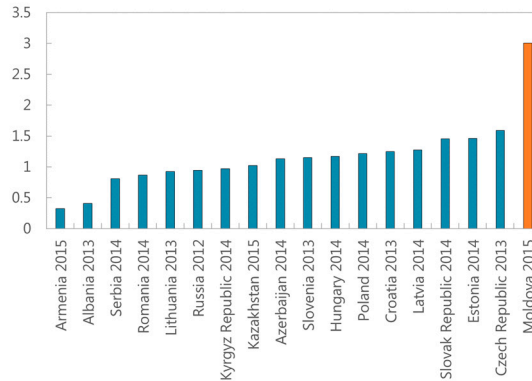
Source: World Bank, OECD, and IMF staff calculations.

Figure 16. Student-Teacher Ratio, Class Size and Teaching Hours in General Education

Source: Moldovan authorities and OECD.

High public spending in primary and secondary education also reflects high spending in non-wage current spending. Total non-wage current spending in Moldova, according to World Bank Education Statistics database, was 3 percent of GDP in 2015, well above the average of 1.1 percent in peer countries (Figure 17). The authorities' estimate is even higher, at 4.3 percent of GDP, driven by high maintenance and utility costs due to large school network (0.7 percent of GDP), universal food subsidies for children in grades 1-4 (over 0.5 percent of GDP), training (0.6 percent of GDP), and other current expenditure (2.5 percent of GDP).

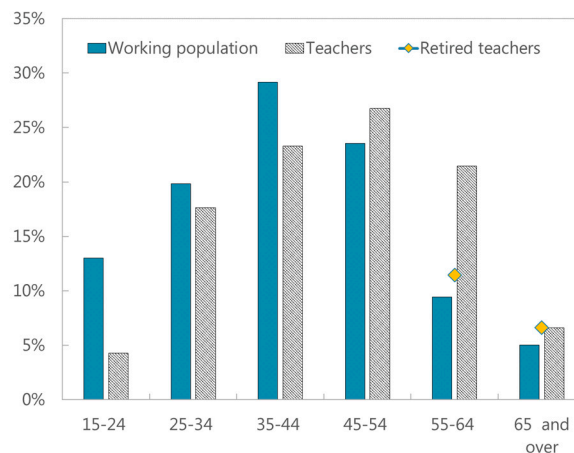
Figure 17. Government Non-Wage Current Expenditure in Education
(in percent of GDP)



Source: World Bank and IMF staff calculation.

Other potential sources of inefficiencies are related to the detailed designs in the education systems, which are critical to effective learning and education outcomes. Teacher skills and motivation are among the most fundamental ingredients of learning. To this end, a selection policy needs to be in place to assess the qualification of candidates, for example, through a test; an evaluation policy to allow the education systems to identify effective and ineffective teachers; and a retention policy to transition ineffective teachers out of the teaching workforce. In Moldova, there is ample room for improvements in teacher selection, evaluation and retention policies, and strengthening incentives to stimulate performance. Firing teachers and non-teaching staff is often difficult and they are typically allowed to stay as long as they desire and even beyond retirement, leading to an aged teaching workforce. In primary and secondary education, 18 percent of the teaching staff are over the retirement age and receive both a regular salary and a pension (Figure 18). The curriculum—currently under revision—appears too heavy and does not make the best use of both teachers' and students' time (World Bank 2014). While the curriculum is competence-based, evaluation still largely focuses on students' ability to reproduce materials learned in class, rather than on their competencies.

Figure 18. Moldova: Age Distributions of Teachers and the Working Population

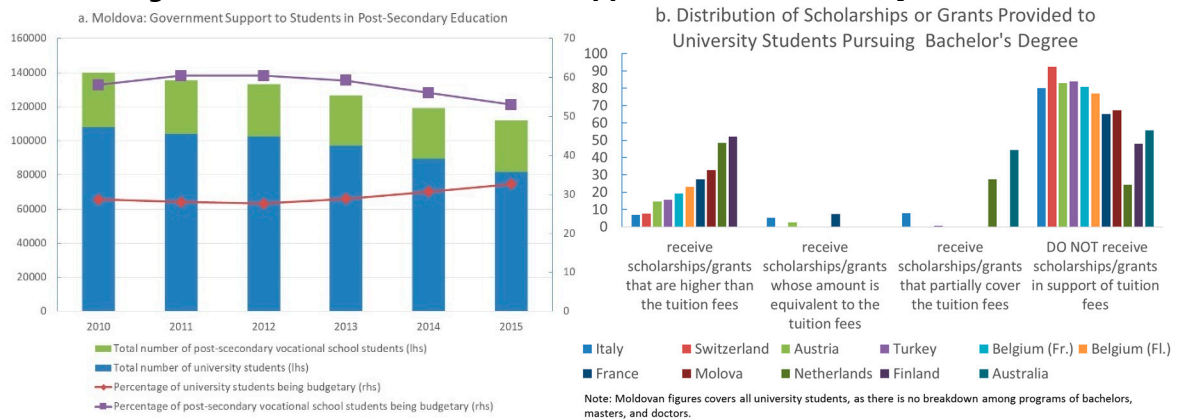


Source: Moldovan authorities.

E. University and Post-Secondary Vocational Education

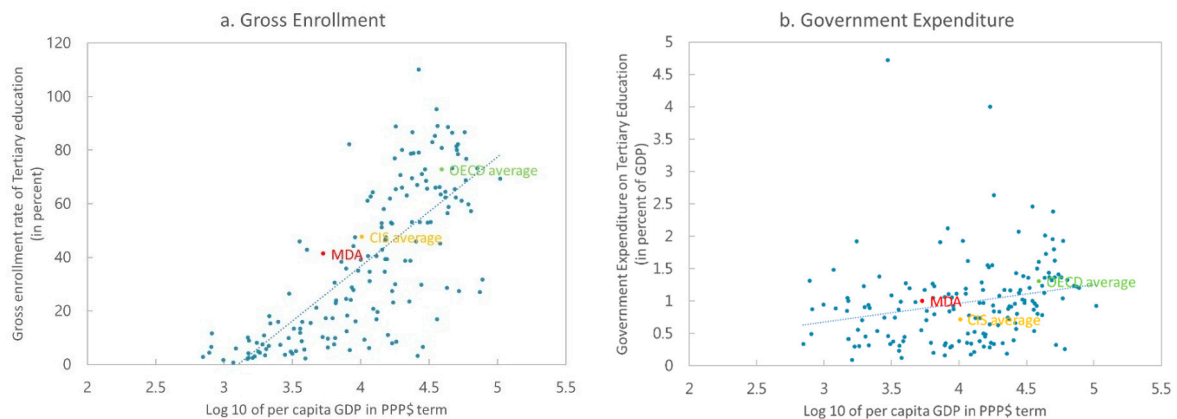
The 19 public universities enrolled 82 percent of total university students, with the rest in the 12 private universities. Over 30 percent of total university students, all of which in public universities, are considered “budgetary students” while the rest are “contractual students”. A budgetary student receives a scholarship to cover full tuition, as well as a stipend of around 500 lei per month. A contractual student pays an average annual tuition of 17,000 lei, ranging between 4,700 and 33,700 lei, depending on specialties and educational institutions. About 85 percent of the budgetary positions are “merit based” and are awarded annually based on academic performance at admission and during school years in universities. The remaining 15 percent are allocated to students in certain categories, including minorities, orphans and the disabled. While the number of students has been declining, the share of budgetary students has increased slightly in recent years. Among a few countries where data are available, government financial support appears high in Moldova, especially given that Moldova is still a low-income country (Figure 19). Similarly, vocational colleges are free to over 50 percent of the students, with a monthly stipend of 450 lei. Contractual students in vocational colleges pay an annual tuition of 6,000-7,000 lei.

Figure 19. Government Financial Support in Post-Secondary Education



Source: Moldovan authorities, OECD.

Both enrollment rate and public spending are relatively high in Moldova, in comparison to countries at a similar level of income (Figure 20). If not matched with labor market needs, high spending on tertiary education may not be an efficient use of public resources. In addition, much of the return from tertiary education accrues to graduates in the form of higher earnings and other non-monetary benefits, and high subsidies could lead to overinvestment in tertiary education.

Figure 20. Tertiary Education: Public Spending and Enrollment

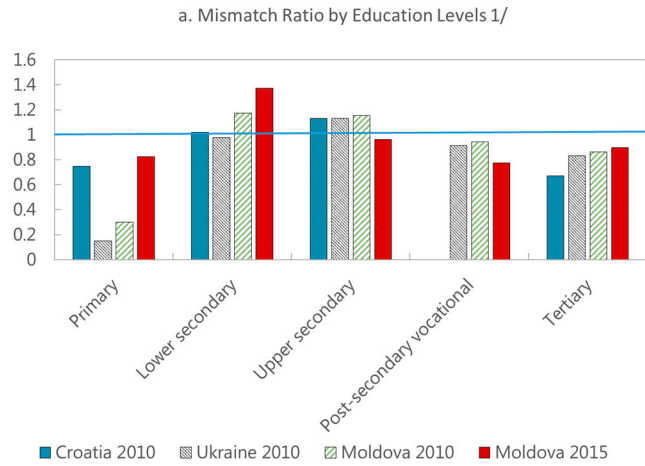
Source: World Bank, and IMF staff estimates.

Evaluation of quality of post-secondary education is not straightforward. One feature that distinguishes tertiary education from basic education is that tertiary education is expected to equip students with specific skills that are demanded by the labor market. Therefore, one way to assess the outcomes of tertiary education is to measure whether it provides the right number of high-skilled workers (measured by qualification mismatch) and whether their skills match what is demanded by the labor market (measured by field of study mismatch).

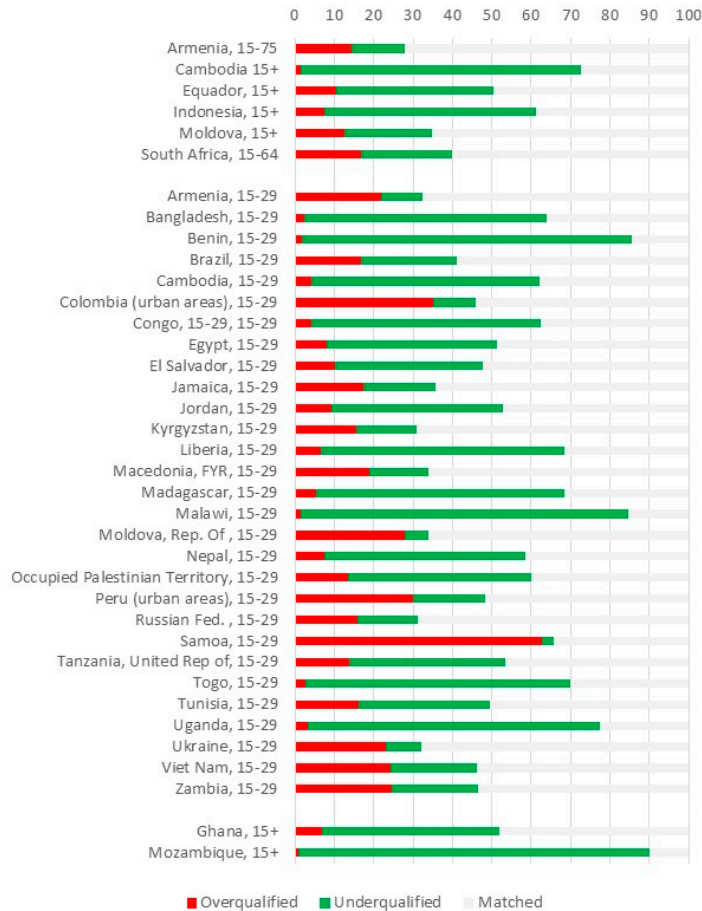
There are different ways to measure qualification mismatch and each of them has its advantages and disadvantages.

- One approach assigns a level of education to each major occupational group in accordance with the International Standard Classification of Education. Workers in a particular group who have a higher (lower) level of education are considered overeducated (undereducated). The advantages of this approach include simplicity and consistency over time. The disadvantage is that it ignores the variations in education requirements within each occupational group and one adjustment is to use a range of education levels instead of a single one (ILO 2014).
- Another approach is based on self-assessment in which workers' answers to the qualification requirements for their jobs are compared to their actual qualification, such as in the OECD Survey of Adult Skills. While biased by individual perceptions and period or cohort effects, self-reported qualification requirements have the advantage of being job-specific rather than assuming that all jobs with the same occupational code require the same level of qualification (OECD 2017).
- In a third approach, mismatch is measured by comparing the share of the unemployed with a given education level to the share of the employed with the same level of education and the key underlying assumption is that there is no substitutability between workers with different education levels (Bartlett 2013). For example, a relative high unemployment rate for those with college education indicates oversupply of college graduates. As employers are likely to choose workers with higher education levels to those with lower education levels for the same positions, a negative mismatch for tertiary education needs to be interpreted with caution.

Figure 21. Qualification Mismatch in Moldova



b. Qualification Mismatch, Selected Developing Countries 2/



Source: Bartlett (2013), Moldova 2015 Labor Force Survey, IMF staff calculation, and Stoevska (2017).
 Note: 1/ Mismatch ratio is the share of the unemployed with a given education level divided by the share of the employed with the same level of education. A ratio larger than 1 (positive mismatch) means an excess supply of labor with that education level. A ratio less than 1 (negative mismatch) means too few graduates with that education level. 2/ Workers are classified as under-qualified (over-qualified) if their educational attainment is lower (higher) than the modal educational attainment of workers in their occupation within the country.

To assess field of study mismatch, occupations are linked to fields of study based on what educational specialization is deemed to be appropriate for the jobs in that occupation (Wolbers 2003; Montt 2015). Workers who are not employed in an occupation that is considered a good match for their field of study are counted as mismatched.

Results from two approaches indicate that qualification mismatch does not appear to be high in Moldova, in comparison to countries at a similar level of development or OECD countries, with a qualification mismatch of 34 percent (Figure 21; OECD 2017). Field of study mismatch also appears to be low (Stoevska 2017). There is, however, the potential “brain drain” problem because many better educated Moldovans leave for work in other European countries (Porcescu, Nestorowicz and Markowski 2014). This makes it difficult to assess the labor market mismatches as only a selected share of graduates remains in Moldova.

V. ASSESSING EQUITY IN EDUCATION

In addition to resource allocation across economic and functional classifications, the distribution of resources across households with different levels of income is another important dimension for public policy, because equity itself is a major social concern and may also be a source of inefficiency. For example, Inequality in access to education means that some children are not making the best use of their ability to acquire the necessary skills due to their family background and thus cannot fully realize their potentials.

Enrollment data reveals little disparities in Moldova in general primary and secondary education (Table 3). This is expected, given the high enrollment rates at these levels of education. There are some disparities in early childhood education and large disparities exist in secondary vocational schools, vocational colleges and universities (Table 3). Children from rich households are much more likely to go to a university than those from poor households.

Table 3. Enrollment Rates by Family Income

Quintile	Early Childhood	General Primary and Secondary	Vocational Secondary	Vocational Colleges	Universities
Q1 (poorest)	64.9	81.3	11.3	9.1	6.7
Q2	71.5	80.1	8.9	19.8	12.6
Q3	81.5	77.6	20.1	14.0	19.4
Q4	73.1	81.4	9.2	16.1	24.9
Q5 (richest)	77.0	78.1	1.9	15.3	23.0
Total	72.0	79.9	10.3	14.8	18.0

Source: Moldova 2014 Household Budget Survey.

Note: Enrollment rate is defined as the number of students as a share of school-age population for each level of education. School-age population is defined as follows: early childhood (2-6), general primary and secondary (6-18), vocational secondary (16-19), vocational colleges (16-21), and universities (18-29). Each school-age population covers at least 95 percent of total students in the corresponding level of education.

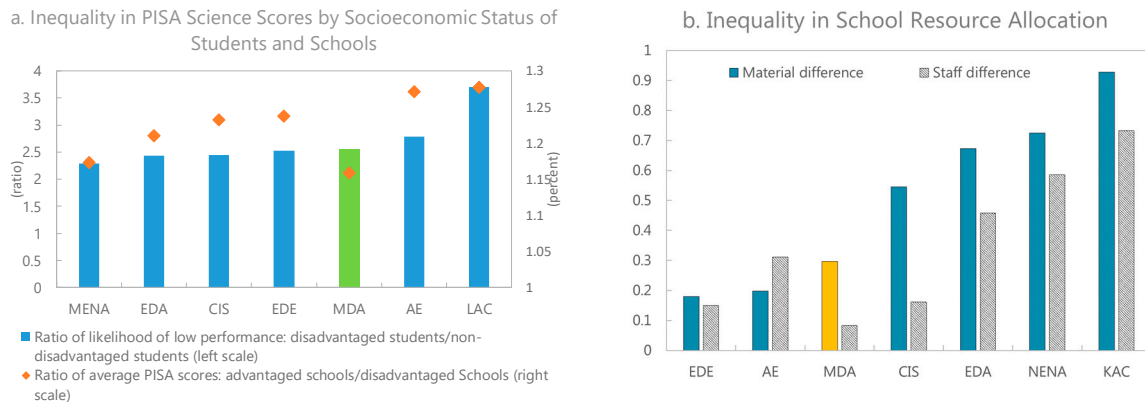
Table 4. Enrollment Rates of Budgetary and Contractual Students in Vocational Colleges and Universities by Family Income

Quintile	Vocational Colleges			Universities		
	Budgetary	Contractural	Total	Budgetary	Contractural	Total
Q1 (poorest)	7.7	1.4	9.1	4.9	1.8	6.7
Q2	14.6	5.2	19.8	5.5	7.1	12.6
Q3	9.8	4.1	14.0	9.6	9.7	19.4
Q4	7.0	9.1	16.1	8.6	16.3	24.9
Q5 (richest)	9.0	6.3	15.3	10.7	12.2	23.0
Total	9.6	5.2	14.8	8.2	9.8	18.0

Source: Moldova 2014 Household Budget Survey.

While part of the disparities in higher education enrollment may reflect differences in family's socioeconomic background, enrollment rates may have masked differences in the quality of basic education, with students from richer households attending schools with more material resources and better teachers. The disparities in student performance between advantaged and disadvantaged students in Moldova appear in line with those in other countries. However, the disparities between advantaged and disadvantaged schools tend to be smaller, both in terms of student performance and resource allocation, suggesting that the disparities between advantaged and disadvantaged students are more driven by factors outside of school systems such as study resources at home and parental engagement in Moldova than in other countries (Figure 22).

Figure 22. Disparities in Test Scores and Allocation of Schools Resources



Source: OECD PISA 2015, and IMF staff calculation.

Note: On the right chart, material (staff) difference is the additional material (staff) resource received by advantaged schools compared to disadvantaged schools. The larger the value, the greater the difference.

VI. DESIGNING AN EFFECTIVE REFORM STRATEGY

Moldova has been experiencing economic and fiscal difficulties. While growth has returned, and the outlook is favorable, significant risks remain and continued prudent macroeconomic policies are needed to ensure sustainable growth. While there may be some room to increase overall public expenditure, public expenditure will be tilted toward public investment and social protection. This implies that high priority must be given to improving education spending

efficiency and equity, which can help improve overall education outcomes—essential for long-term economic growth—with little adverse effect on fiscal sustainability.

A. Early Childhood Education

Public spending on early childhood education is high, likely driven by its extensive coverage and overstaffing. On the former, there may be scope for private spending to play a larger role in early childhood education. Bringing private spending in Moldova to the EU average of 16 percent could lead to fiscal savings of 0.27 percent of GDP. This can be achieved by targeting tuition support—particularly for children under the age of two—and food subsidies to low-income households, as Moldova already has a targeted social safety net in place.

There may be also the need to reduce the number of teachers and supporting staff—even if Moldova is on the efficiency frontier—as the resource could be better used elsewhere, for example, to reduce fiscal deficit and public debt, increase public investment, or strengthen social protection. The downsizing could be achieved in several ways, including hiring freeze, mandatory retirement and layoffs, and a cost-benefit analysis would be needed to prioritize these methods, taking into account the fiscal savings (e.g., wage savings and severance payments), the impacts on the operation and quality of early childhood education, and the well-being of those losing their jobs. If student-teacher ratio is raised from the current 11.9 to EU average of 12.7 and non-teaching staff-teacher ratio is reduced from the current level of 1.5 to 1.2 (a 25 percent reduction is assumed as the ratio in Moldova is substantially higher than that of other countries) by 2019, the reform could generate fiscal savings of 0.08 percent of GDP.⁸ To achieve these ratio targets, it would require the downsizing of teachers through attrition and a reduction of 4,000 non-teaching staff (or a 22 percent reduction) through merging schools, increasing class size and centralizing or outsourcing certain services, which would have minimal adverse effects on access to and quality of early childhood education.

B. Primary and Secondary Education

The main inefficiencies in general primary and secondary education are the oversized school network and high employment. To bring student-teacher ratio in Moldova from the current 11.3 to the EU average of 13 by 2019—with the number of students continuing to decline—would require a reduction in the number of teachers by over 7,000 (or 24 percent). However, to minimize the impact on access to and quality of education, it is only feasible to lower employment after reducing teaching positions through consolidating the school network, increasing class size, or expanding teachers' working hours. Based on several recent feasibility studies, conservative estimates suggest that a total of 3,143 teaching positions could be reduced with no significant impact on quality of teaching and educational outcomes (Table 5):

⁸ For OECD countries where data are available and Chile and Slovenia, the ratio of non-teaching staff to teachers in primary, secondary and post-secondary non-tertiary educational institutions was around 30 percent in 2007, according to OECD Education at Glance 2009. The high non-teaching staff-teacher ratio may reflect that the distinction between a teacher and a non-teaching staff is to some extent arbitrary in nursery schools (providing childcare for children of 0-2 years old).

- Close the remaining 117 primary and secondary schools identified as clear-cut cases in the 2010 feasibility study. Based on the study, 792 teaching positions could be eliminated.
- Continue to merge classes within schools. The targeted class size could be the OECD average of 22. A conservative estimate is that 3.2 percent of total teaching positions (or 945 positions) could be eliminated, based on other Eastern European countries' experiences analyzed by the World Bank (2013b).
- Increase average teaching hours to EU or OECD average. Moldova's average teaching hour per school year (665) is below the EU average (698) and OECD average (720). Assuming the EU average could be achieved by 2019, correspondingly 1,405 teaching positions could be eliminated.

These reforms would need to be accompanied by amendments to the education codes and norms and require the central government and local governments to work together. Employment reduction could be achieved in several ways. Attrition through retirement and hiring constraint have several potential advantages over layoffs, including less resistance from teacher unions and thus less political and implementation risk, less social impact as the retirees would still receive pension income, and that no severance payments would be required. One disadvantage is that the employment reduction may be too slow, and it may require an extensive period to achieve the targets (Table 5).

In Moldova, retired teachers often enter a contractual agreement with the schools upon retirement if they decide to stay and would receive a salary and a pension. One option is that schools could first target retired teachers to eliminate redundancy as result of school network consolidation. If this is not enough, layoffs would then be considered. When the number of retired teachers exceeds the number of positions that need to be eliminated as in the case of Moldova, selection could be based on a performance review. In addition, retired teachers should compete for positions with other applicants in terms of both competency and cost. This may also help improve the quality of education by rejuvenating the teacher workforce with new college graduates. Here it is assumed that 25 percent of retired teachers are in remote rural areas and thus are difficult to be replaced because of poor working and living conditions.⁹ The rest will be gradually replaced by young teachers whose salary is only about half of the salary for teachers approaching retirement age.

A similar approach can be applied to non-teaching staff as well. Given limited information on non-teaching staff, the following assumptions are made for illustrative purposes: the age profile of non-teaching staff is the same as the age distribution of public sector workers in the Household Budget Survey; non-teaching staff-teacher ratio would be gradually reduced to 0.4 by 2019, from 0.64 in 2016; the current level of non-teaching staff could be reduced by 20 percent without adverse effects on service delivery, while additional reduction would require outsourcing of certain functions; the reduction of non-teaching staff will be first accommodated through attrition (hiring freeze and retirement), and then by layoffs which would require a severance package equivalent to 3 months of salary; the outsourcing cost is assumed to be the same as the

⁹ The LFS shows that a slightly over 60 percent of all education sector workers are in rural areas. Here we assume a fraction of them are in remote areas.

remuneration for the corresponding non-teaching staff, but this is likely conservative because the private sector can potentially implement these functions more efficiently on a larger scale.

The illustrative reform plan appears only sufficient to offset the decline in the number of students, with student-teacher ratio largely unchanged. This suggests more ambitious reforms would be needed to significantly increase student-teacher ratio, and additional reforms could include closing some schools identified by the World Bank “with an uncertain future”, and further increasing class size and teaching hours. In addition, universal subsidies for student meals may not be the best use of public resources and targeting the food subsidies to students from the poorest two quintiles of households could save 0.27 percent of GDP, while making the program more progressive.

Table 5. An Illustrative Reform Plan to Reduce Employment in General Education

	2015	2016	2017	2018	2019
1. Teaching staff					
Number of teachers (baseline)	29,535	29,535	29,535	29,535	29,535
Number of students (forecast)	334,509	323,337	312,539	302,101	292,011
Student/teacher ratio (baseline)	11.3	10.9	10.6	10.2	9.9
Student/teacher ratio target (EU average of 13)					13.0
Number of teachers to be downsized from consolidation measures					
Further consolidate 117 schools 1/		0	1,048	2,095	3,143
Increase class size 2/		0	264	528	792
Increase teaching hours to EU average of 698 hours		0	315	630	945
		0	468	937	1,405
Potential downsizing from mandatory retirement					
Number of teachers over retirement age	5,327	6,301	7,275	8,248	9,222
Mandatory retirement to accommodate the above measures		0	1,048	2,095	3,143
25% of retired teachers are in remote rural area not subject to competition		1,575	1,819	2,062	2,306
Pool of retired teachers subject to competition with young teachers		4,726	4,408	4,091	3,774
Number of retired teachers replaced by young teachers after competition					
As a share of the potential pool		0%	29%	61%	100%
Final number of teachers	29,535	29,535	28,487	27,440	26,392
Final student/teacher ratio	11.3	10.9	11.0	11.0	11.1
2. Non-teaching Staff					
Number of non-teaching staff (baseline)	18,803	18,803	18,803	18,803	18,803
Non-teaching/teaching ratio (baseline)	0.64	0.64	0.66	0.69	0.71
Non-teaching/teaching ratio targeted	0.64	0.64	0.56	0.48	0.40
Number of non-teaching staff targeted	18,803	18,803	15,889	13,140	10,557
Total downsizing of non-teaching staff					
As a share of the baseline		0%	2,914	5,663	8,246
			15%	30%	44%

Source: Moldovan authorities and IMF staff calculations.

1/ Based on the 2010 World Bank feasibility study for school consolidation in Moldova.

2/ Based on a 2013 World Bank study which estimated within-school consolidation effects in other Eastern European countries.

C. Tertiary and Post-Secondary Vocational Education

Since much of the return from post-secondary education accrues to graduates in the form of higher earnings and other non-monetary benefits, there is a strong case for more private financing. One potential instrument is income-contingent student loans which allow students to begin paying off their loans once they start working, ensure that higher education is free at the point of use, and provide insurance against inability to repay due to low future income (Barr, 2012). This seems particularly relevant in the Moldova context as a large share of the skilled workforce emigrate to other countries. This suggests that there is scope to reduce the budgetary student programs in universities and vocational colleges, moving them from general budgetary support to programs that incentive performance and promote equality of opportunities.

More specifically, the reform assumes that the share of budgetary students in the newly admitted cohorts would decrease from 45 to 30 percent for universities, and from 52 to 40 percent for vocational colleges, starting in 2017. Some of the savings (20 percent) would be used to provide student loans. The remaining budgetary support could include a merit-based component and a need-based component. The merit-based component could be awarded to top students to steer competition in specific academic fields. The need-based component should be means-tested with a minimum academic performance requirement, to support students from low-income families. Such reform could generate savings of 0.04 and 0.14 percent of GDP in vocational colleges and universities by 2019, respectively.

D. General Reforms to Improve Efficiency and Equity

Some of the savings from the illustrative reforms could be channeled to areas where public investment is badly needed (Table 6 summarizes the reform impacts). Because the wage bill and basic maintenance and energy costs have absorbed an excessive share of public education spending, many school facilities are in urgent need of renovation and more investments are needed for study materials and equipment. Teacher training needs to be accelerated as teacher qualification is central to quality of education. This is particularly the case for schools that are most attended by disadvantaged students, and more resources to these schools will help improve both the overall quality of education and equality of opportunities by narrowing the outcome gap between advantaged and disadvantaged students.

Teacher qualification, teacher motivation and incentives are also key to quality of education. To this end, a number of improvements in the pay structure could be made, including increasing wages for entry level teachers to attract young talents to the teacher workforce, introducing a performance-based wage component to incentivize high quality teaching, and reducing the seniority-based component. This would require establishing an evaluation system to monitor and track student performances.

Reforming curriculum is another area where improvements are urgently needed. A World Bank study finds that the curriculum in Moldova is often outdated and typically does not reflect the skills that are demanded by the labor market. For example, in primary and secondary education, revision could put a greater focus on interdisciplinary approaches, to better align the curriculum with teaching materials and books (World Bank 2014).

Reforms to the school governance structure are also needed to better facilitate efficiency improvements. This includes, for example, adopting a per-student financing formula for all types of schools and further enhancing school autonomy while ensuring accountability. These reforms can help incentivize local governments and schools—for example, by consolidating their school networks and rightsizing their employment levels in education—to improve efficiency.

Table 6. Illustrative Education Sector Reforms and their Fiscal Impacts

(percent of GDP)

	2017	2018	2019
1. General Education	0.22	0.42	0.64
Further consolidate 117 schools	0.01	0.02	0.04
Increase class size	0.02	0.03	0.05
Increase teaching hours to EU average of 698 hours	0.03	0.05	0.08
Retired teachers complete with new entrants for positions	0.03	0.06	0.09
Downsize non-teaching staff	0.04	0.07	0.11
Better target the food program	0.09	0.18	0.27
2. Early Childhood Education	0.12	0.24	0.35
Freeze teacher hiring and downsize non-teaching staff	0.04	0.06	0.08
Increase tuition to EU average share	0.09	0.18	0.27
3. Postsecondary education	0.06	0.12	0.18
Reform scholarships in public vocational college	0.01	0.03	0.04
Reform scholarships in public universities	0.05	0.09	0.14
4. Introduce per capita based formula to non-general education	>0	>0	>0
Maximum Savings (in percent of GDP)	0.40	0.78	1.16
Maximum Savings (in percent of total public education spending)	5.75	11.16	16.63

Source: IMF staff calculations.

VII. CONCLUSION

Education is critical for individual well-being and economic development. The education sector, however, is facing important challenges in many countries. This includes the need to improve education outcomes and reduce inequality in an often fiscally constrained environment. Thus, improving the efficiency in the education sector will need to play a key role in achieving this objective. Using Moldova as a case study, this paper illustrates a systematic approach to assess the efficiency and equity of public education spending, identify sources of inefficiencies and inequality, and formulate potential reform options. The approach largely follows a top-down structure, with a focus on both economic and functional classifications of public education spending and education outcomes. It combines international benchmarking with in-depth within country analysis often based on microdata.

In Moldova, the analysis indicates significant scope to improve both efficiency and equity. The main sources of inefficiencies are oversized school network and overstaffing in primary and

secondary education and possibly also in early childhood education, which have absorbed an excessive share of public education spending and crowded out key public investment in education. The current remuneration policy is also inefficient in attracting high quality teachers and incentivizing good performance. General subsidies and support, particularly in early childhood education and higher education, are also inefficient ways of spending public resources. In areas where an assessment could not be made due to data limitations, data gaps are also identified for future improvements.

Removing the inefficiencies with minimum impact on access to and quality of education is no easy task and requires an effective reform strategy. For example, careful sequencing and evaluations of reforms are needed to consolidate the school network and lower employment, including identifying candidate schools and classes to merge, estimating the impacts on employment, and determining the most cost-effective ways to reduce employment. On school network consolidation, detailed plans are needed for renovating host schools and transporting students to their new schools, if necessary. Improving the targeting of food and scholarship programs necessitates close coordination between the education ministry, the social protection ministry and local governments. Modernizing the curriculum needs to take into account the evolving labor market needs and work with multiple stakeholders.

Data availability is often a constraint in the analysis and could be an even more important challenge in reform implementation. Moldova, as a low-income country, has relatively good data, but still there appears to be many gaps. Some data may already exist but are not easily available for analysis because they are not organized in ways that can be useful. This includes, for example, number of teachers and non-teaching staff and student-teacher ratios in nursery schools. More importantly, it is the need to further develop data infrastructure on student performance that could help monitor student, teacher and school performance. The continued development of databases—such as the estimates of qualification mismatch and field of study mismatch—that are comparable across countries would greatly facilitate analysis of this type. Currently, these databases are typically only available for small groups of countries, such as the OECD or the EU.

The approach proposed in the paper is only the beginning phase of assessing the education sector and does not replace more sophisticated modeling exercises—such as those based on general equilibrium models—that can evaluate the full economic and social impacts of education reforms. In fact, they can complement each other. The approach in this paper makes an initial assessment and proposes potential reform options while the general equilibrium models analyze the broad economic impacts of these options, which can help further refine and improve the reform designs.

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