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Kyrgyz Republic Social Sectors at a Glance

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Abstract

Traditional benchmarks to assess performance rely on unconditional rankings or regional averages. This paper uses a recently developed methodology based on quantile regressions and initial conditions to propose alternative benchmarks for social sectors in Kyrgyz Republic. Covering a wide set of indicators, the analysis reveals mixed results for Kyrgyz Republic. The country has made important strides in many social areas, with outstanding results in reducing child mortality and undernourishment. However, other areas are still key challenges and demand further attention and resources, as evidenced by the underachievement in maternal mortality, educational performance, and increasing informality in labor markets.

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Kyrgyz Republic: Social sectors at a glance

I. Introduction¹

This note examines the Kyrgyz Republic's performance in its social sectors. It uses an innovative methodology to create benchmarks based on international experience and the country's history. The methodology takes into account the country's initial conditions—in terms of the initial value of the outcome indicator and other factors, such as GDP per capita—and can be used to assess past progress and set targets for future performance. Thus, the analysis is tailored to the country's particular situation.

The results of the benchmarking methodology can be summarized in two metrics, which are comparable across countries and indicators. The metrics are the *raw* and the *characteristic-specific percentiles* where the country falls in the *raw* and the *characteristic-specific distribution* of an indicator (outcome or output), which range from 0 to 100, with higher values indicating better performance. The raw percentile captures where the country is relative to other countries in the world over a certain period of time, while the characteristic-specific percentile indicates whether the performance is below or above what could be expected given the country's characteristics. Consequently, the results can be easily communicated to a non-technical audience, in an intuitive way.

The main results are summarized in an accompanying two-pager flyer that tells the story of the social sectors in graphics, mimicking the World Bank's "Country at a Glance" template.

¹ We thank the peer reviewers: José Cuesta, Ana María Oviedo, and Ken Simler; sector specialists working in the Kyrgyz Republic: Dingyong Hou, Igor Kheyfets, Erkin Mamadaliev, and Gulmira Sultanova; and Asli Gurkan, Aibek Baibagysh uulu, and Juliana Flanagan for their suggestions and comments. We also thank Omar Arias for the overall guidance provided and Alex Kremer for posing interesting questions that pushed us to ask more of this exercise.

This can be used to engage policy makers and other stakeholders in the Kyrgyz Republic in a dialogue about what social sector-related policies can improve performance, in conjunction with more in-depth sector studies.

The remainder of this note is organized as follows. Section 2 briefly introduces the benchmarking methodology used for the analysis; it is presented in an intuitive manner for a wide non-technical audience, while a formal presentation is deferred to Annex A1. Section 3 describes the data and the model specifications. Sections 4 and 5 present the main results. Section 4 shows the results of a retrospective exercise for the Millennium Development Goals (MDGs). We apply the benchmarking methodology to the data that was available at the beginning of the millennium when the MDGs were set, and we assess the feasibility of the MDGs for the Kyrgyz Republic. Then, Section 5 provides a more comprehensive and current description of all social sectors. The benchmarking methodology is applied to a longer timeframe and a larger set of indicators. Whenever data limitations prevent the application of the benchmarking methodology, some complementary information is included. Section 6 summarizes the main messages.

II. Benchmarking methodology

Most of the analysis in this note relies on a methodology that was recently applied to assess country performance and targets in reducing poverty, and originally developed to evaluate standards of performance for government. This is the first application to a wide range of social sector indicators and to a large set of developing countries.

This section describes the methodology in an intuitive manner, while the formal presentation is found in Annex A1. The methodology aims to maximize the use of information when assessing the country's performance and can be easily communicated to a non-technical audience. It uses information from all countries and a long time series, resulting in a broad spectrum of performances. It also provides better benchmarks than those arising from rankings or regional averages since it allows the initial conditions and other relevant factors

that might explain performance to be taken into account. Finally, it builds on statistical techniques such as cumulative distributions and quantile regressions, but at the same time the results can be summarized in two numbers with intuitive interpretation.

The country's performance in a certain social sector is measured by the *percentile*—a number ranging from 0 to 100—in which the country's indicator falls in the cumulative *distribution* of the relevant social sector indicator. The cumulative distribution function is a function that, for a certain value of an indicator, gives the percentage of cases that have a lower value. That percentage is called percentile.

The performance can be assessed solely in relative terms to other countries—called *raw performance* hereafter—or taking into account a country's characteristics—called *characteristic-specific performance* hereafter. The *raw performance* is the percentile in which the value of the indicator of the country falls in the *raw* cumulative distribution function² of all observed values of such indicator. It is akin to creating a ranking normalized to vary between 0 and 100, and evaluating the position of the country in it. Thus, the country's performance depends on the values observed for all other countries during the period under examination. As for the interpretation, a value of 50 for the raw performance indicates the country in a certain year has performed better than half of the country-year episodes (or cases) analyzed in the sample.

Alternatively, the performance can be tested against an estimated distribution that takes into account the characteristics of the country. This *characteristic-specific performance* is the percentile where the country falls in the *counterfactual cumulative distribution* based on its characteristics, such as the initial value of the indicator (that is, the starting point), the gross domestic product (GDP) per capita, or other factor that might affect the performance.³ The counterfactual (cumulative) distribution is estimated using quantile regressions that help to

² Newman et al. (2010) use the term *empirical* or *unconditional* distribution to refer to the raw distribution.

³ Newman et al. (2010) use the term *conditional performance* to refer to the percentile where a country falls in the *conditional distribution*. This note uses the term *characteristic-specific performance* since it seems more accessible to a non-technical audience. The definitions remain the same, however.

approximate the variation in the indicator given a set of characteristics. Thus, a value of 25 for the characteristic-specific performance is interpreted as the country performing better than 25 percent of the country-year cases with similar values of the variables controlled for.

In this note, *effort* is defined as the percentile at which the country needs to perform during a certain number of years in order to achieve a previously defined target. As before, effort can be measured using two metrics: the raw cumulative distribution or the counterfactual characteristic-specific distribution. The effort can also be measured ex ante to make a prediction of how much the indicator needs to improve based on past information, or ex post taking into account the progress achieved by other countries during the period.

The methodology, however, is only applicable to indicators where good (bad) performance is associated with monotonic increases (decreases) of the indicator, or where the indicator can be transformed in order to have monotonicity. For example, the indicator *spending on social protection* is not monotonic since more spending is not necessarily associated with better performance (for example, more spending can be associated with more coverage for a given level of poverty or lower coverage but higher poverty incidence). The indicator *pupils-per-teacher* is not monotonic either, as too many students can be as bad as too few in terms of efficiency of delivery. However, if the optimal number of students-per-teacher is known, monotonicity can be obtained via a simple transformation: distance to the optimal value.

To implement the methodology, the analyst needs to address a few issues. First, which indicator is best suited to measure performance of the outcome of interest? For example, if the interest is to assess quality of education, there are several variables produced with Program for International Student Assessment (PISA) scores that can be used: the score in each subject test, the average score of the three subject tests, the percentage of students who perform below level 2 in literacy, and so on. Next, the analyst needs to decide whether to work with the variable in levels or in changes—either absolute or in percentages. Second, what is the sample under analysis? This measure of performance is relative and thus depends on the countries and years used as reference group. For example, the reference group can

include all countries in the world, or all countries in a region, or all countries of similar income levels. Third, which variables are used as controls in the quantile regressions needed to estimate the counterfactual characteristic-specific distribution? Undoubtedly, all these decisions affect the results and depend on data availability. Thus, it is acknowledged there is some degree of arbitrariness in the estimation, which is undermined via a series of robustness checks.

Box 2.1. Summary of methodological terms

Raw performance: the percentile where a country falls in the cumulative distribution of all observed episodes of a certain indicator.

Characteristic-specific performance: the percentile where a country falls in the counterfactual cumulative distribution that takes into account the country's characteristics.

Raw effort: the raw performance (percentile) at which a country needs to progress over a certain number of years to achieve the target.

Characteristic-specific effort: the characteristic-specific performance (percentile) at which a country needs to progress over a certain number of years to achieve the target.

III. Data and model specifications

The exercise relies on different data sources to gauge the performance of the social sectors in the Kyrgyz Republic. The selection of indicators is mainly guided by the data availability and requirements of the benchmarking methodology. This is complemented with other data sources that help distill the story of the sectors' performance. The choice of indicators is guided by the following criteria:

- (i) *Relevance.* Indicators were selected based on discussions with sector specialists who provided information and guidance about relevant issues in each area. For example, while primary enrollment is not a concern in the Kyrgyz Republic (as there is almost universal enrollment), pre-primary enrollment is—both in terms of its implications for early childhood development and for the labor force participation of women.
- (ii) *Good coverage of countries and years.* In order to have accurate estimates of the characteristic-specific performance, the indicator has to be available for many countries and over a relatively long period of time. The analysis uses data for the period 1990–2012 (or latest year available). The exact number of countries and years of data vary by indicator.
- (iii) *At least two data points for the Kyrgyz Republic.* Since the performance is evaluated in terms of changes, at least two data points for the Kyrgyz Republic are needed. For most of the indicators this was not a constraint, with the exception of social protection performance.⁴
- (iv) *Monotonicity.* As discussed above, the methodology sorts values of the indicators across countries and time. Thus, as in any ranking, performance has to be associated with a continuous increasing or decreasing value of the indicator. For example, while there is a consensus that a higher enrollment rate is a positive outcome, there is not similar consensus about the optimal pupil-to-teacher ratio.

⁴ In terms of country and time coverage, we have included indicators produced by the Enterprise Survey. These data are available only from 2002 onwards, with low frequency and low country coverage. However, some estimates were made when enough data were available. We extended the period of analysis to 2013 to increase the number of observations. GDP growth projections have been used to build a proxy of the GDP per capita in 2013, used as a control variable in the estimations. In the case of the international PISA exam, data for the Kyrgyz Republic is only available for 2006 and 2009. Country coverage is limited, ranging from a minimum of 42 countries in 2000 to a maximum of 68 countries in 2009. However, we believe it is important to tell the story about quality of learning in the Kyrgyz Republic.

**Box 3.1. Millennium Development Goals:
Goals and select targets from the Millennium Declaration**

Goal 1 Eradicate extreme poverty and hunger

- Target 1A Halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day.
- Target 1B Achieve full and productive employment and decent work for all, including women and young people.
- Target 2 Halve, between 1990 and 2015, the proportion of people who suffer from hunger.

Goal 2 Achieve universal primary education

- Target 3 Ensure that by 2015, children everywhere, boys and girls, will be able to complete a full course of primary schooling.

Goal 3 Promote gender equality and empower women

- Target 4 Eliminate gender disparity in primary and secondary education, preferably by 2005, and at all levels by 2015.

Goal 4 Reduce child mortality

- Target 5 Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate.

Goal 5 Reduce maternal mortality

- Target 6 Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio.

Goal 6 Combat HIV, malaria, and other diseases

- Target 7 Have halted by 2015 and begun to reverse the spread of HIV/AIDS.
- Target 8 Have halted by 2015 and begun to reverse the incidence of malaria and other diseases.

Source: United Nations, 2000.

All the indicators used are publicly available and can be downloaded using the World Bank's Open Data. We included all the MDG indicators that satisfied the conditions (i) to (iv) and are associated with social sectors (Box 3.1). Looking at the MDGs is especially relevant as they guided policies over the last 15 years. Moreover, setting future targets in line with MDGs and post-MDGs indicators has to be an informed process that focuses on efforts and not only on outcomes. Only a few other indicators satisfied the above conditions and could be included in the analysis. Unless otherwise indicated, we use all the years available for the chosen indicators.

Model specifications to estimate the counterfactual characteristic-specific distribution

The characteristic-specific distribution is estimated using the coefficients from quantile regressions for each indicator. To evaluate an indicator's performance, the explained (or dependent) variable is the growth of the indicator expressed as the annual percentage

change. Each episode of change (or observation) in the sample is computed using the two closest years of data, and then normalizing it annually to make it comparable.

For the quantile regressions we opted to use a parsimonious specification that uses the same explanatory variables to assess performance of any sector. The baseline specification for the annualized growth rate includes as controls the initial value of the indicator used to compute the change, the GDP per capita in the same initial year, the annual growth of GDP per capita (also computed over the same period used to calculate the dependent variable), and time and region dummies.⁵ Other sector-specific variables could also be included in the regression specification, for example, the fact that government spending in a sector is likely to affect outcomes. However, as of today, there is little coverage of disaggregated measures of public spending.⁶

This note opts for a parsimonious specification instead of one tailored to each sector indicator. On the one hand, tailoring the specifications to each indicator requires a deeper knowledge of the sector, demanding more of a specialist's time and involvement than what was originally envisioned when the task was commissioned. On the other hand, we acknowledge that biases of different magnitude might arise in each tailored specification if data constraints affect them in different ways, as well as in this simple specification. We lean toward having a simpler and parsimonious specification, even if arbitrary.

⁵ The time dummy variables were constructed to indicate five-year periods (1990–1994, 1995–1999, 2000–2004, 2005–2009 and 2010–2014) except for PISA indicators, where dummy variables indicate the year of the PISA assessment (2000 (omitted), 2003, 2006, 2009, and 2012), and for the Enterprise Survey, where a dummy variable indicates the year with available data between 2002 and 2013. The region dummy variables are East Asia and Pacific (EAP), Europe and Central Asia (ECA) developing, Europe high income (EHI), Latin America and Caribbean (LAC), Middle East and North Africa (MENA), North America (NA), South Asia (SAR) and Sub-Saharan Africa (SSA). GDP controls are omitted for maternal mortality ratio (modeled) as it is used to compute the indicator.

⁶ The World Bank has recently made progress in having comprehensive, homogeneous, and detailed data on public spending. BOOST is a tool applied to treasury data to produce several public spending indicators. However, the tool is not yet widely developed to incorporate it into the study. For more information, consult <http://go.worldbank.org/S14MC5Z9LQ>.

To test the robustness of the results, additional specifications are estimated using (i) a different set of controls; and (ii) different samples of country/years. Results are presented in Annex A3, and in all cases the qualitative conclusions hold.

Following previous applications (Newman et al., 2010), we estimate 99 percentiles in almost all cases. The exception is the undernourishment ratio, since the indicator is bottom-coded: no distinction is made among values below 5 percent, which is equivalent to the bottom 22 percent of the observations in 2012. In this case, for estimations in levels, there is only one estimate for the upper quintile, and percentile regressions for the rest of the distribution (percentiles 1st to 80th).

In all cases, a higher percentile is associated with better performance of the corresponding indicator. Figures have been reversed in the estimation for consistent interpretation across indicators in those cases where a higher indicator value reflects a worse situation (such as mortality or undernourishment rate).

IV. Assessing progress with the Millennium Development Goals

A backward-looking assessment on progress with the MDGs illustrates the proposed benchmarking methodology. Using data up to 2000 (when the MDGs were set) and the benchmarking methodology, two main questions are explored: (1) Were the MDGs feasible targets for the Kyrgyz Republic? (2) In the last almost 15 years, did the Kyrgyz Republic achieve the MDG targets as expected, and did the country outperform or underperform them? This retrospective exercise should serve to inform the country when setting post-MDG targets, and more generally to help it understand the value of using this additional information. Updated information that includes all available years is presented in the section.

To answer the above questions the benchmarks are set based on the information available at the beginning of the millennium. The steps followed are:

- (i) Focus on MDGs that satisfy conditions (i) to (iv) of Section 3, “Data and model specifications.” These include undernourishment, primary school enrollment, gender parity in secondary education, under-5 mortality rate, maternal mortality ratio, and incidence of tuberculosis.
- (ii) Compute the annualized growth rates for each MDG indicator between 1990 (or earliest available) and 2000 (or latest available).
- (iii) Estimate the raw and the characteristic-specific distributions for each MDG indicator to evaluate the raw and the characteristic-specific performance of the Kyrgyz Republic, as described in the previous section.
- (iv) Compare the raw and the characteristic-specific performance with the targets set for 2015 for each MDG.

Goal 1—Eradicate extreme poverty and hunger.

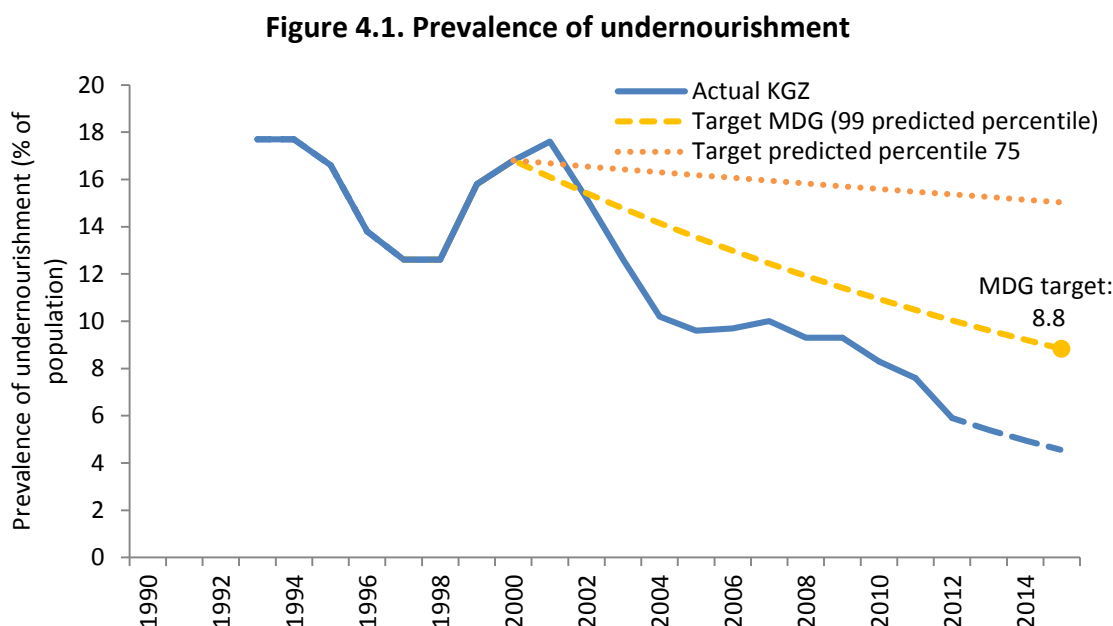
Hunger measured by undernourishment was relatively high in the Kyrgyz Republic at the beginning of the millennium. With 17 percent of the population undernourished in 2000, the Kyrgyz Republic was in the 56th percentile of the raw distribution for this indicator. This level of undernourishment was observed in Turkmenistan in 1993 and in Chile in 1991.

The MDGs set the target of halving the level of undernourishment to achieve an undernourishment rate of 9 percent by 2015.⁷ This target implied a rate of reduction in undernourishment of 4.2 percent per year, which was equivalent to what was observed for many Latin American countries in the 1990s, but it represented a harder effort for the Kyrgyz Republic given its initial position. This rate of progress implied performing above percentile 87 of the characteristic-specific distribution, considerably higher than the progress achieved during the 1990s: the raw performance was at the 51st percentile and the characteristic-specific was around the 7th decile. Without any doubt, this was an extremely ambitious target for the Kyrgyz Republic. Only one other country—Azerbaijan—showed this type of progress

⁷ The MDG target meant to halve by 2015 the global level of undernourishment rate of 1990. However, data for the Kyrgyz Republic is available since 1993, obliging us to use this year as the starting point.

in the 1990s.⁸ In spite of the predictions, the Kyrgyz Republic performed exceptionally well, decreasing undernourishment at an average rate of 8.4 percent per year between 2000 and 2012 and reaching a level of undernourishment of 5.9 percent in 2012. This performance was at the level of percentile 99 of the characteristic-specific distribution, based on the information available at the beginning of the millennium.

This success story is summarized in Figure 4.1. The yellow dashed line shows the trajectory required to achieve the MDG target. The dotted orange line indicates the trajectory performing at the 75th percentile, which would have been still a very ambitious target, but with higher guarantees of achievement. Finally, the blue line shows the success of the Kyrgyz Republic in this area, with the actual rate of progress below the two projected lines.



Source: Authors' estimation based on WDI (FAO, World Bank, 2014a) and MDGs. Notes: The dashed blue line indicates the projection of actual undernourishment until 2015, if the Kyrgyz Republic continued to perform at the average rate of the 2000–2012 period.

⁸ Azerbaijan reduced undernourishment at a yearly rate of 6.5 percent between 1993 and 2000, from 23.8 to 14.9 percent.

Goal 2—Achieve universal primary education.

Primary enrollment was already high in the Kyrgyz Republic in 1990, with a gross enrollment rate close to 110 percent. However, in 2000, primary gross enrollment decreased to 95.8 percent, an annual decrease rate of 1.4 percent. This implied a raw performance at the 11th percentile and a characteristic-specific performance at the 10th percentile. However, there is no clear target for this indicator in terms of the MDGs against which to assess performance. Between 2000 and 2012, gross primary enrollment has increased again, reaching a level of 105.9 percent in 2012. Performance between 2000 and 2012 was at the level of the 93th percentile of the characteristic-specific distribution. Primary net enrollment also increased between 2000 and 2012, from 85.8 percent in 2000 to 90.5 percent in 2012.

Goal 3—Promote gender equality.

Equal access to education is instrumental to promote women's empowerment. This can be measured by the gender parity index (GPI) in secondary gross enrollment.⁹ Gender parity was not a concern in the Kyrgyz Republic, as parity was close to 100 between 1990 and 2011. The main concern might instead be related to boys leaving school for work. In order to capture equal access to education (and to make the indicator monotonic),¹⁰ the indicator is constructed as the absolute difference between the gender ratio in secondary gross enrollment and the parity value—that is, the distance to education parity.

Between 1990 and 2000, the distance from total gender equality in secondary enrollment in the Kyrgyz Republic increased by 20 percent. This performance placed the Kyrgyz Republic at the level of 11th percentile of the raw distribution and 35th percentile of the characteristic-specific distribution. When we look at the absolute level of the distance, and after controlling

⁹ This indicator captures the ratio of female gross enrollment for secondary school to male gross enrollment for secondary school, per 100. A GPI equal to 100 indicates parity between females and males. In general, a value less than 100 indicates disparity in favor of males and a value greater than 100 indicates disparity in favor of females.

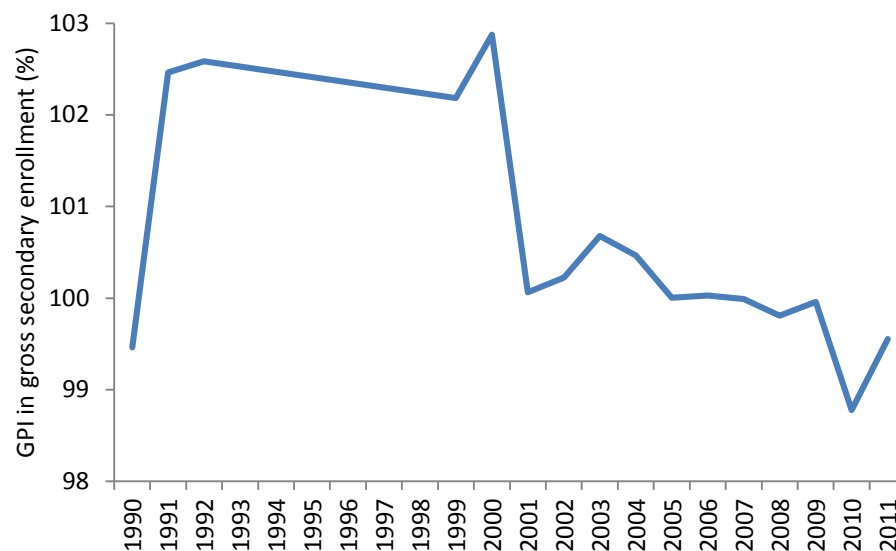
¹⁰ The benchmarking tool could not be used to evaluate the evolution of the GPI, since results do not have a monotonic interpretation. However, distance from 100 can be interpreted in terms of the benchmarking tool.

by GDP per capita and regional dummies, the Kyrgyz Republic is at the median of the distribution. However, as already discussed, GPI was very close to 100 during the period. Besides, between 2000 and 2012, distance from 100 in GPI was reduced again, at an annual rate of 15 percent. This yearly performance positioned the Kyrgyz Republic above the 85th percentile, based on the information available by 2000 (Figure 4.2 plots the evolution of the indicator between 1990 and 2012).

Goal 4—Reduce child mortality.

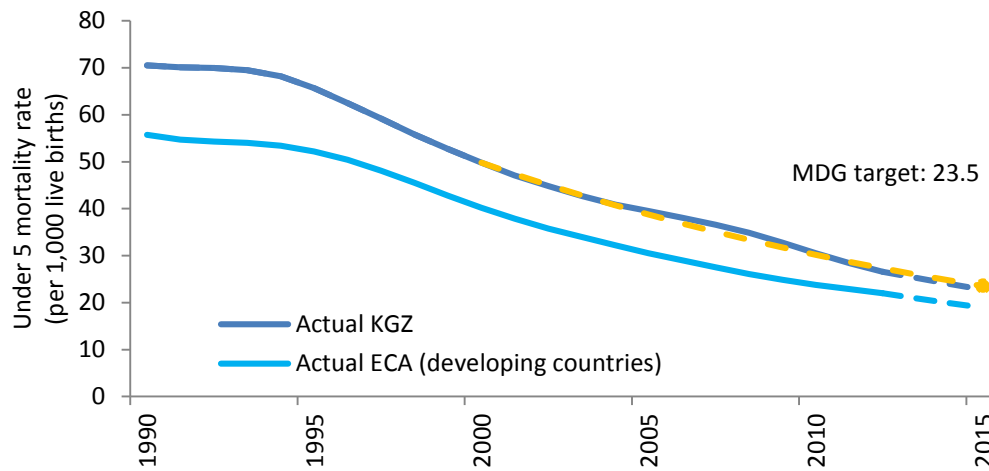
Reducing child mortality by two-thirds between 1990 and 2015 implied moving from 70.5 deaths per 1,000 live births in 1990 to 23.5 by 2015. In 2012, the mortality rate of children younger than 5 was 26.6 deaths per 1,000 live births, which meant the target had been reached on time. The target was meaningful as the reduction in the 1990s was of 3.4 percent per year.

Figure 4.2. Gender parity index in gross secondary school (%)



Source: Authors' estimation based on WDI.

Figure 4.3. Child mortality (under 5)



Source: Authors' calculations based on WDI. Notes: The dashed blue line indicates the projection of actual child mortality until 2015, if the Kyrgyz Republic continued to perform at the average rate of the 2000–2012 period (done by authors).

The Kyrgyz Republic's performance in the 1990s was average; it placed the country in the 53rd percentile of the raw distribution and the 75th percentile if we take into account its own characteristics. This fourth goal target was ambitious, with a required performance at the 87th percentile of the country characteristic-specific distribution. But the Kyrgyz Republic did not fall short in the new millennium, performing at an average annual rate of -5.1 percent and reaching the targeted performance of the characteristic-specific distribution. This evolution is summarized in Figure 4.3. Note that even though the Kyrgyz Republic performed as expected, the country still lagged behind regional averages.

Goal 5—Reduce maternal mortality.

Maternal mortality was a concern for the Kyrgyz Republic circa 2000, with a performance below the median of the raw distribution (percentile 47). The country was not improving, as maternal mortality rates increased between 1990 and 2000 at an annual rate of 1.6 percent, from 85 deaths per 100,000 live births in 1990 to 100 deaths by 2000. This rate of change placed the Kyrgyz Republic at the 11th percentile of the raw distribution, based on 1990–2000 data, and the 30th percentile of the characteristic-specific distribution.

Reducing the maternal mortality rate by three-quarters between 1990 and 2015 meant reaching a level of 21 deaths per 100,000 live births in 2015, equivalent to a reduction of 9.8 percent per year. This was a very ambitious target, and maybe even unfeasible. The Kyrgyz Republic was performing at the 30th percentile when its characteristics are taken into account, and achieving Goal 5 meant jumping to the 95th percentile of the characteristic-specific distribution. Between 2000 and 2013, maternal mortality decreased at an annual rate of 2.2 percent. This annual growth rate falls in the 60th percentile of the characteristic-specific distribution for the Kyrgyz Republic, based on the evidence available in 2000.

Figure 4.4 summarizes the gap between the target set by the MDGs and the reality in the Kyrgyz Republic. The solid blue line shows the actual evolution of the Kyrgyz Republic between 1990 and 2010, while the dotted blue line shows the projection for 2015 if the indicator follows the same pattern for the period 2000–2013. The yellow dashed line shows how the Kyrgyz Republic would have had to perform between 2000 and 2015 to achieve the target set by the MDGs for maternal mortality. The dotted orange line indicates a more sensible goal, performing at the 70th percentile of the characteristic-specific distribution, while the light blue dotted line indicates a performance at the level of the 75th percentile. Even if the country was underperforming during the 2000s, the target set by the MDGs was not realistic for the Kyrgyz Republic. A target at the level of the 75th percentile of the characteristic-specific distribution would have been easier to reach.

Goal 6—Combat HIV, malaria, and other diseases.

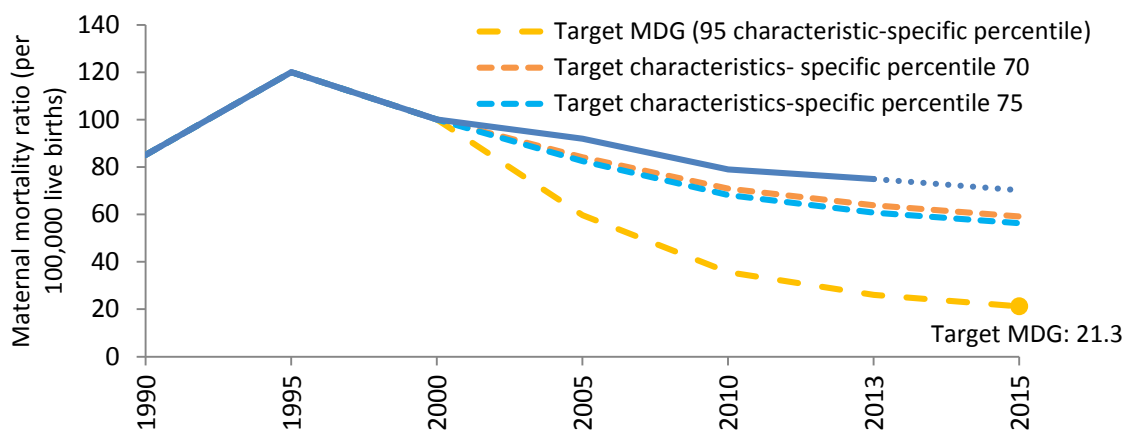
A lack of information makes us unable to apply the methodology to focus on HIV, so only the incidence of tuberculosis is examined here.¹¹ The incidence of tuberculosis was 92 cases per 100,000 people in 1990 and increased to 249 cases in 2000. However, after a few years of stabilization, it started to decrease. The increase in the incidence of tuberculosis at an annual rate of 10.5 percent per year between 1990 and 2000 meant a performance for the Kyrgyz

¹¹ Incidence of tuberculosis includes only new detected cases, while prevalence of tuberculosis includes both new and previous cases. Incidence of tuberculosis was the chosen indicator for this section since it is the data typically used to monitor the achievement of the MDGs.

Republic at the level of percentile 6 of the raw distribution and the 19th percentile of the characteristic-specific distribution.

To halt the incidence of tuberculosis required a performance at the level of 80th percentile—equivalent to a growth rate of zero. However, between 2000 and 2012, the incidence of tuberculosis decreased at a rate of 4.6 percent per year, equivalent to a performance at the 99th percentile.

Figure 4.4. Maternal mortality rate



Source: Authors, based on WDI. Notes: The maternal mortality rate is estimated only every five years between 1990 and 2010, and for 2013. The maternal mortality ratio is estimated per 100,000 live births.

In summary

Overall, the Kyrgyz Republic has performed exceedingly well when it comes to the MDGs in social sectors, achieving more than what could have been expected considering the country's historical performance and the international experience. This is summarized in Table 1. However, two important qualifiers are warranted. First, the big exception is maternal health: even with almost universal access to skilled birth attendance, the maternal mortality rate is still high. A target at the level of percentile 75 of the characteristic-specific distribution in 2000 required a reduction of 3.7 percent per year.

Second, although the Kyrgyz Republic has achieved outstanding progress, this does not mean in any way it is sufficient. For example, child mortality rates are still behind regional averages.

While the trend in the incidence of tuberculosis was reversed, this disease is still a concern to address in the future, as identified in the *Den Sooluk* plan. In education, although levels of enrollment in primary education are high, the Kyrgyz Republic has work to do on the quality of education and early childhood development. This becomes clearer in the next section, which goes beyond this set of indicators.

V. Benchmarking progress in the social sectors going forward

This section assesses progress over a larger set of social sectors during the last decade. Results are mainly based on the application of the benchmarking methodology and the preferred specification explained in Section 3. Subsections are organized according to the thematic global practices.

Health, nutrition, and population

The 2012–2016 National Health Reform Program, *Den Sooluk*, identifies some of the Kyrgyz Republic’s most relevant challenges to overcome in the following years, many of which overlap with the MDGs. These include improve child and maternal health, eradicate infectious diseases such as HIV and tuberculosis, and decrease hunger. The benchmarking analysis seeks to identify past performance and set feasible though meaningful targets for the future.

In short, *Manas* and *Manas Taalimi*—the health reforms that have defined a plan for the modernization of the health system—have paid off. It has been said that the clear priorities, realistic goals, and coherent sequencing of reforms were keys to success (Balabanova et al., 2013).

Table 4.1. Evaluation of the effort needed by Kyrgyz Republic to achieve social sector MDGs 2000–2015

Goal/target	Indicator used	Past raw performance between 1990 and 2000	Expected effort to achieve MDG	Characteristic-specific performance between 2000 and latest year available	In a nutshell
Goal 1—Eradicate extreme poverty and hunger					
Target 2—Halve, between 1990 and 2015, the proportion of people who suffer from hunger.	Undernourishment	70 (51)	87	99	Outperformed
Goal 2—Achieve universal primary education					
Target 3—Ensure that by 2015, children everywhere, boys and girls, will be able to complete a full course of primary schooling.	Gross enrollment rate	10 (11)	No clear target	93	Outperformed
Goal 3—Promote gender equality and empower women					
Target 4—Eliminate gender disparity in primary and secondary education, preferably by 2005, and at all levels by 2015.	Distance to gender parity in secondary enrollment	35 (11)	No clear target	85	Outperformed
Goal 4—Reduce child mortality					
Target 5—Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate.	Mortality under 5	75 (53)	87	87	Reached the target
Goal 5—Reduce maternal mortality					
Target 6—Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio.	Maternal mortality ratio	30 (11)	95	60	Underperformed for MDG, but close to the level of percentile 75
Goal 6—Combat HIV, malaria, and other diseases					
Target 8—Have halted by 2015 and begun to reverse the incidence of malaria and other diseases.	Incidence of tuberculosis	19 (6)	81	99	Outperformed

Notes: WDI data based on MDGs performance. All percentiles are based on the characteristic-specific distribution of annualized growth rate using data for 1990 and 2000, or the latest year available. Numbers in brackets are the percentiles obtained from the raw distribution.

Maternal health. Maternal health is an area at which more effort could be directed. Maternal mortality has diminished during the last decade at a good rate based on the progress during the 1990s. The number of deaths per 100,000 live births first increased from 85 in 1990 to 100 in 2000, to later decrease to 79 in 2010 (the last year of available data). According to the raw distribution, this indicator falls in the 51st percentile for 2010. However, when controls are included, maternal mortality falls in the 13th percentile of the characteristic-specific distribution. This result reflects how urgent is to improve maternal health in the Kyrgyz Republic.

Measured in percentage change, the performance is poor. The Kyrgyz Republic falls in the 33rd percentile of the characteristic-specific distribution. A reasonable and significant post-MDG target could be to reduce maternal mortality at rate of 5.6 percent per year, which is equivalent to performing at the 75th percentile in the characteristic-specific distribution in 2013.

The teenage fertility rate is a related aspect of maternal health included in the MDGs. The Kyrgyz Republic has made considerable progress in this area. The number of births per 1,000 teenagers decreased from 68.4 in 1992, to 34.4 in 2002, to 29.8 in 2012. The Kyrgyz Republic outperformed between 1997 and 2002, when the adolescent fertility rate decreased at a yearly pace of 11.5 percent. In the last 5 years, the characteristic-specific performance has stagnated around the 10th percentile (with an annual decrease of 0.3 percent), but this is typical of countries with low levels of teenage pregnancy. If the Kyrgyz Republic wants to maintain the performance of the past, at the 75th percentile for example, the teenage fertility rate should decrease at an annual rate of 4.7 percent.

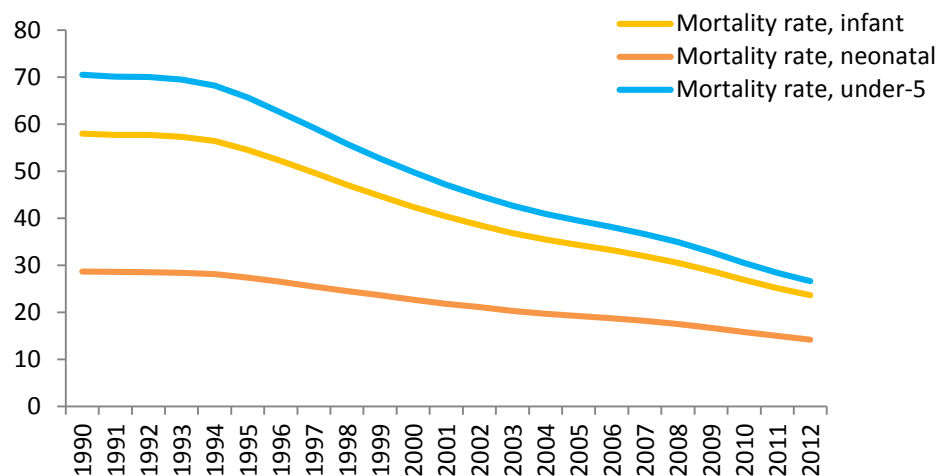
There is now almost universal skilled birth attendance, and nearly all women receive prenatal care.¹² Some argue that the lack of larger response of the maternal mortality ratio is related to the need for further quality improvements in health delivery, while others say it is an

¹² Based on National Statistical Committee of the Kyrgyz Republic et al., 2013.

artifact of the reporting system which results in a gap between the national and the modeled estimates of the maternal mortality ratio (Murzalieva et al., 2013; Giuffrida, 2014).

Child health. The assessment of child mortality drives more optimistic results. Between 2000 and 2012, neonatal mortality, infant mortality, and under-5 mortality rates have been decreasing steadily (see Figure 5.1).

Figure 5.1. Mortality rate: Neonatal, infant, and under-5 (per 1,000)



Source: UN Inter-agency Group for Child Mortality Estimation. Notes: Neonatal mortality is the number of newborns who die before reaching 28 days of life, per 1,000 live births. Infant mortality is the number of infants who die before reaching one year of age, per 1,000 live births. Under-5 mortality is the probability per 1,000 that a baby will die before the age of five.

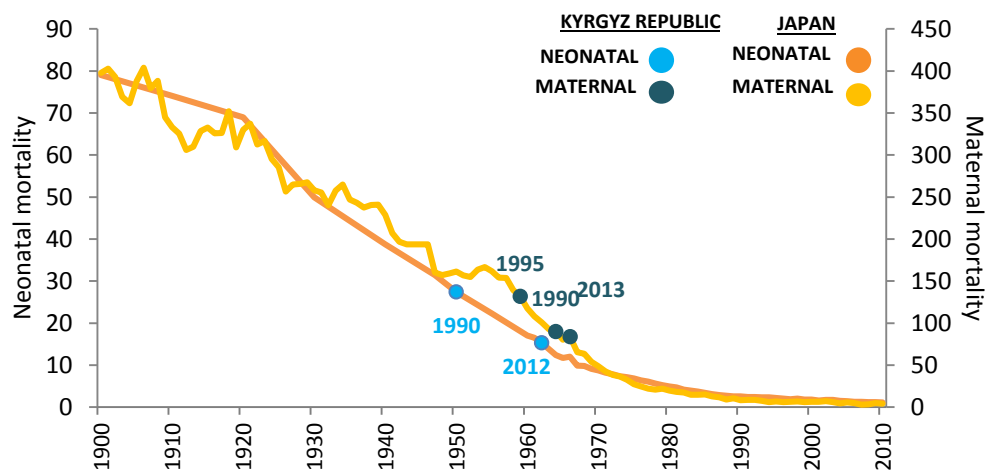
For the three indicators, child mortality is around the median of the raw distribution (measured in levels), but around the 40th percentile of the characteristic-specific distribution. Although the country is behind regional averages, with higher mortality rates than the average of ECA developing countries, the characteristic-specific performance seems to be better. When we look at the growth rate in the last period (2011–2012), the Kyrgyz Republic performed above the 85th percentile, both in the raw and the characteristic-specific distribution; the ECA region, as an aggregate, performed around the 70th percentile of the characteristic-specific distribution.¹³

¹³ As expected, the estimations for ECA developing as an aggregate did not include regional dummies.

Vaccination is an important instrument for decreasing child mortality. In particular, the share of immunization against measles among children in the 12–23 months group is included as a MDG. Coverage in the Kyrgyz Republic is almost universal (98 percent both in 2000 and 2012) and then does not seem to be a concern.

Summing up, both maternal and child mortality have been reduced in the last 20 years. However, there is still much room for improvement. Figure 5.2 benchmarks the Kyrgyz Republic against a top performer like Japan. This country had high maternal and neonatal mortality rates at the beginning of the twentieth century but made important achievements. As of 2010, Japan was at the 95th percentile of the raw distribution of maternal mortality, with 6 deaths per 1,000 live births;¹⁴ in 2011 it was at the 99th percentile of the raw distribution of neonatal mortality, with only 1.1 deaths per 1,000 live births.

Figure 5.2: Maternal and neonatal mortality: Comparison with a top performer



Source: WDI and UN Inter-agency Group for Child Mortality Estimation.

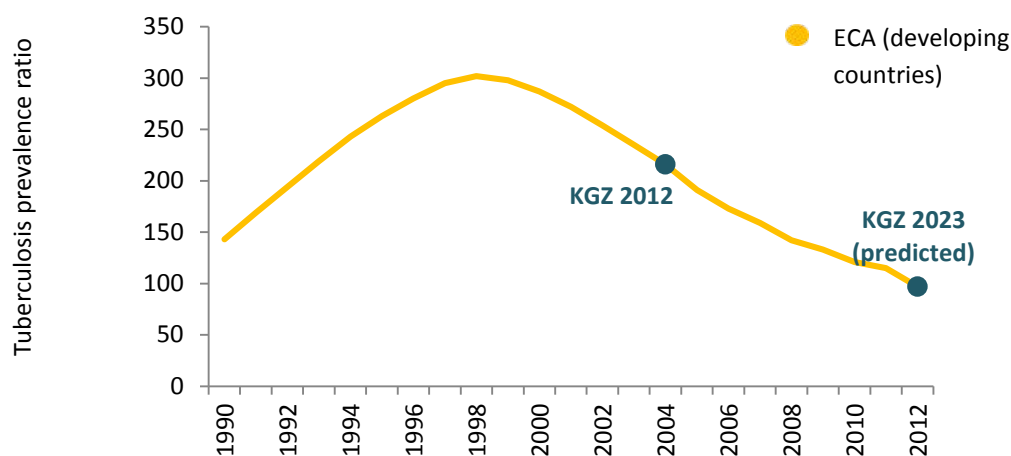
Nutrition and health. Improvements in health can also be quickly assessed by examining a few outcome indicators such as undernourishment, and the incidence of a few key diseases. For example, undernourishment has sharply fallen in the last 15 years, from 16.8 in 2000 to

¹⁴ World Bank, 2014a.

5.9 percent in 2012. Performance has been particularly outstanding in the last observed year, with a 22.4 percent drop between 2011 and 2012. This rate of decrease corresponds to the 98th percentile of the raw distribution and the 94th percentile of the characteristic-specific distribution. As was discussed above, the Kyrgyz Republic's performance was outstanding, largely exceeding the targets set by the MDGs in 2000.

The prevalence of tuberculosis has shown a similar evolution to the incidence of tuberculosis discussed earlier. While the prevalence rate was 449 cases per 100,000 persons in 2000, it was halved by 2012. However, a big effort still needs to be made to fully eradicate this disease. The level of this indicator is only at percentile 35 of the raw distribution and at the 40th percentile of the characteristic-specific one. A target of performance at the level of the 75th percentile of the characteristic-specific distribution would imply reducing the tuberculosis prevalence rate by 6.9 percent per year. If this target were reached, tuberculosis prevalence would be, by 2023, similar to the regional average in 2012—around 100 cases per 100,000 population (see Figure 5.3).

Figure 5.3. Tuberculosis prevalence ratio: Closing the gap with ECA?



Source: WDI. Notes: The tuberculosis prevalence ratio includes both new and old cases (measured per 100,000 population).

Some other diseases are not studied here because of a lack of worldwide data with long time series, and require more attention if the population's health is to be improved over the next few years. In particular, it is worth highlighting the case of cardiovascular diseases, which account for almost half of all deaths in the Kyrgyz Republic each year (50.1 percent in 2011).¹⁵ HIV is also an issue, though there is considerably less valid information on this problem.

Education

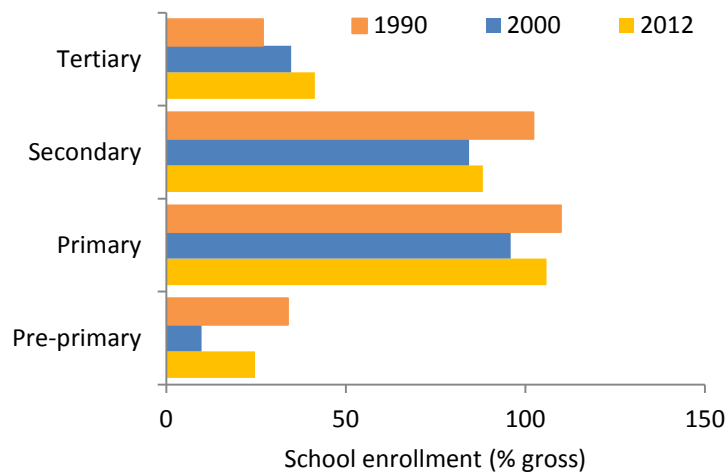
In the Kyrgyz Republic, equitable access to education is only achieved on some levels. While almost everybody is enrolled in primary and secondary education, enrollment in preschool among children 3 to 5 is very low, and with strong variation across the oblasts. For example, preschool enrollment is 32 percent in Bishkek and 8.5 percent in Osh and Batken. Similarly, the quality of education varies widely across the country (Cahu, 2014). Also, the country's low quality of tertiary education, coupled with a large increase in the number of institutions, is also a major concern that should be addressed in the following years. The National Sustainable Development Strategy for 2013–2017 points toward the reform of the educational system as an urgent issue.

Access to education. There is almost universal enrollment in primary and secondary enrollment, with gross rates close to 100. However, the story is different for preschool and tertiary levels (see Figure 5.4), with slow growth during the first 12 years of the millennium. In particular, enrollment in pre-primary school is still a challenge. As of 2012, pre-primary enrollment was only 25 percent, well below pre-primary enrollment in other countries of the region such as Armenia (51%), Georgia (58%), Kazakhstan (54%), Moldova (80%) and the Russian Federation (90%).¹⁶ Countries with similar or lower pre-primary enrollment rates than Kyrgyz Republic are Azerbaijan and Uzbekistan (25%), Bosnia and Herzegovina (16%) and Tajikistan (9%).

¹⁵ WHO, country cooperation strategy at a glance

¹⁶ Numbers for Russian Federation correspond to 2009 and for Georgia to 2008.

Figure 5.4. Gross school enrollment, by level of education



Source: WDI. Notes: Gross enrollment ratios include students in a corresponding school level, independent of the student's age. Gross enrollment rates may be higher than 100 percent if the total number of students exceeds the population of the age group that officially belongs to a certain school level for reasons such as early enrollment, late enrollment, and/or grade repetition. Figures for secondary and tertiary enrollment correspond to 2011 (the last year of data availability).

Between 2000 and 2012, the country more than doubled its pre-primary enrollment rate, moving up in the raw distribution of the indicator from the 16th percentile in 2000 to the 26th in 2012 (or percentile 22 of the characteristic-specific distribution). Although at first glance the change could be perceived as substantial, there is still much room for improvement: pre-primary enrollment is still lower than it was before the transition to the market economy and behind regional averages (45 percent in 2012). However, when focusing on the last few years, the Kyrgyz Republic shows an outstanding performance. Between 2011 and 2012, pre-primary enrollment rate increased by 19 percent, a characteristic-specific performance at the 95th percentile. With a target growth set at the 75th percentile of the raw distribution (that is, 7.8 percent per year), the Kyrgyz Republic could double its pre-primary enrollment rate by 2021.

Regarding tertiary enrollment, there are two points worth mentioning. First, between 2010 and 2011 the Kyrgyz Republic performed at only the 19th percentile of its characteristic-

specific distribution, with a negative (annual) growth rate of 1.9 percent. Second, tertiary enrollment might not be the best indicator by which to evaluate, since there are other factors stemming from the labor market, as well as the quality of tertiary education, which may be more relevant to assess the sector's current situation. As discussed in the National Sustainable Development Strategy (2013–2017), educational content needs to be urgently reformed to make tertiary education both relevant and compatible with the needs of the national labor market.

Education attainment. To evaluate educational attainment, we use the Barro-Lee data.¹⁷ The Kyrgyz Republic increased the average years of schooling of those 25 years or older from 8.1 in 1990 to 9.3 in 2010. Progress slowed in the last 5 years, with an annual growth rate of 0.2 percent. This is in line with a performance *only* below the level of the first decile of the characteristic-specific distribution. One could think that the low performance is typical of countries with high achievement. However, after controlling for GDP and time and regional dummies, the level of this indicator is at the 4th percentile of the characteristic-specific distribution.

A substantial target at the 75th percentile of the characteristic-specific distribution implies a 0.8 percent annual growth rate in the average years of schooling. This target would increase education to 10.4 years by 2025, a level that is similar to the 2010 educational attainment of other countries of the ECA region, such as Armenia, Albania, and Kazakhstan.

Quality of education. Improving the quality of education is one of the country's major challenges and priorities. Outcomes for the internationally standardized PISA exams indicate the educational system's failure to provide children with the relevant tools to become integrated in future labor markets. The Kyrgyz Republic was a bottom performer both in 2006 and 2009, with low achievements in math, reading, and science.¹⁸ However, the Kyrgyz Republic is the poorest country among those collecting information on education quality.

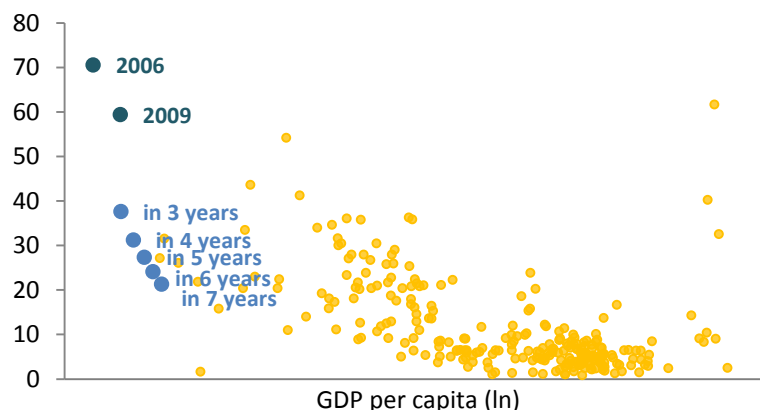
¹⁷ Data cover the period 1970–2010.

¹⁸ The Kyrgyz Republic did not take part in the PISA assessments in 2000, 2003, and 2012, and will not participate in PISA in 2015. However, even if not updated, data from PISA assessments in 2006 and 2009 are the most

We chose to measure quality of education with the indicator share of students below Level 1A in the PISA reading test. This is typically known as functional illiteracy.¹⁹ Students are not illiterate per se, but rather those who perform below Level 1A are unable to reach a reading proficiency needed to successfully undertake daily life's most basic reading tasks (see Annex A2). In 2006, 70.5 percent of the 15-year-old students who participated in the exam performed below Level 1A in reading. The Kyrgyz Republic improvements translated in lower share of students below Level 1A reaching 59.4 percent in 2009 (Figure 5.5).

The progress between 2006 and 2009, equivalent to a yearly reduction of 5.5 percent, was quite good compared to other countries but very poor for the Kyrgyz Republic. The country performed at the 62nd percentile of the raw distribution, but below the 10th percentile of the characteristic-specific distribution.

Figure 5.5. Projected evolution in PISA: Functional illiteracy



Source: Authors, based on WDI and PISA. Notes: Functional illiteracy is defined as the percentage of students below Level 1A in the reading exam (see Annex A2). Projections are based on the assumption of progress at the 75th percentile of the characteristic-specific distribution of changes measured in percentage points for the Kyrgyz Republic starting in 2009, which is the latest year information is available for the country.

We forecast the evolution of the Kyrgyz Republic in this indicator setting a target at the 75th percentile of the characteristic-specific distribution of change. This target would better

reliable evidence available regarding learning outcomes in the country. In 2009, the Kyrgyz Republic had average grades of 331 points in math, 314 points in reading, and 330 points in science.

¹⁹ Similar results are obtained when math or science are considered instead of reading. Also, outcomes are qualitatively similar when the scores are considered, rather than the shares of students below the lowest level.

position the Kyrgyz Republic, with only 21 percent of students functionally illiterate in 7 years. This share would be closer to 36 percent with a more conservative target at the 50th percentile.²⁰

In sum, students face a variety of educational opportunities and learning conditions in underperforming schools. Among the factors affecting learning are low coverage of preschool education, late entrance into primary school, overloaded school curricula, and the use of outdated teaching and learning methods not in line with international best practices. Spending efficiency is low across the education system, and sector financing sustainability is threatened by large outlays on wages following rapid wage growth during 2010–2012, with high shares of resources going toward food and utility costs. Lack of investment in the necessary teaching and learning materials contributes to low education quality, with Kyrgyz Republic students scoring at the bottom of 2009 PISA international learning assessments. Also, the examination system is still based on Soviet principles and has yet to be aligned with the market economy's requirements (World Bank, 2009). These issues clearly impact the labor market, as reported, for example, by employers in the Enterprise Survey of 2013. Around 33.1 percent of surveyed firms identified the inadequately educated workforce as a major constraint, saying that workers do not match firms' requirements. Coverage remains low in pre-primary education, while equitable education service provision varies widely across localities and social groups. The practices surrounding education sector governance could also be improved and aligned with international standards.

Social protection and labor

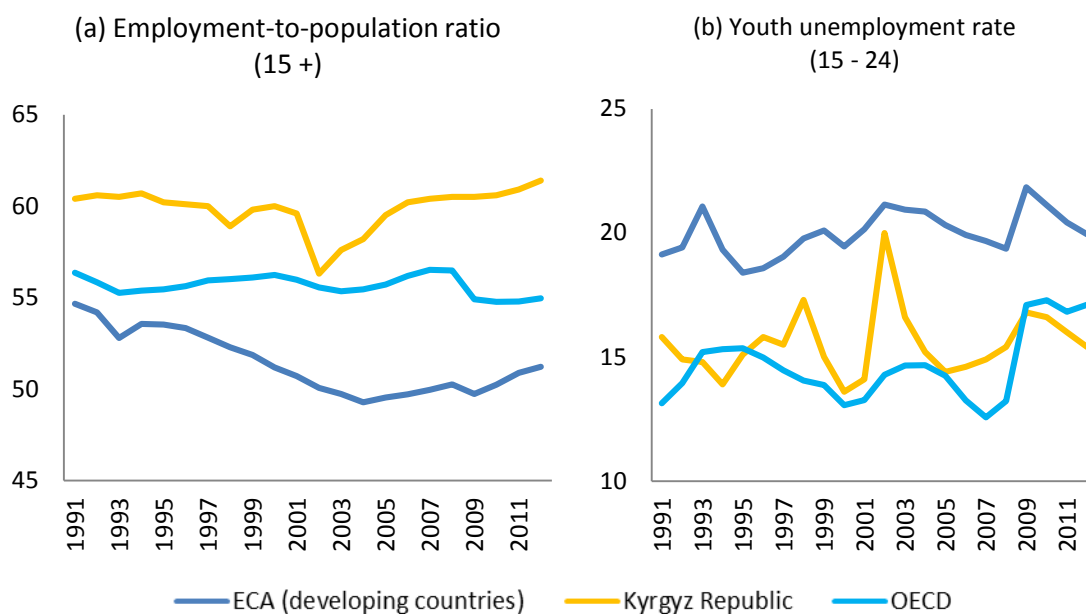
High employment rates and productive jobs are fundamental for growth, both to reduce dependence on social assistance and more generally to improve standards of living. In this section we review the results of applying the benchmarking methodology to select labor market and social protection indicators. However, many of the most common and

²⁰ As opposed to the rest of the analysis, these results are presented in percentage points instead of percentage rate of change. In addition, time and regional dummies were not included in the estimations.

informative indicators cannot be used because of data limitations or because they cannot be transformed into an indicator that is monotonically associated with improvement.

Labor Markets. At first glance, the Kyrgyz Republic appears strong in labor market indicators. The employment-to-population ratio is higher than the regional average and the Organisation for Economic Cooperation and Development (OECD) average for all the years considered. Youth unemployment is lower than the regional average and close to the OECD rate during most years (except for peaks in 1998 and 2002; see Figure 5.6).²¹

Figure 5.6. Evolution of labor market indicators



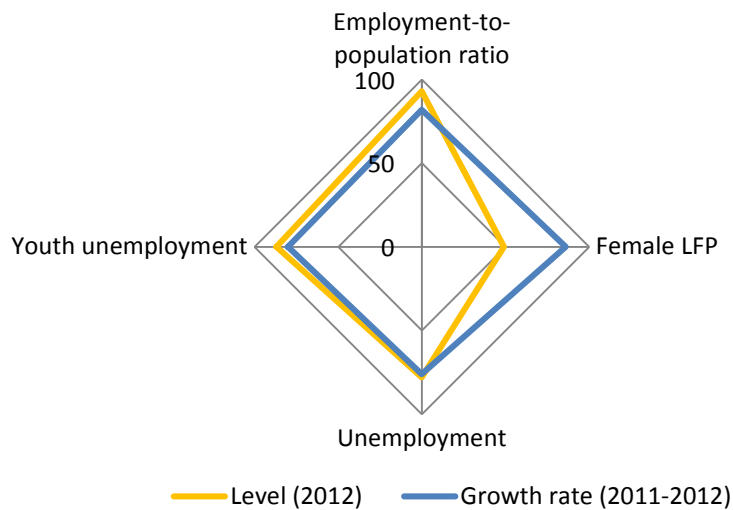
Source: KILM.

The benchmarking tool has been used to evaluate the performance of the country in four different indicators: the unemployment rate (as a percentage of the total labor force); the youth unemployment rate (for 15- to 24-year-olds); the employment-to-population ratio (for

²¹ Figures for unemployment, labor force participation, and the employment-to-population ratio are estimated on an annual basis. For the purpose of our analysis, it would be preferable to rely on national data for labor market indicators instead of using estimations provided by the ILO. However, as it was previously suggested, data for various years is not available for several countries, and cross-country comparability issues also arise.

the 25 years and older population); and the female labor force participation (for 15- to 64-year-olds). Looking at levels for each of these in 2012, the Kyrgyz Republic is close to the median in the raw distribution but above percentile 80 in the characteristic-specific distribution (except for female labor force participation).

Figure 5.7. Characteristic-specific performance on labor market indicators



Source: Authors, based on KILM.

In the four cases, changes in the indicators for 2011–2012 have gone in the “right” direction: unemployment has decreased (by 3.8 percent for youth and 2.3 percent in the case of total unemployment), and female labor force participation and employment-to-population ratio have increased (0.5 and 0.8 percent, respectively). In all cases, performance during the last period (2011–2012) was at the level of 75th percentile or higher of the characteristic-specific distribution for the Kyrgyz Republic. Figure 5.7 summarizes this information, showing the percentiles in the observed distribution for the four indicators in 2012, both in levels and annual growth rates. Results for employment-to-population ratio are quite robust when only the adult population (25 and older) is included. Although in this case performance between 2011 and 2012 was at the median of the raw distribution for the Kyrgyz Republic, it was around percentile 75 of the characteristic-specific distribution. Relying on the indicator for the adult population solves the potential non-monotonicity of the interpretation of this

indicator for youth population (that is, a higher employment-to-population ratio for 15- 24-year-olds might be associated with a reduction in schooling).²²

GDP per person employed was used to assess the evolution of labor productivity. The Kyrgyz Republic is only at the third decile of the raw and characteristic-specific distribution. However, the country performed at the level of the 69th percentile of the characteristic-specific distribution between 2011 and 2012, with a decrease of 0.6 percent in GDP per person employed during that period.

The National Sustainable Development Strategy (2013–2017) highlights the weak links existing between professional education and the requirements of national, regional, and global labor markets. The percentage of enterprises identifying an inadequately educated workforce as a major constraint has been rising steadily in the last 10 years, from 6.1 percent in 2002 to 33.6 percent in 2013.²³ These numbers are well above the (unweighted) average for the ECA region, which is 13.8 percent. Only two other countries—Moldova and Romania—have similar levels to the Kyrgyz Republic. Moreover, the country has a large share (compared to ECA) of unskilled workers among all production workers (25.7 and 21.1 percent, respectively, in 2013).

More promising, the pace of the increase in the share of firms with unmet educational requirements slowed down between 2009 and 2013, though this is not a stunning performance for the country.²⁴ The annualized growth rate of this indicator is at the 6th decile of the raw distribution, and at the median of the characteristic-specific distribution (Figure

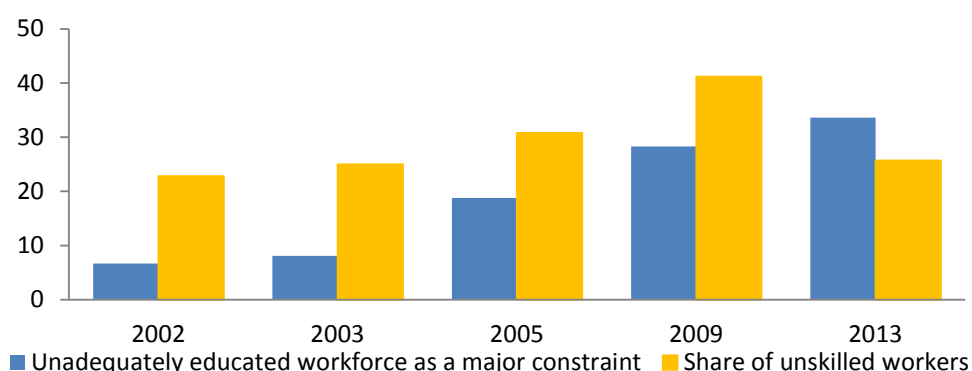
²² Unfortunately, we could not adjust female labor force participation in the same manner. Thus, the results should be taken with caution as the indicator is violating one of our assumptions.

²³ Enterprise Surveys for years 2002, 2003, 2005, 2009, and 2013. Unweighted regional averages have been calculated considering those countries belonging to the ECA region for which data for the 2013 Enterprise Survey is available.

²⁴ GDP per capita for 2013 is not available in WDI at the time this note was written. For that reason, GDP per capita for 2013 was calculated using the growth rates estimated at the Global Economic Prospects.

5.8).^{25, 26} Firms are making efforts to improve these shortcomings by increasing the formal training offered to workers (63.5 percent of firms offered formal training in 2013). Performance of this indicator in the last period (2009–2013) was exceptional, at the level of the 90th decile of the predicted distribution.

Figure 5.8. Interrelation between labor markets and education sectors



Source: World Bank Enterprise Surveys.

Informality in the labor markets is a great concern in the Kyrgyz Republic. In 2009, 59.2 percent of non-agricultural workers were employed in the informal sector. The share is higher for men (65.4 percent) than for women (50.7 percent); and in rural areas (63.5 percent) than in urban areas (54.7 percent). Informality in labor markets can aggravate the deterioration of the contributor to pensioner ratio, with a negative effect on the social protection system. According to the National Sustainable Development Strategy (2013–2017), the ratio of employed citizens to retired ones is slightly above one, while the ILO advises for a ratio closer to three contributors per each pensioner. This problem is exacerbated by the increasing number of migrant workers, who do not contribute to the social system. Also, according to data coming from the Household Budget Survey (HBS), 20 percent of youths are neither in school nor in the labor market (NEETs). The number of temporary workers might also be a proxy of the informality in the labor markets. This indicator was in 2012 only at the first decile

²⁵ Most of the results for the indicators coming from the Enterprise Survey are based on estimations for 9 deciles. The reduced number of observations made these estimations more reliable than those for 99 quantiles.

²⁶ Estimations for indicators coming from the Enterprise Survey exclude time dummies when the percentiles for the benchmarking rates are computed.

of the observed and the characteristic-specific distributions for the Kyrgyz Republic. Between 2009 and 2013, the number of temporary workers increased by 14.8 percent.²⁷

Summing up, the Kyrgyz Republic has a higher employment-to-population ratio and lower unemployment than the regional average (considering only developing countries in the ECA region). Female labor force participation declined by about 8 percent between 1990 and 2012, even though it is above regional averages. However, the fall in this indicator, coupled with a steady increase of female labor force participation in OECD countries, reversed the relation existing until 2002 (when female LFP was higher in the Kyrgyz Republic than in the OECD).

Social protection. Enhancing effectiveness of social assistance expenditure, including its impact on poverty, is one of the key challenges facing the social assistance system in the Kyrgyz Republic. Non-contributory social protection expenditure doubled between 2008 and 2011. Levels of coverage are high, and close to those of countries with high levels of poverty in the ECA region (In Figure 5.9, panel a, the Kyrgyz Republic is to the left with respect to other countries with similar levels of poverty incidence). However, performance of the system in terms of coverage of the poor, targeting accuracy, and impact on poverty did not improve. For example, for the same level of coverage, targeting is relatively low in the Kyrgyz Republic compared to other countries (Figure 5.9, panel b).

Given the nature of social protection indicators, we could not apply the benchmarking methodology to them, as none satisfied the conditions (i) to (iv) of Section II “Benchmarking methodology.” By swiftly looking at the outcomes, we can highlight the following facts of the sector in the Kyrgyz Republic:²⁸

- A large share of the population continues to be poor, despite the significant decline on poverty over the last decade.

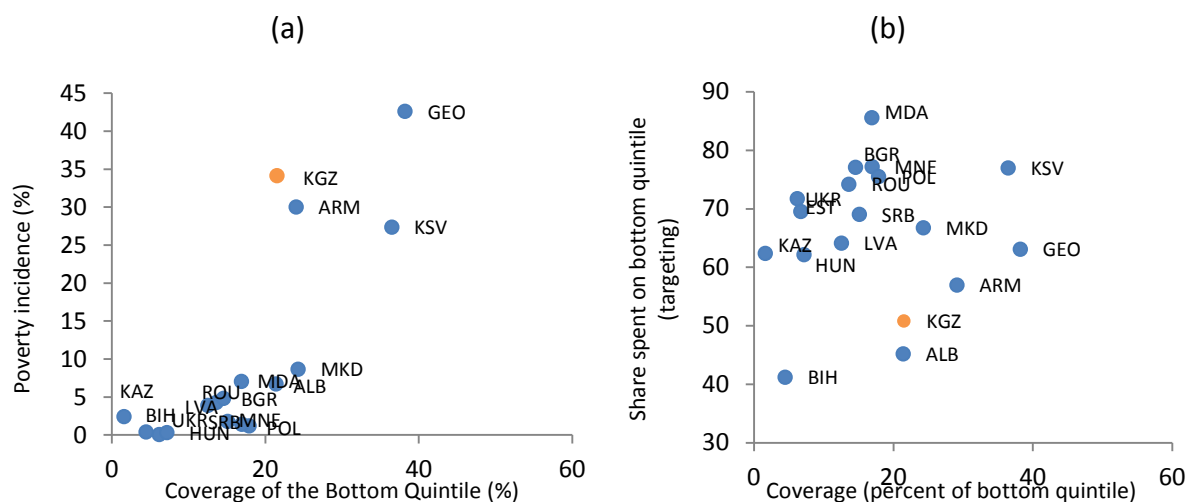
²⁷ Estimations for the number of temporary workers also control by the number of permanent full-time workers, also obtained from the Enterprise Survey.

²⁸ This section draws on Mamadaliev, 2014.

- The social protection system is complex, and spending on select programs has significantly increased in 2010 and remained stable since then.
- The Monthly Benefit to Poor Families with Children Program (MBPF) is the most pro-poor program.²⁹
- Data suggest that the pension transfer is very important for poor beneficiary households.
- The impact of the main program in reducing poverty remains low (see Figure 5.10), with the MBPF being the most efficient program reducing the poverty gap, followed by pensions.

Table 5.1 summarizes the results for our preferred specification, presented in the previous section.³⁰

Figure 5.9. Poverty incidence, coverage, and targeting for ECA countries

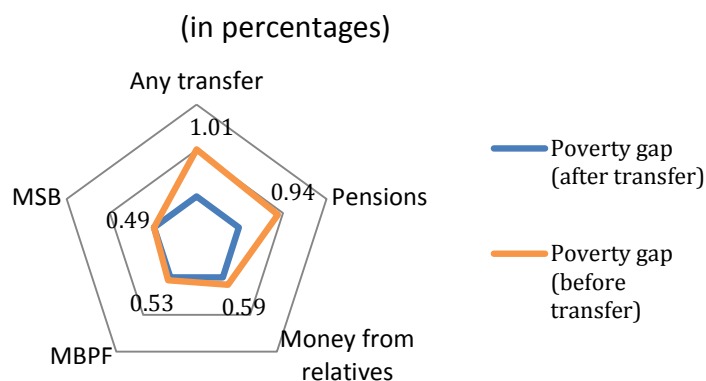


Source: SPEED. Notes: Latest year available between 2007 and 2012. In particular, data for Kyrgyz Republic is for 2007. Poverty incidence is measured as poverty headcount ratio at US\$2.5/PPP a day.

²⁹ For more details see Figure 6 of Mamadaliev, 2014.

³⁰ These results are presented in an accompanying graphical two-page note.

Figure 5.10. The extreme poverty gap, 2011



Source: Mamadaliev, 2014. Notes: Based on KHS 2011.

VI. Summary

This assessment of the social sector outcomes based on benchmarking methodology reveals that the Kyrgyz Republic has made important strides in many social areas, often achieving more than expected, especially once the Kyrgyz Republic's initial conditions are taken into account. However, there are key areas that demand attention, and in some cases even further resources. Most of these areas are rightly identified by the country in its sector development plans, and described in depth in recent analytic products produced by the World Bank (2014b, 2014c).

In the area of health, the Kyrgyz Republic has exhibited outstanding progress in reducing undernourishment and child mortality. During the first decade and half of the new millennium, the country performed at the maximum expected for its initial position—that is, the initial levels of the indicator, the initial GDP per capita, and the growth of the GDP per capita. The country achieved the 99th and 87th percentiles in the characteristic-specific distribution. Regarding vaccinations and non-communicable diseases, however, lack of data has prevented us from applying the benchmark methodology. However, the analysis of the data corroborates the messages transmitted in other World Bank reports (World Bank,

2014b), which state the Kyrgyz Republic is doing well in tackling epidemiological diseases, although multidrug-resistant tuberculosis is a concern. Despite this, challenges remain when it comes to non-communicable diseases, especially for chronic and cardiovascular ones that are a major cause of death in the country

Table 5.1. Benchmarking exercise for social sectors in Kyrgyz Republic

	Indicator's level				Indicator's growth rate (annualized percentage change)				
	2000	2012	Raw ptile. level ²	Characteristic-specific ptile. level ²	Last change (in %)	Last period of change	Raw ptile. growth rate ³	Characteristic-specific ptile. growth rate ³	Target ptile. 75 th (%)
HEALTH, NUTRITION, AND POPULATION									
Maternal mortality ratio (modeled, per 100,000 live births)	100.0	75.0	51	13	-1.7	2010/13	35	33	5.6
Maternal mortality ratio (national, per 100,000 live births)	49.0	63.5	42	8	15.5	2008/09	15	30	-25.7
Adolescent fertility rate (births per 1,000 women age 15–19)	34.4	29.8	67	58	-0.3	2007/12	19	10	-4.7
Mortality rate, neonatal (per 1,000 live births)	22.7	14.2	52	40	-5.3	2011/12	88	86	-4.1
Mortality rate, infant (per 1,000 live births)	42.4	23.6	52	37	-6.0	2011/12	87	84	-4.8
Mortality rate, under 5 (per 1,000 births)	49.8	26.6	53	36	-6.3	2011/12	88	84	-5.1
Immunization, measles (% children ages 12–23 months)	98.0	98.0	88	65	1.0	2011/12	58	76	1.0
Prevalence of undernourishment (% of population)	16.8	5.9	77	67	-22.4	2011/12	98	94	-5.0
Tuberculosis prevalence rate (per 100,000 population)	449.0	217.0	35	42	2.8	2011/12	24	33	-6.9
EDUCATION									
School enrollment, pre-primary (% gross)	9.8	24.7	26	22	18.9	2011/12	93	95	7.8
School enrollment, primary (% gross)	95.9	105.9	66	78	4.9	2011/12	90	97	1.1
School enrollment, secondary (% gross)	84.3	88.2	58	38	5.0	2010/11	80	98	1.9
School enrollment, tertiary (% gross)	34.8	41.3	71	54	-1.9	2010/11	16	19	7.7
Average years of total schooling, age 25+ total (Barro-Lee)	9.2	9.3	74	16	0.2	2005/10	9	4	0.8
PISA: 15-year-olds performing below Level 1A in reading	70.5	59.4	1	6	-5.6	2006/09	62	10	-18
LABOR MARKETS									
Employment-to-population ratio (15+) (ILO estimates)	60.0	61.4	64	93	0.8	2011/12	75	82	0.4
Employment-to-population ratio (25+) (ILO estimates)	67.9	70.7	69	90	0.1	2011/12	52	76	0.1
Female labor force participation (15–64) (ILO estimates)	61.4	59.3	54	49	0.5	2011/12	56	86	0.2
Unemployment rate (ILO estimates)	7.5	8.4	40	78	-2.3	2011/12	65	76	-2.0
Unemployment rate, youth (15–24) (ILO estimates)	13.6	15.4	47	87	-3.8	2011/12	72	80	-2.2
GDP per employed person (constant 1990 PPP USD)	5,947	7,175	27	33	-0.6	2012/11	22	69	-0.4
Firms identifying inadequately educated workforce (%)	6.7	33.6	21	1.5	4.4	2009/13	56	41	-20
Share of firms offering formal training	47.9	63.5	87	98.5	20.9	2009/13	93	90	8.3
Number of temporary workers	9.9	17.2	5	2	-	2009/13	-	-	-28
Share of unskilled workers (out of all production workers) (%)	22.8	25.7	51	21	-11.13	2009/13	84	60	-17

Notes: Data in first column correspond to year 2000 except for national maternal mortality (2003), adolescent fertility rate (2002), share of students below Level 1A in PISA (2006) and indicators of the Enterprise Survey (2002 and 2007). Data for last year of data availability (second column) is as of 2012, except for modeled maternal mortality (2013), national maternal mortality (2009), secondary and tertiary enrollment (2011), average years of total schooling (2010), share of students below Level 1A in PISA (2009) and Enterprise Survey

indicators (2013). For levels, characteristic-specific percentiles are based on estimations, including the GDP per capita and time and regional dummies. For growth rates, characteristic-specific percentiles include the initial value of the indicator in each period of change, the GDP per capita, the GDP per capita growth rate, and time and regional dummies. For modeled maternal mortality, GDP and GDP per capita growth have been excluded from the estimations. Estimations for indicators from the Enterprise Survey in rates exclude time dummies.

In the area of maternal mortality, the country performed at the 60th percentile of the expected distribution of 1990–2000. This performance has not been enough to achieve the MDG, and the analysis let us conclude that the target was simply too high for the country, and the performance was not significantly below a more realistic target at the 75th percentile. Some argue that part of the problem relates to measurement issues in maternal mortality, as there is almost universal access to skill birth attendance and prenatal controls, and some differences between national and model estimates. Thus, in going forward, the country should focus on addressing the measurement issues as well as improving efficiency in the delivery of maternal health.

In education, the picture is also mixed, with the Kyrgyz Republic showing high levels of access to education in primary and secondary levels while low levels in pre-primary and tertiary ones. The progress has been also uneven, depending on the level, fantastic improvements for pre-primary, where the enrollment rate increased by 19 percent, a performance at the 95th percentile of the characteristic-specific distribution between 2011 and 2012. In this area, the country needs to continue with this high level of performance for the next decade if it wants to achieve similar levels of enrollment to those observed in OECD counties. However, the big challenges of the country are tertiary education, and more importantly quality of education achievement. Improvements in achievement were also low, with the country placed below the first decile of the characteristic-specific distribution for the indicator of annual growth in (average) years of education. The performance of the Kyrgyz Republic in terms of progress in the annual growth of the percentage of functional literacy was extremely low: at the 6th percentile of the characteristic-specific distribution.

In-depth analysis of the sector suggests that in order to improve the outcomes on these lagging areas, the country needs to tackle the low efficiency of the education system, address

issues of financial sustainability (as there are massive outlays on wages that are not translating into higher education quality), and, more generally, improve the governance of the sector by adopting and reaching international standards.

When it comes to employment, the Kyrgyz Republic seems to be performing well, with high levels of employment and low levels of unemployment. However, a closer look at the dynamics of the labor market might raise some flags of alert. Informality seems to be growing, as well as the percentage of NEET youth, and the incipient fall in female labor force participation. If the country wants to take advantage of this stage of growth, it becomes very important that it focus on setting clear targets to maintain high levels of formal and productive employment for all groups of the population. The benchmark methodology employed in this analysis can be of help in setting credible and feasible targets that proved useful in the health sector.

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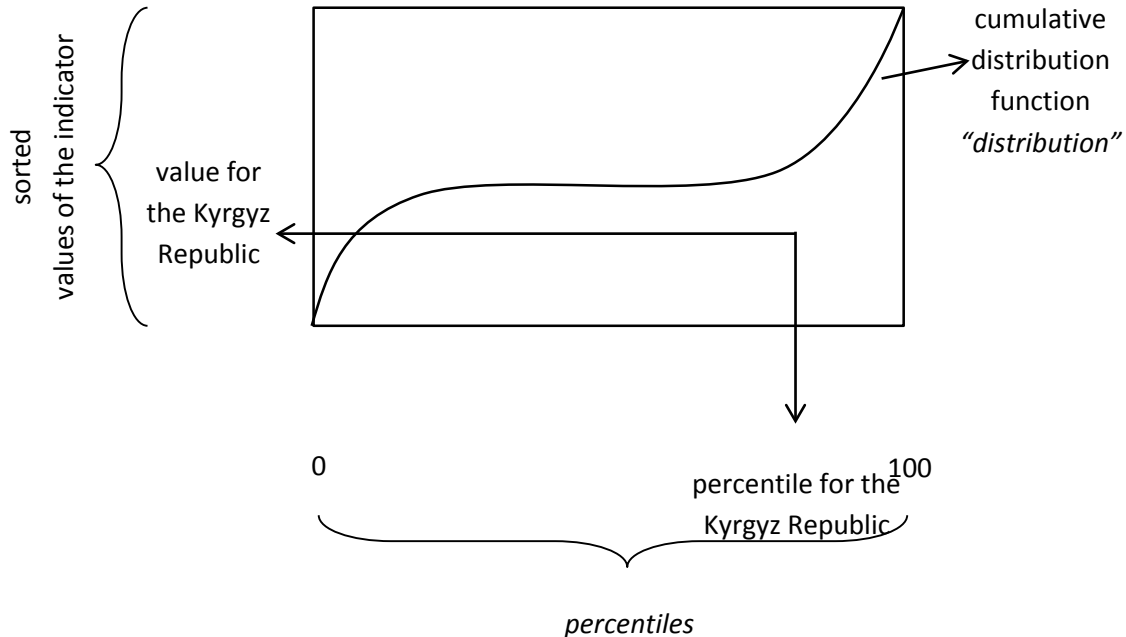
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Annex A1. Methodology

Country performance in a certain social sector is measured by the *percentile* in which the country falls in the *distribution* of the relevant social sector indicator. By distribution we refer to the cumulative distribution function that—after sorting all values of the indicator—denotes for each value of the indicator the percentage of cases that have a lower value. The percentile indicates the percentage of the cases—in our case countries—that have a value below that observed for the country. Figure A1.1 shows the graphic representation of the two concepts.

Figure A1.1. Visualization of *percentile* and *distribution* concepts



The performance can be assessed relative to the outcomes of other countries—which we will call *raw performance*—or also taking into account the country's characteristics—which we will call *characteristic-specific performance*. The *raw performance* is the percentile in which the country falls in the *raw distribution*; that is, the cumulative distribution function of all observed values of the indicator. For example, a value of 50 of the observed performance indicates that the country has performed better than half of the countries in the sample.

The *characteristic-specific performance* is the percentile where the country falls in a *characteristic-specific distribution* that takes into account the country's key characteristics such as its initial position or per capita GDP. The predicted distribution is a counterfactual distribution estimated using quantile regressions over the whole sample of countries and country-specific information.

Consider the case in which we are interested in explaining the yearly change in PISA scores—measured in points—and take into account the initial conditions in terms of quality of education. To maximize the information we include in all the episodes of change of the indicator based on all countries and years available. The first step is to estimate quantile regressions like the following:

$$\Delta Y_i = \beta_q Y_{0i} + \varepsilon_i$$

where ΔY_i is the annual change in the PISA score for episode i , Y_{0i} is the initial value of PISA used to compute change episode ΔY_i , β_q is the estimated coefficient of quantile regression for quantile q , and ε_i is an error term. There are N episodes of change that can be estimated for C countries over T years. Next, the estimates of the quantile regression are combined with the country (episode) values to compute the predicted distribution of changes given country characteristics as follows:

$$\widehat{\Delta Y}_{c,q} = \widehat{\beta}_q Y_{0c} \quad q = 1, \dots, 99$$

where $\widehat{\Delta Y}_{c,q}$ is the predicted change for country c , given country's c characteristics Y_{0c} and performing at quantile q . Unless otherwise indicated, 99 quantile regressions are estimated. Then, the 99 values of $\widehat{\Delta Y}_{c,q}$ form the predicted distribution of country c . The predicted performance is the percentile where ΔY_c falls in the predicted distribution. If country c is performing low given characteristics Y_{0c} , then it will be placed in the graph among the bottom dots for level Y_{0c} , and the level of change can be approximated with the low quantile regression. If country c is performing well, then the observed change will be among the top dots in the graph, and the predicted change can be approximated with the high quantile

regression. These last two steps can be visualized in Figures A1.2 and A1.3, and exemplified in Figure A1.4 for the indicator enrollment in pre-primary schooling.

Figure A1.2. Quantile regressions used to estimate predicted performance distribution

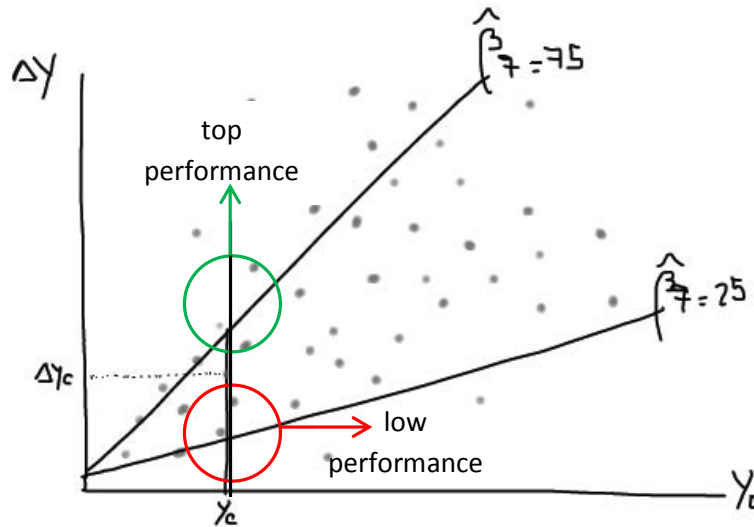
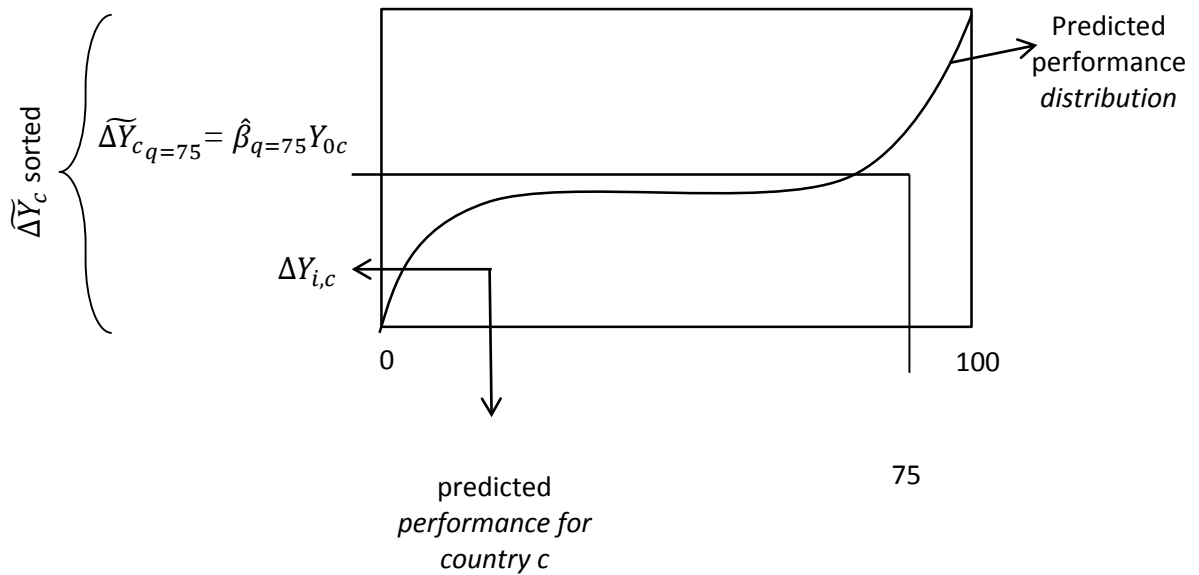
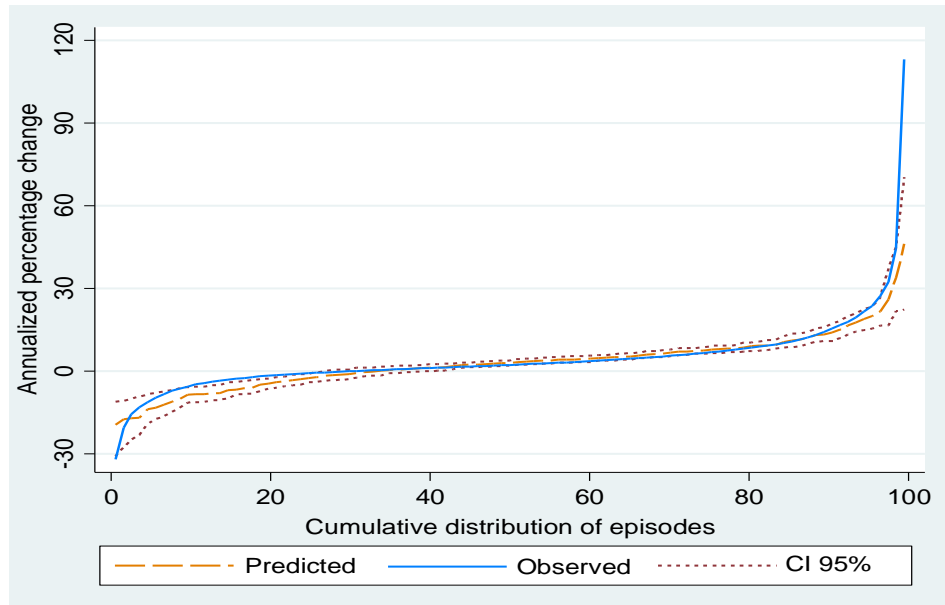


Figure A1.3. Characteristic-specific performance distribution



Next, we illustrate the methodology with the indicator pre-primary enrollment.

Figure A1.4. Illustration of methodology using pre-primary enrollment



Annex A2. List of indicators

Indicator name	Source of data	MDG	Exercise	Reason for exclusion
GDP per capita (constant 2005 USD, PPP)	WDI	No	No	-
Population (total)	WDI	No	No	-
Population living below US\$2 (PPP)	WDI	No	No	-
HEALTH, NUTRITION, AND POPULATION				
Maternal mortality ratio (modeled estimate, per 100,000 live births)	WHO	Goal 5	Yes	-
Teenage fertility rate (births per 1,000 women age 15–19)	UN World Population Prospects	Goal 5	Yes	-
Births attended by skilled health staff (% of total)	UNICEF	Goal 5	No	Data coverage
Mortality rate, infant (per 1,000 live births)	UN Inter-agency Group for Child Mortality Estimation	Goal 4	Yes	-
Mortality rate, neonatal (per 1,000 live births)	UN Inter-agency Group for Child Mortality Estimation	Goal 4	Yes	-
Mortality rate, under 5 (per 1,000 births)	UN Inter-agency Group for Child Mortality Estimation	Goal 4	Yes	-
Immunization, measles (% children ages 12–23 months)	WHO and UNICEF	Goal 4	Yes	-
Prevalence of undernourishment (% of population)	FAO	Goal 1	Yes	-
Tuberculosis prevalence ratio (per 100,000 population)	WHO	Goal 6		-
Cardiovascular diseases and diabetes (deaths per 100,000, male)	WHO	No	No	Data coverage
EDUCATION				
School enrollment, pre-primary (% gross)	UNESCO, EdStats	No	Yes	-
School enrollment, primary (% gross)	UNESCO, EdStats	Goal 2	Yes	-
School enrollment, secondary (% gross)	UNESCO, EdStats	No	Yes	-
School enrollment, tertiary (% gross)	UNESCO, EdStats	No	Yes	-
Average years of total schooling, age 25+ total (Barro-Lee)	Barro-Lee Dataset, EdStats	No	Yes	-

PISA: 15-year-olds performing below Level 1A in reading	OECD, EdStats	No	Yes	-
Persistence to last grade of primary school (% of cohort)	UNESCO	Goal 2	No	Data coverage
Gross lower secondary graduation ratio	UNESCO	No	No	Data coverage
Gender parity index for secondary gross enrollment ratio (%)	UNESCO	Goal 3	No	Relevance for social sectors
LABOR MARKETS				
Employment to population ratio (15+) (ILO estimates)	KILM – ILO	Goal 1	Yes	-
Employment to population ratio (25+) (ILO estimates)	KILM – ILO	Goal 1	Yes	-
Female labor force participation (15–64 years old) (ILO estimates)	KILM – ILO	No	Yes	-
Unemployment rate (15–64 years old) (ILO estimates)	KILM – ILO	No	Yes	-
Unemployment rate, youth (15–24 years old) (ILO estimates)	KILM – ILO	No	Yes	-
GDP per person employed (constant 1990 PPP USD)	KILM – ILO	No	Yes	-
Percentage of firms identifying inadequately educated workforce as a major constraint	Enterprise survey	No	Yes	-
Percent of firms offering formal training	Enterprise Survey	No	Yes	-
Share of unskilled workers (out of all production workers) (%)	Enterprise Survey	No	Yes	-
Number of temporary workers	Enterprise Survey	No	Yes	-
Not in employment, education, or training (% of 15- 24-year-olds)	Kyrgyz Republic Household Budget Survey (HBS)	No	No	Data coverage and cross-country comparability issues
SOCIAL PROTECTION				
Benefits incidence in the poorest quintile (%)—all social protection	ASPIRE	No	No	Data coverage
Coverage in the poorest quintile (%)—all social protection	ASPIRE	No	No	Data coverage
Generosity of benefits in the poorest quintile (%)—all social protection	ASPIRE	No	No	Data coverage
Old-age dependency ratio	UN World Population Prospects	No	No	Non-monotonicity of outcomes
Child dependency ratio	UN World Population Prospects	No	No	Non-monotonicity of outcomes

Indicators selected for the benchmarking exercise

Health, nutrition, and population

Undernourishment (% of population). This indicator is available at the Health, Nutrition and Population database and is originally elaborated on by the FAO. The indicator is constructed with the following caveats: 1) It is bottom-censored. The indicator takes on a value of 5 every time that the undernourishment rate is estimated to be lower than 5 percent. This may introduce some bias in the exercise, because it is impossible to calculate in an accurate way the growth rate for this indicator in all cases that it takes on a value of 5 for a certain year and country. 2) Data for this indicator are not available for developed countries, which may introduce a source of bias in the estimations.

Teenage fertility rate (birth per 1,000 women, 15–19 years old). Data on this indicator has been obtained from the UN World Population Prospects. Estimations are performed for five-year intervals. For the exercise, data was imputed to the middle year of the interval, as was done in the WDI database. However, estimations included in the WDI database for the remaining years of each interval have been disregarded.

Maternal mortality ratio (modeled estimate, per 100,000 live births). This estimator accounts for the number of women who die from pregnancy-related causes while pregnant or within 42 days of pregnancy termination per 100,000 live births. The data are estimated by WHO, UNICEF, UNFPA, the World Bank, and the United Nations Population Division with a regression model using information on the proportion of maternal deaths among non-AIDS deaths in women ages 15–49, fertility, birth attendants, and GDP.³¹ Estimations are presented every five years. The use of GDP as a control variable in the quantile regressions may affect the validity of the estimations. National estimates would be a preferable source of data for the benchmarking exercise. However, national estimates were not used in the

³¹ World Bank, 2014a.

analysis due to lack of coverage. In particular, for the Kyrgyz Republic, national estimates are only available 2003, 2006, 2008, and 2009.

Child mortality indicators. Three different indicators are used: a) neonatal mortality rates (per 1,000 live births)—this is the number of newborns who die before reaching 28 days of life, per 1,000 live births; b) infant mortality rate (per 1,000 live births)—this is the number of infants who die before reaching one year of age, per 1,000 live births; and c) the under-5 mortality rate (per 1,000)—this is the probability per 1,000 that a newborn will die before the age of five. The three indicators are annually estimated by the UN Inter-agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UN DESA Population Division) and are available at www.childmortality.org and the Health Stats database.³²

Tuberculosis prevalence ratio (per 100,000 population). This indicator measures the number of illnesses, accidents, or sick persons per 100,000, including patients with HIV. Estimations for this indicator are made on an annual basis by the WHO. The difference between prevalence of tuberculosis and incidence of tuberculosis is the second indicator only takes into account new tuberculosis cases, while prevalence includes both new and old cases.³³

Immunization, measles (% of children ages 12–23 months): this estimator is provided by WHO and UNICEF and measures the percentage of children ages 12–23 months who received vaccination before 12 months or at any time before the survey. A child is completely immunized against measles after receiving one dose of the vaccination.³⁴

Education

Enrollment ratios. For all school levels (pre-primary, primary, secondary, and tertiary) quantile regressions were run and results were presented for gross enrollment ratios instead of net enrollment ratios. Gross enrollment ratios include students in a corresponding school level, independently of the student's age. Total number of students may exceed the

³² Further information about the estimations method can be found in Alkema and Rou New, 2013.

³³ World Bank, 2014a.

³⁴ World Bank, 2014a.

population of the age group that officially belongs to a certain school level for reasons such as early enrollment, late enrollment, and/or repetition. For that reason, gross enrollment rates may be higher than 100 percent in some cases.

Average years of total schooling, age 25+, total. Data for this indicator are obtained from the Barro-Lee dataset and are available at The World Bank Group EdStats data portal. This dataset on educational attainment contains series for 146 countries, from 1950 to 2010. Data are disaggregated by gender and at five-year age intervals. Attainment is estimated for total schooling and for different educational levels.³⁵ The last year of data availability is 2010. In particular, estimations in this exercise use data for the average years of total schooling for the age group 25 and older. Criteria for selection of this indicator are twofold: 1) using total schooling instead of primary, secondary, or tertiary schooling avoids issues of country comparability in terms of number of years for formal education; and 2) the age group 25 and older is expected to have finished formal education, and this indicator accounts for the total stock of education.

PISA. Performance below Level 1A. In 2000, 2003, and 2006, PISA assessments used a proficiency scale from Level 1 to Level 5. However, in 2009 and 2012 the scale was modified to include Level 1B, Level 1A, and Levels 2 to 6. In order to harmonize the data for different years, an indicator “Performance below Level 1A in Reading” was built with the following caveats: 1) Data used to construct the indicator comes from the EdStats database at the World Bank. 2) For 2000, 2003, and 2006, data for performance below Level 1A is not available at EdStats, while data for performance at Level 1A is included under the indicator “PISA: 15-year-olds by reading proficiency level (%). Level 1A” in EdStats. Then, the indicator for “Performance below Level 1 in reading” is calculated as a difference of 100% and the indicators in the categories Level 1A and Level 2 to Level 5. 3) In 2009 and 2012, the Level 1 was disaggregated between Level 1A and 1B. To allow comparability, “Performance below

³⁵ Barro and Lee, 2010.

Level 1 in reading” for 2009 and 2012 is calculated as the sum of those students performing below Level 1B and those performing at Level 1B.

Labor Markets

Employment-to-population ratio (15+) (ILO estimates). This indicator is measured as the share of working age population in a country that is employed in a certain period and country. ILO estimates are harmonized to account for differences in national data, methodology, and data coverage. Data for this indicator can be found at the Key Indicators of the Labor Market (KILM) database and may differ from national estimates.³⁶ A high employment-to-population ratio is not necessarily associated with decent work in a country. Besides, a low employment-to-population ratio is not a negative outcome *per se*. For example, a high employment-to-population ratio among youth may reflect a lack of access to the educational system.³⁷ In all cases, a complete assessment of labor market conditions should be complemented with additional indicators to account for decent employment and labor informality. However, there is a consensus of the relevance of this indicator for country comparisons. Employment-to-population rate has even become one of the four indicators selected to monitor the achievement of target 1b of the MDGs.³⁸ In this exercise, we assumed that a higher value of the indicator is associated with a better outcome for the country.³⁹

Employment-to-population ratio (25+) (ILO estimates). This indicator is estimated with the same consideration as employment-to-population ratio (15+), presented above. However, it excludes youth in the age group 15–24 and focuses only on the adult population.

³⁶ The series includes both nationally reported and imputed data. Estimates are based mainly on nationally representative labor force surveys, with other sources (population censuses and nationally reported estimates) used only when no survey data are available (World Bank, World Development Indicators database).

³⁷ The indicator used in this exercise uses data for the population aged 15 and older. It would have been preferable to use data for the age group 25–64, to avoid issues associated with differences in the school system. However data for this age group was not available.

³⁸ The target 1b of the MDG is “achieving full and productive employment and decent work for all, including women and young people.”

³⁹ Additional information on this indicator and other indicators obtained from KILM database and estimated by the ILO can be found at: <http://kilm.ilo.org/2011/download/kilmcompleteEN.pdf>.

Female labor force participation rate (15–64 years old) (ILO estimates). This indicator measures the share of 15–64 females that are economically active, either by working or looking for a job. This provides an estimate of the size of the labor force that is available for the production of goods and services. In particular, monitoring the evolution of female labor force participation may be very relevant in those countries where women are not typically engaged in labor markets. The same considerations that apply for the employment-to-population ratio apply for this indicator.⁴⁰

Unemployment rate (15–64 years old) (ILO estimate). This indicator measures the share of the labor supply that is currently employed but is actively looking for a job. Together with the employment-to-population ratio, this is a typical indicator used to monitor the evolution of the labor market in a country. Although unemployment is not a desirable situation, low unemployment rates in developing countries may be masking weak safety nets or unemployment insurance, which make it unbearable for people to be unemployed. In these cases, low unemployment rates may be associated with lack of decent work and labor underutilization. The same considerations that apply for the employment-to-population ratio apply for this indicator.⁴¹

Youth unemployment (15–24 years old) (ILO estimates). Youth unemployment refers to the share of youth that are currently unemployed but who are actively looking for a job. The same considerations that apply in the case of unemployment apply for this indicator.⁴² Although not explicitly included in the exercise, NEETs (not in education, employment, or training) are a relevant indicator to get a more complete overview of a country's young population. NEETs are those who are not engaged in the labor market but are not in school. A high proportion of NEETs may reflect both a poor quality education system and weak access and lack of opportunities for a country's young population.

⁴⁰ See footnote 33 and 36.

⁴¹ See footnote 33 and 36.

⁴² See footnote 33 and 36.

GDP per person employed (constant 1990 PPP USD). This indicator measures the GDP divided by the total employment in a given country. Purchasing power parity (PPP) GDP is GDP converted to 1990 constant international dollars using PPP rates. This indicator is a proxy of labor productivity, which is used to assess a country's economic ability to create decent employment opportunities with fair and equitable remuneration. Increase in labor productivity is relevant from a social perspective since it can improve social protection and reduce poverty. Country comparability issues may arise when using this indicator.

Share of firms identifying an inadequately educated workforce as a major constraint (%).

This indicator is obtained from the Enterprise Survey.⁴³ This survey is based on firm-level microdata, obtained from a representative sample of the private sector in each country. This specific question is based on the respondent's opinion of which are the major constraints for a firm's growth in the country. Interpretation of the results may take into account potential sample bias (not all the countries are surveyed in all the periods). In particular, in the case of the Kyrgyz Republic, data for the Enterprise Survey is available for five years. However, for most countries it is only available for at most two or three years. Observations are lost for those countries for which data is available for only one year. Besides, data for the Enterprise Survey only covers the period 2002–2013.⁴⁴

Share of unskilled workers (out of all production workers) (%). Data for this indicator also come from the Enterprise Survey. The same caveats that apply for the previous indicator apply here (see footnote 41). In particular, data for this indicator is constrained to manufacturing firms.

Number of temporary workers. Data for this indicator was obtained from the Enterprise Survey. This indicator captures the number of short-term and full-time workers employed by

⁴³ The Enterprise Surveys conducted in the Eastern Europe and Central Asian countries are also known as Business Environment and Enterprise Performance Surveys (BEEPS). These surveys are jointly implemented by the World Bank and the European Bank for Reconstruction and Development.

⁴⁴ Additional information on Enterprise Surveys and methodological issues can be found at: <http://www.enterprisesurveys.org/Methodology>.

the firm throughout the fiscal year. These employees have no guarantee of their contract being renewed. This variable might be a proxy of work informality and may also reflect the inflexibility of firms to contract long-term workers.

Percent of firms offering formal training. Data for this indicator come from the Enterprise Survey. This indicator measures the share of firms that offer formal training programs to their permanent, full-time workers.

Annex A3. Robustness checks

This annex summarizes the results of the benchmarking exercise, considering different specifications of the main regressions presented in Section 5.

Panel A of Table A3.1 presents the same specifications as in Section 5, but excludes time and regional dummies. Panel B of the table includes a single dummy for ECA, irrespective of the countries' income level.

Table A3.2 presents the benchmarking exercise when the sample of years and countries is changed. Panel A restricts the sample to ECA countries (considering all income levels) and includes time dummies every five years. Panel B slightly changes the baseline sample, excluding observation prior to 1993 and including time dummies. Finally, Panel C removes the last observation for each country, computing the percentiles for the previous year with the available data and for the penultimate percentage change.⁴⁵

⁴⁵ Specifications in Panel B and C of Table A3.2 are modifications to baseline specification in Panel A of Table A3.1. Regional dummies were not included in these specifications.

Table A3.1: Baseline specification

		Panel A: Baseline specification				Panel B: ECA is treated as a single region (all income levels). Time and regional dummies are included			
	Last period of change	Raw pctile. Level ²	Characteristic-specific pctile.	Raw pctile. growth rate ³	Characteristic-specific pctile. growth rate ³	Raw pctile. level ²	Characteristic-specific pctile. level ²	Raw pctile. growth rate ³	Characteristic-specific pctile. growth rate ³
HEALTH, NUTRITION, AND POPULATION									
Maternal mortality ratio (modeled, per 100,000 live births)	2010/13	51	51	54	55	51	1	35	42
Maternal mortality ratio (national, per 100,000 live births)	2008/09	42	60	15	15	42	9	15	29
Adolescent fertility rate (births per 1,000 women age 15–19)	2007/12	67	87	19	18	67	53	19	12
Mortality rate, neonatal (per 1,000 live births)	2011/12	52	76	88	90	52	23	88	82
Mortality rate, infant (per 1,000 live births)	2011/12	52	74	87	88	52	22	87	85
Mortality rate, under 5 (per 1,000 births)	2011/12	53	77	88	89	53	25	88	85
Immunization, measles (% children ages 12–23 months)	2011/12	88	91	57	85	88	72	57	87
Prevalence of undernourishment (% of population) ⁴⁶	2011/12	77	80	98	99	-	-	-	-
Tuberculosis prevalence rate (per 100,000 population)	2011/12	35	46	24	23	35	16	24	31
EDUCATION									
School enrollment, pre-primary (% gross)	2011/12	27	41	93	90	27	13	93	93
School enrollment, primary (% gross)	2011/12	66	61	90	92	66	72	90	98
School enrollment, secondary (% gross)	2010/11	59	89	80	90	59	32	80	95
School enrollment, tertiary (% gross)	2010/11	71	94	16	14	71	55	16	14
Average years of total schooling, age 25+ total (Barro-Lee)	2005/10	74	90	9	10	74	32	9	6
PISA: 15-year-olds performing below Level 1A in reading	2006/09	1	1	62	6	1	1	62	10
LABOR MARKETS									
Employment-to-population ratio (15+) (ILO estimates)	2011/12	64	63	75	81	64	95	75	83
Employment-to-population ratio (25+) (ILO estimates)	2011/12	69	64	52	55	69	94	52	72
Female labor force participation (15–64) (ILO estimates)	2011/12	54	54	56	56	54	41	56	79
Unemployment rate (ILO estimates)	2011/12	40	45	65	75	40	77	65	71
Unemployment rate, youth (ILO estimates)	2011/12	47	49	72	81	47	83	72	78
GDP per employed person (constant 1990 PPP USD)	2011/12	27	61	23	81	27	9	23	73
Firms identifying inadequately educated workforce (%)	2009/13	21	19	60	60	21	10	60	50
Share of firms offering formal training	2009/13	87	92	92	91	87	99	92	90
Number of temporary workers	2009/13	5	15	14	11	5	10	14	40
Share of unskilled workers (out of all production workers) (%)	2009/13	49	56	79	85	49	10	79	50

Notes: Percentiles correspond to the same periods as in Table 5.1. Estimations for maternal mortality exclude GDP per capita and GDP per capita growth. Estimations for the Enterprise Survey estimators were in some cases approximated to the closest decile.

⁴⁶ Specification in Panel B is not presented because it mimics results in Table 5.1 of Section V. Since this indicator was only estimated for developing countries, ECA region is equal to ECA developing.

Table A3.2: Additional specifications with changes to the sample

	Last period of change	Panel A: Sample restricted to ECA countries				Panel B: Sample excludes observations prior to 1993; time dummies included				Panel C: Sample excludes last observation for each country; time dummies included					
		Observed pctile. level ²	Predicted pctile. level ²	Observed pctile. growth rate ³	Predicted pctile. growth rate ³	Observed pctile. level ²	Predicted pctile. level ²	Observed pctile. growth rate ³	Predicted pctile. growth rate ³	Observed pctile. level ²	Predicted pctile. level ²	Observed pctile. growth rate ³	Predicted pctile. Growth Rate ³	Last change (annualized)	Last period of change (for restricted sample)
HEALTH, NUTRITION AND POPULATION															
Maternal mortality ratio (modeled, per 100,000 live births)	2010/13	5	2	42	15	50	47	34	38	51	69	54	55	-3.0	2005/10
Maternal mortality ratio (national, per 100,000 live births)	2008/09	2	7	27	30	41	60	16	17	42	65	82	83	27.3	2006/08
Adolescent fertility rate (births per 1,000 women age 15–19)	2007/12	31	56	18	17	64	83	18	11	68	87	64	61	-13.4	2002/07
Mortality rate, neonatal (per 1,000 live births)	2011/12	19	33	71	83	50	67	87	92	50	65	86	88	-5.1	2010/11
Mortality rate, infant (per 1,000 live births)	2011/12	18	32	75	79	50	66	86	90	50	66	91	90	-6.7	2010/11
Mortality rate, under 5 (per 1,000 births)	2011/12	19	33	81	82	51	68	87	88	52	68	91	88	-6.9	2010/11
Immunization, measles (% children ages 12–23 months)	2011/12	82	59	64	72	87	87	59	86	83	82	23	17	-2.0	2010/11
Prevalence of undernourishment (% of population)	2011/12	58	60	92	96	76	80	98	99	72	80+	87	80	-8.4	2010/11
Tuberculosis prevalence rate (per 100,000 population)	2011/12	17	27	33	7	34	42	22	12	36	44	23	8	3.4	2010/11
EDUCATION															
School enrollment, pre-primary (% gross)	2011/12	10	25	97	96	26	33	92	88	24	30	81	66	8.9	2010/11
School enrollment, primary (% gross)	2011/12	84	83	96	99	65	54	90	92	45	41	70	61	1.3	2010/11
School enrollment, secondary (% gross)	2010/11	22	45	95	98	58	85	80	89	53	76	25	24	-0.5	2009/10
School enrollment, tertiary (% gross)	2010/11	47	39	14	21	68	84	15	16	73	86	9	9	-4.8	2009/10
Average years of total schooling, age 25+ total (Barro-Lee)	2005/10	36	13	13	9	71	86	11	9	76	87	5	9	-0.2	2000/05
PISA: 15-year-olds performing below Level 1A in reading	2006/09	1	2	59	-	1	1	58	10	1	2	-	-	-	-
LABOR MARKETS															
Employment-to-population ratio (15+) (ILO estimates)	2011/12	89	94	71	92	64	60	75	88	63	59	67	71	0.5	2010/11
Employment-to-population ratio (25+) (ILO estimates)	2011/12	95	91	53	84	69	59	51	70	69	59	41	36	0.0	2010/11
Female labor force participation (15–64) (ILO estimates)	2011/12	40	46	60	80	53	49	56	65	54	48	42	42	0.0	2010/11
Unemployment rate (ILO estimates)	2011/12	55	88	60	79	39	46	64	86	38	44	47	27	0.0	2010/11
Unemployment rate, youth (ILO estimates)	2011/12	66	96	66	77	47	52	71	89	45	50	71	80	-3.6	2010/11
GDP per employed person (constant 1990 PPP \$)	2011/12	11	24	20	58	27	58	19	81	27	60	78	70	4.8	2010/11
Firms identifying inadequately educated workforce (%)	2009/13	11	14	57	45	-	-	-	-	-	-	-	-	-	-
Share of firms offering formal training	2009/13	79	78	92	90	-	-	-	-	-	-	-	-	-	-
Number of temporary workers	2009/13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Share of unskilled workers (out of all production workers) (%)	2009/13	22	22	78	40	-	-	-	-	-	-	-	-	-	-

Notes: Percentiles correspond to the same periods as in Table 5.1. Estimations for maternal mortality exclude GDP per capita and GDP per capita growth. Specifications in Panel B and C were not performed for the indicators of the Enterprise Survey due to lack of data.

Finally, Table A3.3 benchmarks the performance of ECA developing countries, using the specification in Panel B of Table A3.1, but excluding regional dummies. Indicators coming from the Enterprise Survey have been removed from this table since different years of data for different countries complicate the calculation of regional averages.

Table A3.3: Benchmarking exercise for ECA developing countries

			Panel A: Baseline specification		Panel B: with time dummies	
	2000	2012	Raw pctile. level ¹	Characteristic-specific pctile. level ¹	Raw pctile. level ¹	Characteristic-specific pctile. level ¹
HEALTH, NUTRITION, AND POPULATION						
Maternal mortality ratio (modeled, per 100,000 live births)	44	31	70	70	70	64
Adolescent fertility rate (births per 1,000 women age 15–19)	36.8**	30.5	65	76	65	74
Mortality rate, neonatal (per 1,000 live births)	16.9	10.2	63	77	63	69
Mortality rate, infant (per 1,000 live births)	33.3	19.1	58	70	58	62
Mortality rate, under 5 (per 1,000 births)	40.2	22	59	71	59	64
Immunization, measles (% children ages 12–23 months)	91.8	93.6	65	70	-	-
Tuberculosis prevalence rate (per 100,000 population)	287	97	51	61	51	59
EDUCATION						
School enrollment, pre-primary (% gross)	29.2	44.9+	44+	50+	44	41
School enrollment, primary (% gross)	101.2	100.7+	43+	44+	43	38
School enrollment, secondary (% gross)	84.4	92.1	66	80	66	74
School enrollment, tertiary (% gross)	29.8	47.9	78	88	78	78
LABOR MARKETS						
Employment-to-population ratio (15+) (ILO estimates)	51.2	51.2	29	29	29	29
Female labor force participation (15–64) (ILO estimates)	52.2	51.9	39	38	39	31
Unemployment rate (ILO estimates)	10.3	9.7	32	35	32	35
Unemployment rate, youth (ILO estimates)	19.5	19.9	36	36	36	39
GDP per employed person (constant 1990 PPP USD)	19,057	11,268	61	77	61	74

Notes: ECA developing region was included as an additional country in the regressions. Regional averages were not available for the indicators that are included in Table A3.1, but missing in this table. Percentiles for maternal mortality were computed using data as of 2010 (excluding 2013).

¹Percentile for the level of the indicator in 2012 or latest year available.

**Data for 2002.

+ Data for 2011.

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