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ABSTRACT

The Pecuniary Costs of Early School Leaving and Poor Basic Cognitive and Non-cognitive Skills*

We produce estimates of the pecuniary costs of inadequate investment in human capital for countries, macro regions and the world at large. These costs are borne by individuals (*private costs*), the government (*fiscal costs*), and society, which includes both individuals and the government (*social costs*). We estimate that, in 2030, the global annual private costs of having a share of children with less than basic skills at its 2021 value rather than at zero are equal to 9,154 billion 2015 dollars, or 17.1 percent of global GDP in 2030.

JEL Classification: I24, I25

Keywords: early school leaving, low basic skills, private, fiscal and social costs

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Abstract

We produce estimates of the pecuniary costs of inadequate investment in human capital for countries, macro regions and the world at large. These costs are borne by individuals (*private costs*), the government (*fiscal costs*), and society, which includes both individuals and the government (*social costs*). We estimate that, in 2030, the global annual private costs of having a share of children with less than basic skills at its 2021 value rather than at zero are equal to 9,154 billion 2015 dollars, or 17.1 percent of global GDP in 2030.

Executive Summary

Inadequate human capital – due to early school leaving or to a lack of basic cognitive and non-cognitive skills - is costly for individuals and societies. Individuals with inadequate human capital earn, on average, less than better endowed individuals. Societies with higher average human capital enjoy higher economic growth.

The individual costs of inadequate human capital are both pecuniary – for instance, lower earnings - and non-pecuniary – for instance, lower self-reported happiness (Oreopoulos and Salvanes, 2011). Early school leaving and/or a lack of basic cognitive and non-cognitive skills often originate from a variety of constraints, which can be economic, social, technological, or organizational in nature. These constraints hinder some individuals from acquiring an adequate level of human capital.

At the aggregate level, for instance for a country, the pecuniary costs of inadequate investments in human capital are measured in terms of loss of economic resources (current and future production and income), compared to a counterfactual situation where investment in human capital is adequate.

In this paper, we focus on the aggregate level and produce estimates of the pecuniary costs of inadequate investment in human capital for countries, macro regions and the world at large. These costs are borne by individuals (*private costs*), the government (*fiscal costs*), and society, which includes both individuals and the government (*social*

costs). Although our focus is on pecuniary costs, we also present estimates for some non-pecuniary costs.

While defining social costs in this way is standard in economics, it may cause confusion as social costs often refer to non-pecuniary costs, such as the loss of life satisfaction or human suffering. Because the focus of the report is on pecuniary costs, we only pay limited attention to the non-pecuniary dimensions. However, this does not mean that these dimensions are not important.

We measure inadequate investment in human capital with the following indicators: a) the share of early school leavers (ESL), defined as young adults who have only achieved lower secondary education or less, including those who have never attended school; b) the proportion of children with less than basic cognitive skills (LBS), defined as Level 1 skills in the Program for International Student Assessment (PISA), the lowest of the six available performance levels; c) two indices of socio-emotional skills (SES), the motivation and the Big Five index. Both indices are constructed using individual data from PISA. The motivation index captures the decline in performance by students during a test. The Big Five index refers to the Big Five personality traits: agreeableness, openness, conscientiousness, extraversion, and neuroticism (see for instance OECD, 2021).

We express each pecuniary cost as the product of the ratio λ of this cost to real GDP per capita, by real GDP per capita (that is, cost= λ x GDP). We show that both ESL and SES affect pecuniary costs directly because they impact both on the ratio λ and on real GDP per capita. Conversely, our evidence suggests that socio-emotional skills affect either the ratio λ or real GDP per capita only indirectly, by affecting ESL and LBS.

We compute the costs of inadequate human capital by comparing two scenarios, the status quo scenario, characterized by the current observed levels of human capital, and the intervention scenario, where these measures are set either to zero (in the case of ESL and LBS) or to their maximum value (in the case of SES). For each item contributing to the costs, we compute two indicators: a) the annual costs in 2030, discounted in 2021, the last year for which we have sufficient data; b) the lifetime costs

during the interval 2021 to 2041, also discounted in 2021. These costs are reported both in 2015 dollars and as percent of annual or lifetime GDP.

We also decompose the total costs of having ESL or LBS above zero by gender. For each gender, we compare the status quo scenario with an intervention scenario where gender-specific ESL and LBS are brought to zero while keeping the other gender's ESL and LBS constant at their status quo level.

The private costs of inadequate human capital are defined as the monetary difference between net income (net of taxes and transfers) and private expenditure for health, education, and crime in the status quo scenario minus the monetary difference in the intervention scenario. The social costs are defined as the monetary difference between gross income and private and public expenditures, inclusive of the estimated costs of raising taxes.

We estimate that, in 2030, the global annual private costs of having ESL and LBS at their 2021 value rather than at zero are equal to 6,265 and 9,154 billion 2015 dollars, or 10.7 and 17.1 percent of global GDP in 2030. Over a 20-year horizon, ranging from 2021 to 2041, the lifetime costs of ESL and LBS are estimated at 133,396 and 195,000 billion 2015 US dollars, or 10.8 and 17.3 percent of global lifetime GDP.

The global annual social costs, which consist of private and fiscal costs, net of the costs of raising taxes, are close to the private costs and equal to 5,951 billion dollars for ESL and to 10,051 billion dollars for LBS. The global lifetime social costs are instead equal to 126,505 billion for ESL and to 213,485 billion US dollars for LBS.

Although often disregarded, the costs of having average levels of socio-emotional skills SES below the highest attainable levels are high. We estimate that the annual costs in terms of lost GDP, evaluated in 2030 but discounted at 2021, are equal to 6,554.87 billion 2015 US dollars (15.83 percent of annual GDP) when we measure SES with the Big Five index, and to 9,841.89 (18.88 percent of annual GDP) billion 2015 US dollars when we measure SES with the motivation index. These costs may seem to be very high when compared to the costs of ESL and LBS. Notice, however, that the former refer to GDP while the latter refer to income minus expenditures, a fraction of GDP.

Since the share of ESL and LBS is on average higher for males than for females, we find that the costs associated with the former are higher than those associated with the latter. We estimate that the annual costs attributed to having gender-specific levels of ESL (LBS) above zero are equal to 2,957.07 (3,507.27) billions for females and to 4,645.90 (5,219.67) billions for males.

These estimates suggest that the global pecuniary benefits associated with the elimination of ESL and LBS and the improvement of SES are massive. Although we recognize that, especially for developing countries, setting values of ESL and LBS at zero or the values of SES at their maximum level for the intervention scenario may seem extreme, the estimated benefits from reducing ESL and LBS from current values to zero provide a useful and scalable benchmark. Clearly, smaller, and easier to implement reductions in ESL and LBS are likely to yield proportionally smaller benefits.

Early school leaving and poor educational outcomes are the result of multiple and interrelated factors, which include poor early school experience, lack of ability, low perceived labor market returns to education, heavy discounting of future benefits, poor social environments, and peer influence. There has been extensive research on these factors, which can be classified as individual or social, school, and systemic (OECD, 2012).

Numerous policies have been pursued around the world to reduce early school leaving and improve learning outcomes, and the debate on which policies are more effective is still very animate among both academics and politicians. While some policies are aimed at students at-risk or are targeted to disadvantaged pupils, other policies affect the entire school system with actions involving all pupils in school. Policies can also be ostensibly gender neutral or explicitly target girls or boys.

Unfortunately, these policies are rarely evaluated using approaches that identify causal effects, partly because their design and implementation often disregard that a source of exogenous variation in the treatment should be available for serious evaluation. In the concluding section of this report, we review the evidence from studies that rely on credible identification strategies, which are based on quantitative

analyses, where the causality between intervention and educational outcome has been established.

Investing in human capital can be a cost-effective strategy for economic development. Hanushek and Woessmann, 2015, estimate that improving student test scores by 50 points in the PISA scale permanently increases *annual* economic growth by 1 percentage point. We find that a 10 percent reduction of ESL (LBS) with respect to the sample mean increases annual GDP growth by 0.73 (0.99) percentage points. Student performance can be increased, and drop-out rates reduced, by implementing education policies that release liquidity constraints and affect the incentives faced by families, teachers and students, without requiring excessive financial resources (OECD, 2018; Machin and McNally, 2008).

Introduction

Early school leaving and the lack of basic cognitive and non-cognitive often originate from a variety of constraints, which can be economic, social, technological, or organizational in nature. These constraints can hinder individuals from acquiring an adequate level of human capital.

Economic models of human capital accumulation, which go back to Becker, 1964, predict that individuals increase their investment in human capital if the benefits from the investment are higher than the costs, and keep investing until the additional benefit of the investment is equal to the additional cost.

However, many individuals face financial constraints that prevent them from allocating the necessary resources to cover the required costs. Social norms and values, such as those related to gender and culture, can also act as barriers to education. In some cases, even when individuals are willing to invest in human capital, the school system may fail to provide the skills and competencies demanded by the labor market. These constraints can result in population-level inadequate human capital, which in turn reduces the ability to produce and generate income but also affects non-pecuniary outcomes such as life satisfaction, tax morale or early pregnancies.

In this report, we provide estimates of the costs of inadequate human capital for countries, macro regions and the world at large. These costs are borne by individuals (private costs), the government (fiscal costs), and society, which includes both individuals and the government (social costs). Some costs, known as negative externalities, are not directly borne by individuals or the government, but they exist and are eventually borne by society.[1] We define social costs as the sum of private, fiscal economic costs and the value of negative externalities.

While defining social costs in this way aligns with our purpose and is standard in economics, it may cause confusion as social costs often refer to non-pecuniary costs, such as the loss of life satisfaction or human suffering. Since the focus of this report is

[1] For instance, a low educated worker not only directly affects productivity and efficiency but could also hamper the productivity of team workers. The second is an external cost which is not considered by the individual but that accrues to society.

on pecuniary costs, we will pay limited attention to the non-pecuniary dimensions. However, this does not mean that these dimensions are not important.

We measure inadequate investments in human capital with the following indicators:

a) *The share of early school leavers (or out of school individuals).* This indicator refers to young adults who have only achieved lower secondary education or less, including those who have never attended school. This indicator provides a comprehensive and widely available measure of lack of exposure to education and focuses on education *quantity*.
b) *The proportion of students with less than basic skills LBS*. This indicator, harmonized across countries by Gust et al, 2022, and Angrist et al., 2021, is based on international test scores and identifies children whose cognitive skills are below basic level. Compared to ESL, LBS compounds education quantity and quality.
c) *Two indices of socio-emotional skills (SES), the motivation and the Big Five index*. Both indices are constructed using individual data from PISA. The motivation index captures the decline in performance by students during a test. The Big Five index refers to the Big Five personality traits: agreeableness, openness, conscientiousness, extraversion, and neuroticism (see for instance OECD, 2021).

We express each pecuniary cost as the product of the ratio λ of this cost to real GDP per capita by real GDP per capita (that is, cost= λ x GDP). We show that both ESL and SES affect pecuniary costs directly because they impact both on the ratio λ and on real GDP per capita. Conversely, our evidence suggests that socio-economic skills SES affect either the ratio λ or real GDP per capita only indirectly, by affecting ESL and LBS.

We compute the costs of inadequate human capital by comparing two scenarios, the status quo scenario, characterized by the current observed levels of human capital, and the intervention scenario, where these measures are set either to zero (in the case of ESL and LBS) or to their maximum value (in the case of SES). For each item contributing to the costs, we compute two indicators: a) the annual costs in 2030, discounted in 2021, the last year for which we have sufficient data; b) the lifetime costs

during the interval 2021 to 2041, also discounted in 2021. These costs are reported both in 2015 dollars and as percent of annual or lifetime GDP.

We also decompose the total costs of having ESL or LBS above zero by gender. For each gender, we compare the status quo scenario with an intervention scenario where gender-specific ESL and LBS are brought to zero while keeping the other gender's ESL and LBS constant at their status quo level.

Table 1 summarizes our key results. We estimate that, in 2030, the global annual private costs of having ESL and LBS at their 2021 value (the status quo scenario) rather than at zero (the intervention scenario) is equal to 6,265 and 9,154 billion 2015 dollars, or 10.7 and 17.1 percent of global GDP in 2030. Over a 20-year horizon, ranging from 2021 to 2041, the lifetime private costs of ESL and LBS are estimated at 133,396 and 195,000 billion 2015 US dollars, or 10.8 and 17.3 percent of lifetime GDP.[2]

We explain the finding that the costs of LBS are always higher than the costs of ESL with the fact that the gap between LBS in the status quo and in the intervention scenario (57 percent globally) is much larger than the gap in ESL (42 percent globally). In addition, LBS is a more encompassing measure of inadequate human capital than ESL, because it combines both school quantity and school quality. Global annual social costs, which consist of private and fiscal costs, net of the costs of raising taxes, are close to the private costs and equal to 5,951 billion dollars for ESL and to 10,051 billion dollars for LBS.

We also estimate that the costs of having average levels of socio-emotional skills SES below the highest attainable levels is very costly in terms of GDP. As shown in Table 2, we estimate that the annual GDP costs, evaluated in 2030 but discounted at 2021, are equal to 6,554.87 billion 2015 US dollars (15.83 percent of GDP) when we measure SES with the Big Five index, and to 9,841.89 (18.88 percent of GDP) billion 2015 US dollars when we use as measure of SES the motivation index. These costs may appear to be very high, at least compared to those shown in Table 1. Notice, however, that the

[2] While global absolute costs are the sum of country specific costs, global costs as percentage or annual or lifetime GDP are a weighted average of percent country-specific costs, using as weight relative population.

former refer to GDP while the latter refer to income minus expenditures, which is typically lower than GDP.

Since the share of ESL and LBS is on average higher for males than for females, it is not surprising that we find that the costs associated with the former are higher than those associated with the latter. We estimate – see Tables 3 and 4 – that the annual costs attributed to gender-specific levels of ESL (LBS) above zero are equal to 2,957.07 (3,507.27) billions for females and to 4,645.90 (5,219.67) billions for males.

Our estimates suggest that the pecuniary benefits associated with the elimination of ESL and LBS and the improvement of SES are massive. Although we recognize that, especially for developing countries, setting an intervention scenario where ESL and LBS are set at zero may seem extreme, the estimated benefits from reducing current values to zero provide a useful and scalable benchmark. Clearly, smaller, and more realistic reductions in ESL and LBS are bound to yield proportionally smaller benefits.

The report is organized as follows: Section 1 introduces our measures of inadequate human capital. Given that SES is a relatively recent addition to the set of measures used in this report, we expand this section by also providing a review of the literature focusing on non-cognitive skills. Section 2 introduces our definitions of the private, social, and fiscal costs of inadequate human capital. In Sections 3 and 4 we compare alternative approaches used by economists to compute the costs of inadequate human capital and describe our own approach.

Section 5 introduces the definition of key variables and describes some of the data. Our empirical estimates are shown in Section 6. Section 7 presents the global private, fiscal, and social costs of inadequate human capital. Section 8 is devoted instead to the GDP costs of inadequate socio-emotional skills. We review the literature on policies addressing inadequate human capital in Section 9. This review suggests several recommendations. Conclusions follow.

1. *Measures of inadequate investment in human capital*

In this section, we discuss the following measures of inadequate investment in human capital: the share of early school leavers, the share of children or students with less

than basic skills, the motivation and Big Fives indices of socio-emotional skills. We describe each measure in turn.

1.1 *The share of early school leavers ESL*

In modern economies, an upper secondary qualification (ISCED 3) is often considered to be the minimum for successful participation in the labor market. For each country where data are available, ESL is defined as 100 minus the completion rate, or the share of individuals in the relevant age range who have graduated from upper secondary education, which in most countries corresponds to 12 years of education.

UNESCO (http://data.uis.unesco.org/) provides international data on completion rates by gender, which cover 225 countries. This rate is computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. If the modal intended age is either 18 or 19, and the last grade refers to 12 years of education, the reference age group is aged 21/22 to 23/24.

This definition accounts for the fact that some early school leavers who have not completed 12 years of education at age 18/19 subsequently return to school to complete their schooling. In Australia, for instance, there were in 2014 81,825 individuals aged 19 who had not completed 12 years of education, out of a population of 312,965 19-year-olds. Of these, only 43,255 had not completed 12 years of schooling at age 24 (see Lamb and Huo, 2016) and could therefore be considered as "permanent" early school leavers. The rest, 38,570 individuals, or 47.1 percent, were "temporary" early school leavers. It is reasonable to expect that the social and fiscal costs of ESL are smaller for temporary than for permanent leavers. By treating all leavers as permanent, we risk over-estimating these costs.

A concept closely related to the early school leaving rate is the *out-of-school rate* (OS) for upper secondary education, or United Nations SDG thematic indicator 4.1.4, defined as the proportion of young people in the official age range who is not enrolled in that level of education. This variable is compiled by the UNESCO Institute of Statistics and the Global Education Monitoring Report using both administrative and survey data (see UNESCO, 2022, and www.education-estimates.org). The correlation

between ESL and OS over the years 2001-2021 and across the more than 200 countries for which we have data is high (0.924).

1.2 The share of children with less than basic skills LBS

One potential drawback of ESL as an indicator of average human capital is that schooling is not equivalent to learning, because school quality matters (see for instance Hanushek and Wossmann, 2012). Students may manage to complete primary or secondary school but with poor cognitive skills. Since the quality of learning is not captured by ESL, we need to consider output-oriented indicators.

Measures of skills that encompass school quantity and quality usually rely on international standardized test scores, such as the Program for International Student Assessment (PISA) run by the OECD. The World Bank has recently compiled the *Harmonized Learning Outcomes Database (HLO)*, which covers 164 countries between 2000 and 2017, i.e., 98 percent of word population. The HLO database extends the seminal work by Hanushek and Woessmann, 2012, 2015, on universal basic skills and harmonizes test scores from different international and national projects into a single comparable index, defined by subject, school level and gender. These scores are from tests taken during either primary or secondary education, and therefore refer to students aged less than 18. Low performance is set at or below 300 and high performance at or above 625 (Angrist et al. 2021).

A potential drawback of indices that rely on standardized tests taken by students is that the percentage of children still at school who take the test may be low, especially in developing economies, representing a selected part of the relevant population. Gust et al, 2022, have recently addressed this issue by computing for 159 countries the share of *children* not achieving basic skills (LBS). This share includes both children still in school and not in school. They adopt the pragmatic definition that basic skills correspond to the PISA Level 1 skills (fully attained), the lowest of the six performance levels defined on the PISA scale. This definition of basic skills corresponds to a modern definition of functional literacy. The border line between Levels 1 and 2 is 420 points on the PISA math scale and 410 points on the PISA science scale.

In this report, we LBS as a measure of insufficient human capital alternative to ESL. The share of children with less than basic skills in six areas is highest in Africa and lowest in Europe and America. Since LBS is not available by gender, we regress average LBS on average ESL, OS and HLO and use the estimated coefficients and gender-specific ESL, OS and HLO to predict gender-specific LBS.[3]

1.3 Indices of low socio-emotional skills (SES)

Cognitive skills important for learning, such as attention and memory, are strongly linked to or guided by emotions. Moreover, cognitive tasks for learning activate and use areas of the brain specialized in social and emotional activity. It is essentially impossible to perform a cognitive task without experiencing positive or negative emotions towards it, and people perform better on cognitive tasks towards which they have a positive attitude (UNESCO, 2023).

It is by now widely recognized that non - cognitive skills and personality traits during adolescence are important dimensions of human capital (see Heckman, Pinto, & Savelyev, 2013; Heckman & Rubinstein, 2001). Socio-emotional learning (SEL) can be broadly defined as the process of acquiring the competencies, skills and/or attitudes to recognize and manage emotions, develop caring and concern for others, establish positive relationships, make responsible decisions, and handle challenging situations.

1.3.1 A review of the literature on SES and educational attainment.

A growing body of scientific research indicates that students' social and emotional competence predicts not only their school success, but also a range of important outcomes in late adolescence and adulthood, including high school graduation, postsecondary completion, employment, financial stability, physical health, and overall mental health and well-being (UNESCO, 2020).

SES are learnt in the family, at school and in the labor market. Schools are important settings in which to promote students' social and emotional development because there are no other places in which most children and youth can be found during their formative years of development. This might suggest that leaving school early could

[3] The regression is based on a general linear model (GLM).

hamper the development of these skills. To our knowledge, however, evidence on this point is scant.

There is ample evidence instead that the quality of SEL affects school performance and ultimately the decision to drop out of school. Cognitive skills, such as verbal or numerical proficiency, remain the most important predictor of academic performance. However, school achievement is also dependent on several social and emotional skills such as perseverance, motivation, self-control, responsibility, curiosity and emotional stability. Some social and emotional skills are a crucial prerequisite for effective participation and performance in school settings. In other words, low levels of social and emotional skills can prevent the effective use of cognitive skills.

This point is made very clearly by Heckman, Sixtrud and Urzua, 2006, who use data from the US national Longitudinal Survey of Youth and measure SES – or personality traits - with indicators of loss of control and self-esteem. Their simulations suggest that an increase in the non-cognitive skills from the 25^{th} to the 75^{th} percentile of their distribution that keeps cognitive skills constant is associated to a close to 25 percentage points increase in the probability of being a four-year college graduate at age 30. This increase is like the one obtained by keeping non- cognitive skills constant and raising cognitive skills from the 25^{th} to the 75^{th} percentile of their distribution. They also find that both types of skills have strong effects on the dropout decision, but that increasing cognitive ability is more effective in reducing dropout behavior.

One of the most striking examples of the importance of non-cognitive skills is provided by Heckman, Hsee and Rubinstein, 2001, who study the General Educational Development (GED) program in the US. High school dropouts who did not complete high school in the US can obtain high school certification by taking the GED exam. Heckman and co-authors show that, once one controls for the impact of cognitive skills, job training and years of schooling, GED recipients have lower wages than high school dropouts without a GED degree. They find that the former group is much more likely to exhibit delinquent behavior during adolescence – such as skipping school, getting into fights, or engaging in crime – and less likely to hold a job when adults than either high school graduates or high school dropouts without GED. This indicates that

GED recipients are relatively qualified and intelligent individuals, but that they lack skills such as discipline, patience, or motivation, and as a result are penalized in the labor market.

The importance of social and emotional skills for several schooling outcomes emerges also from a study which uses the data drawn from the British National Child Development Survey to investigate the effects of cognitive skills and a measure of social maladjustment at age 11 on four indicators of educational attainment: whether the individual stays in school beyond age 16, whether she has a degree from a higher institution by age 42, and indicators of basic literacy and numeracy at age 37. The results show that children who exhibited greater social adjustment at age 11 were both more likely to stay at school beyond age 16 and to have a higher education degree. However, having high social skills early on is not particularly important for basic literacy and numeracy when adult.

Perhaps more interestingly, the marginal effect of cognitive skills on the probability of staying at school beyond age 16 is quite low if social skills are fixed at a low value, but very high if social skills are fixed at a high value (Carneiro, Crawford and Goodman, 2007). These findings suggest that an individual with very high cognitive skills, but very poor social skills is relatively unlikely to stay on at school beyond age 16.

Durlak et al, 2011, present findings from a meta-analysis of 213 school based, universal SEL (socio-emotional learning) programs involving 270,034 kindergartens through high school students. Compared to controls, SEL participants demonstrated significantly improved social and emotional skills, attitudes, behavior, and academic performance that produced an 11-percentile-point gain in achievement. By improving cognitive learning, SEL can improve labor market outcomes such as wages and productivity.

Taylor et al, 2007, perform a meta-analysis of 82 school-based, universal social and emotional learning interventions involving 97,406 kindergartens to high school students (Mean age = 11.09 years; mean percent low socioeconomic status = 41.1; mean percent students of color = 45.9). Although most interventions took place in the US, thirty-eight interventions took place outside it. Follow-up outcomes (collected 6

months to 18 years post-intervention) show SEL's enhancement of positive youth development. Participants fared significantly better than controls in social-emotional skills, attitudes, and indicators of well-being.

Wang et al, 2016, examine the impacts of providing a social-emotional learning program on the dropout behavior and learning anxiety of students in the first two years of junior high school. They do so by analyzing data from a randomized controlled trial involving 70 junior high schools and 7,495 students in rural China. After eight months, the SEL program reduced dropout by 1.6 percentage points and decreased learning anxiety by 2.3 percentage points. Effects are no longer statistically different from zero after 15 months, perhaps due to decreasing student interest in the program. However, they find that the program reduced dropout among students at high risk of dropping out (older students and students with friends who have already dropped out), both after 8 and 15 months of exposure to the SEL program.

More recently, Cipriano et al, 2023, provide a meta-analysis of the evidence for universal school-based social and emotional learning interventions for students in kindergarten through 12th grade available from 2008 through 2020. Their sample includes 424 studies from 53 countries, reflecting 252 discrete SEL interventions, involving 575,361 students. Results suggest that, compared to control conditions, students who participated in SEL interventions experienced significantly improved skills, attitudes, behaviors, school climate and safety, peer relationships, school functioning, and academic achievement.

An increasingly popular way of describing SEL and the related non-cognitive skills is to refer to the "Big Five" personality traits: openness, conscientiousness, extraversion, agreeableness, and neuroticism (OECD, 2021). Psychologists have found that personality influences the quality of one's thinking, and that grit (persistence) and self-control influence how much a child learns in school. Longitudinal studies show that childhood self-control, emotional stability, persistence, and motivation have long term effects on health and labor market outcomes in adulthood. Some studies even found that these sorts of attitudes and behaviors are stronger predictors of long-term

outcomes like college attendance, earnings, home ownership and retirement savings than test scores.

An important conclusion that can be drawn from this literature is that skills within the domain of conscientiousness, such as responsibility, persistence and self-control, are positively related to students' school performance. Students who are more conscientious tend to perform better in school. In addition, conscientiousness is found in some cases to be a better predictor of individual long-term outcomes than long-established measures of cognitive skills. Other Big Five domains that are positively related to students' school performance are open-mindedness and, to a lesser extent, agreeableness (OECD, 2021).

A domain that is often negatively related to students' school performance is neuroticism (or lack of emotional regulation). Students who find it difficult to regulate their emotions, that is, those who are less stress-resistant and less optimistic, tend to have lower school performance when compared to their peers. Relations between extraversion and students' school performance are less clear. However, studies have found certain parts of extraversion, such as being more social, to relate negatively to school performance (OECD, 2021).

The OECD's survey SSES (Survey on Social and Emotional Skills) shows that students' social and emotional skills are significant predictors of school grades across age cohorts and subjects. Being intellectually curious and persistent are the social and emotional skills most strongly related to school grades for both 10- and 15-year-olds in all three subjects. To a lesser extent, yet still significant, being more assertive and responsible are also positively related to better school grades. These findings emphasize the importance of dedication in pursuing predetermined goals even in the face of difficulties.

The survey also found that, while gender differences in emotional control were minimal at age 10, the gender gap had grown considerably by age 15: boys experienced a similar level of emotional control as the younger group, but girls experienced much lower emotional control at age 15. Often this translates into lower emotional well-being.

1.3.2 A review of the literature on SES and adult outcomes.

Early literature from the 1970s on the importance of non-cognitive skills (see for example Jencks, 1979) had already shown that a composite measure of non - cognitive traits is at least as important as cognitive test scores, parental background, and years of schooling in predicting hourly earnings. More recent results based upon US and UK data that measure personality either with the Rotter score for the locus of control or with measures of aggression and withdrawal corroborate earlier findings: the external locus of control– or the belief that outcomes are the result of fate or luck –has a negative effect on earnings. Moreover, both aggression and withdrawal have a sizeable negative impact on later earnings (Bowles, Gintis and Osborne, 2001).

A solid body of research, though more prominent in a high-income country context, demonstrates the significant associations between SES and adult outcomes such as productivity and collegiality at work, positive health indicators and civic participation, all of which benefit wider society (Garcia et al, 2016). Duraippah et al, 2020, report that the lack of SES in education systems can result in potential losses in economic productivity as high as 29 percent of GDP. The World Economic Forum estimates that investing broadly in SES could add an additional $8.3 trillion in increased productivity to the global economy by 2030. They also estimate that preparing today's generation of school-age children with better collaborative problem-solving, could add $2.54 trillion – more than $3,000 per school-age child – from this one skill alone (World Economic Forum, 2022).

Early signals of leadership qualities during school can be valid predictors of positive labor market outcomes during adulthood. Individuals with leadership positions in high school earn between 4 to 24 percent higher wages about 10 years later. Moreover, school leaders are more likely to occupy managerial jobs when adults. Interestingly, the impact of leadership on wages is reduced when one controls for "sociability" – a self-reported measure of enjoyment of being around people. Thus, leadership probably captures in part social skills and emotional intelligence (Kuhn and Weinberger, 2005). These results are particularly convincing because leadership is measured before labor market entry, a fact that avoids the problem of reverse causality

running from earnings or employment to personality traits.

Adequate SES can also improve individual health, as neurological and psychiatric disorders that can occur because of childhood trauma, such as anxiety, depression, and addiction, pose a risk for a wide array of cardiovascular, respiratory, neuroendocrine, cognitive, and autoimmune diseases (Hu et al, 2019). In turn, these disorders result in substantial costs in terms of health care utilization, suicidality, disability, unemployment, and absenteeism (Birbaum et al, 2010).

Additional evidence on the importance of non-cognitive skills comes from the Wisconsin Longitudinal Survey in the US. These data suggest that the combined contribution of the non-cognitive skills included in the Five Factors model is as large as the contribution of IQ - both measured during high school - in explaining earnings later in life (Muller and Plug, 2006). Turning to European evidence, Carneiro, Crawford and Goodman, 2007, use data from the British National Child Development Survey to investigate whether social skills at age 11 have had a significant effect on employment status and labor market earnings at age 42. They find that social adjustment at 11 has indeed a significant impact on labor market outcomes, and that individuals who possess a combination of good cognitive and social skills receive greater returns.

German evidence based on data from the Socio-Economic Panel shows that individuals who score high on the external locus of control scale – and therefore tend to attribute success or failure to external circumstances rather than to individual effort – earn on average less than individuals with lower scores. The effect on earnings is large: everything else held constant, workers who score in the top quartile earn up to 20 percent less than workers who score in the bottom quartile (Heineck and Anger, 2010).

Dutch data have also been used to study how personality traits affect earnings, without controlling, however, for the effect of cognitive skills. On the one hand, there is evidence of a positive association between emotional stability and wages. This relationship is stronger for women. On the other hand, both extraversion and agreeableness are negatively related to earnings. Agreeable persons are either poor

wage negotiators or self-select into low pay occupations, such as services and nursing (Nyhus and Pons, 2005).

One problem with estimating the effect of non - cognitive skills is that the available measures of personality traits are mostly based on self-reported questionnaires. Compared to IQ, these measures are less reliable and precise. Lindquist and Westman, 2010, try to address this problem by using a unique dataset from the Swedish military enlistment. The enlistment is mandatory for all young Swedish men and spans two days with tests of health status, physical fitness, and cognitive ability. In addition, each conscript is interviewed by a certified psychologist on a set of personal characteristics, which include persistence, social skills, and emotional stability. The authors argue that these interviews generate more reliable measures than self-reported measures.

Using the ability measures from the military enlistment, Lindquist and Westman, 2010, find that both cognitive and non-cognitive skills are strong predictors of labor market earnings later in life. Importantly, non-cognitive skills have a much stronger effect at the low end of the earnings distribution. At the tenth percentile, the effect of these skills is between 2.5 and 4 times the effect of cognitive skills. One reason for this result is that men with low non cognitive ability are significantly more likely to become unemployed than men with low cognitive ability. Among the unemployed, the former experience longer spells. In contrast, cognitive ability has no statistically significant effect on the duration of unemployment.

In a cross-country study of the effects of cognitive and non-cognitive skills, the OECD, 2015, considers the simulated impact of raising skill deciles on income and employment. They report that the impact of raising cognitive skills outweighs that of raising social and emotional skills. Moving a secondary school student from the lowest to the highest cognitive skill decile increases his/her likelihood of reaching the top quartile income bracket by 33 percentage points, while the effect of moving these adolescents from the lowest to the highest social and emotional skill (self-confidence) decile is limited to 8 percentage points.

On the other hand, social and emotional skills play a particularly important role in improving health-related outcomes and reducing anti-social behavior. Social and

emotional skills also help protect individuals from being victimized by aggressive behaviors. The simulations presented in the OECD study suggest that the impact of raising social and emotional skills on improving social outcomes generally outweighs the corresponding impact of raising cognitive skills (OECD, 2015).

School bullying has become a major policy concern in many countries. Existing research (Sarzosa and Urzua, 2013) suggests that self-reported engagement in bullying is strongly driven by students' lack of responsibility. Social and emotional skills may not only reduce the likelihood of children becoming the perpetrator of aggression, but also allow them to avoid being its victim. There is also evidence that raising SEL generally has a considerable impact on improving self-reported life-satisfaction (OECD, 2015).

1.3.3 Measuring SES

Most of the available data on SES are from developed countries, and when data are available from developing countries, there are concerns about their comparability. Macours et al, 2019, for instance, analyze 29 face-to-face surveys from 94,715 interviewees in 23 developing countries and 198,365 self-selected respondents of internet surveys from the same countries, showing that in most databases, commonly used personality questions generally do not accurately measure the intended personality traits and show low validity.

In this report, we consider two sets of cross-country data on SES. The first set is due to Balart et al, 2018, who focus on motivation. They exploit the exogenous variation in the ordering of questions asked by the PISA project to assess the reading and math skills of 15-year-olds and decompose student performance into two components: the starting performance, which they interpret as reflecting cognitive skills, and the decline in performance during the test, which they take as an index of motivation. Conditional on the difficulty of questions, a more accentuate decline signals a lower willingness to endure and produce adequate levels of effort.

One might expect that motivation is positively correlated with the willingness to stay in school, and therefore negatively correlated with early school leaving. Although we hasten to stress that correlation is not causation, the correlation between country-level

average motivation (available for 58 countries) and the share of early school leavers is negative.

The second set of data is obtained from the student questionnaire of PISA 2018, which contains several questions on personality traits. In these questions, the student is asked to say whether he/she strongly agree, agree, disagree, or strongly disagree with a statement. We use the answers to compute measures of five personality traits: conscientiousness, agreeableness, openness, extraversion and neuroticism.

We compute – by gender - the country – specific share of pupils with low conscientiousness as the percentage who disagree or strongly disagree with at least half of the following questions: 1) "Once I start a task, I persist until it is finished"; 2) "I find satisfaction in working as hard as I can"; 3) "Part of the enjoyment I get from doing things is when I improve on my past performance"; 4) "If I am good at something, I would rather keep struggling to master it than move on to something I may be good at".

We compute the share of pupils with low extraversion – by gender - as the percentage who disagree or strongly disagree with at least half of the statements: 1) "I make friends easily at school"; 2) "I feel like I belong at school"; 3) "Other students seem to like me" and the percentage who agree or strongly agree with the statement: 4) "I feel lonely at school".

The share of pupils with high neuroticism – by gender – is computed as percentage of who agree or strongly agree with at least half of the following statements: 1) "When I am failing, I worry about what others think of me"; 2) When I am failing, I am afraid that I might not have enough talent"; 3) When I am failing, this makes me doubt my plans for the future", plus the percentage who disagree or strongly disagree with at least 50 percent of the statements: 4) "I usually manage one way or another"; 5) "I feel that I can handle many things at a time"; 6) "When I am in a difficult situation, I can usually find my way out"; 7) "When I am in a difficult situation I can usually find my way out of it".

The share of pupils with low openness is the percentage who does not answer "very much like me" or "mostly like me" in at least half of the following statements: 1) "I

want to learn how people live in different countries"; 2) "I want to learn more about the religions of the world"; 3) I am interested in how people from various cultures see the world"; 4) "I respect people from other cultures as equal human beings"; 5) "I treat all people with respect regardless of their cultural background"; 6) "I give space to people from different cultures"; 7) "I value the opinions of people from different cultures".

Finally, the share with low agreeableness is the percentage who do not answer "very much like me" or "mostly like me" in at least half of the following statements: 1)" I try to look at everybody's side of a disagreement before I make a decision"; 2) "I believe that there are two sides to every question and try to look at them both"; 3) "I sometimes try to understand my friends better by imagining how things look from their perspective"; 4) "Before criticizing somebody, I try to imagine how I would feel if I were in their place; 5) "When I am upset at someone, I try to take the perspective of that person for a while"; 6) "I can change my behavior to meet the need of new situations"; 7) "I can adapt to different situations even when under stress or pressure"; 8) "I can adapt easily to a new culture"; 9) "When encountering difficult situations with other people, I can think of a way to resolve the situation; 10) "I am capable of overcoming my difficulties in interacting with people from other cultures".

After computing country averages for each measure, we summarize the information contained in the five indicators by using principal component analysis, a technique which selects the linear combination of these indicators which accounts for the largest share of the total variance. By so doing, we generate the Big Five index, available for 61 countries, which we standardize so that its mean is zero and its variance is one. The index increases when the share of individuals with low extraversion, agreeableness, conscientiousness, and openness decreases and the share with high neuroticism increases.[4]

2. The private, fiscal, and social costs of inadequate human capital.

[4] The correlation between the index and each indicator is as follows: -0.899 with the share with low conscientiousness; -0.918 with the share with low extraversion; -0.864 with the share with low agreeableness; -0.924 with the share with low openness and 0.345 with the share with high neuroticism.

In this section we describe the private, fiscal, and social costs of inadequate human capital. For brevity, in this and the next two sections we refer only to ESL, but the discussion applies also to LBS and to SES, to the extent that SES affects either ESL or LBS.

The pecuniary costs of ESL are the economic resources (i.e., current and future production and income) lost by maintaining ESL at its current level rather than reducing it to zero. Belfield, Levin and Rosen, 2012, provide a useful taxonomy of these costs that we adapt for this report. The costs are borne by households (private costs), the government (fiscal costs), and society, which includes both households and the government (social costs). Private costs include the effects of ESL on labor income, social transfers, income taxes, private health and education expenditures, and crime victimization. Fiscal costs are defined as the effects on the gap between fiscal revenues and total government spending. Finally, social costs are the sum of private and fiscal costs and also include the shadow cost of public funds.[5]

We focus on countries, and therefore on aggregations of individual costs across economies. By taking an aggregate view, we disregard the important issue of how these costs are distributed within countries. An important exception is that we always try to provide estimates of costs by gender.

We begin by defining the private costs of ESL as the loss of private economic welfare when ESL is at its current level rather than in the hypothetical scenario where no one prematurely abandons education.[6] Aggregate private economic welfare in each country is given by:

$$U = \left(Y - T + W_f\right) - H_p - C_p - E_p \qquad (1)$$

where *Y-T+Wf* is income net of taxes *T* and transfers *Wf* (i.e., disposable income), *Hp* is private health expenditure, *Cp* is the private cost of crime victimization and *Ep* is the private expenditure for education. All the quantities in (1) are affected by ESL. A

[5] Taxes cause a loss of welfare to taxpayers which is larger than fiscal revenues. This is because taxation distorts markets and prevents them to reach a welfare maximizing equilibrium. In other words, whenever the government collects one dollar, the loss suffered by the private sector is larger than one dollar. This additional loss of welfare is the shadow cost of public funds.

[6] Or, alternatively, when ESL assumes a target value (i.e., 10 percent of the relevant population).

higher country – specific ESL reduces incomes and taxes, increases transfers, private health expenditure and the expected cost of crime victimization, and reduces private education expenditures.

In this report, we use the notation ΔX = X1 – X0, where X is a generic variable, and X1 and X0 are the values in the status quo scenario, with ESL at its current level, and in the intervention scenario (no ESL) respectively. The private costs of ESL are given by:

$$\Delta U = \Delta\left(Y - T + W_f\right) - \Delta H_p - \Delta C_p - \Delta E_p \qquad (2)$$

and include: 1) the loss of disposable income $\Delta\left(Y - T + W_f\right) < 0$; 2) the increase in private health expenditures $\Delta H_p > 0$; 3) the increased victim cost of crime ($\Delta C_p > 0$) and 4) the reduction in private educational expenditures ($\Delta E_p < 0$). While the last component contributes to reducing the private costs of ESL, the first three components contribute to expanding them. Overall, ΔU is expected to be negative (a welfare loss).

From the viewpoint of the private sector, lower taxes and higher welfare transfers due to higher ESL contribute to reducing the welfare loss generated by lower aggregate incomes. However, lower taxes and higher transfers correspond to increased fiscal costs. The government budget surplus (or deficit) is defined as

$$B = T\text{-}G \qquad (3)$$

where T are fiscal revenues and G is government spending, which includes welfare transfers W_f, public health expenditures H_f, the public costs for law and order C_f and public education expenditures E_f.

The change in the budget surplus or deficit induced by a value of ESL in the status quo rather than in the intervention scenario is given by:

$$\Delta B = \Delta(T - G) = \Delta T - \Delta W_f - \Delta H_f - \Delta C_f - \Delta E_f \qquad (4)$$

Since higher ESL typically reduces tax revenues and increases spending for welfare transfers, health and law and order, which is only partly compensated by lower public education spending, ΔB is likely to be negative. The fiscal costs of ESL are the reduction in the surplus or the increase in the deficit.

The social costs of ESL, ΔS, add up private (ΔU) and fiscal costs (ΔB), and also include the productivity loss associated with a less skilled labor force ΔTFP and the costs of raising taxes to pay for public services $\lambda \Delta T$, which decline when ESL is higher than zero because of the reduction of tax revenues. Therefore, the social costs of ESL are:

$$\Delta S = (\Delta U + \Delta B) + \Delta TFP - \lambda \Delta T = (\Delta Y - \Delta H_p - \Delta H_f - \Delta C_p - \Delta C_f - \Delta E_p - \Delta E_f) + \Delta TFP - \lambda \Delta T \quad (5)$$

where taxes and welfare transfers cancel out.

This report focuses on the pecuniary costs of ESL, LBS and SES. Yet there are also non-pecuniary costs, which include the loss of personal fulfilment, intellectual growth, and quality of life that can result from incomplete education. While we touch on some of these costs (tax morale, early pregnancies, and corruption), the impact of ESL on individual well-being, including factors such as self-esteem, life satisfaction and wellbeing or mental health are outside the scope of this report. We recognize, however, that these aspects are important for a comprehensive understanding of the consequences of inadequate education.

3. Methodologies to compute fiscal and social costs.

There are two alternative approaches to evaluating the costs of ESL: a) the survey – based approach described by Belfield, 2008, and Belfield, Levin and Rosen, 2012, which relies on the availability of survey data on earnings, health and crime; b) a macro-economic approach, as exemplified by Hanushek and Wossmann, 2012, 2015, which relies instead on cross-country data and aggregate outcomes. These two methodologies are briefly illustrated below.

3.1 The survey - based approach.

For illustrative purposes, we focus on ESL and gross earnings Y. To compute the cost of ESL in terms of lost earnings, Lamb and Huo, 2017, use the Australian Survey of Income and Housing and compare two groups of individuals: a) permanent early school leavers, or individuals aged 25 to 64 who have not completed 12 years of education; b) individuals in the same age group who have completed at least 12 years. Either group is divided in four age bands, and for each band the band-specific cost of

ESL is computed as the difference in average annual earnings between groups a) and b). The weighted average of band-specific costs gives the estimated mean annual cost of ESL.

It is important to stress that that this estimate does not necessarily coincide with the causal effect of ESL on earnings. To see why, consider the individuals who abandoned education prematurely. For them, the causal effect of ESL is defined as the difference between their observed earnings and the counterfactual earnings in the event they completed 12 years of education. Such comparison requires that the same individuals, with their cognitive and non-cognitive endowment, family background and contextual conditions, are observed in two alternative states-of-nature, or contingencies. For early school leavers, however, the counterfactual earnings had they completed upper secondary education cannot be observed and need to be estimated. Lamb and Huo approximate counterfactual earnings with the average earnings of the individuals who instead completed at least 12 years of education. The problem with this approach is that completers and leavers have different characteristics, and that the factors that induced them to complete education might also affect their labor market performance. A more convincing approach would require that the analyst compares individuals with similar characteristics.

3.2 *The macro-economic approach.*

This approach is based on the work by Barro and Lee, 2010; Psacharopoulos and Patrinos, 2011; Thomas and Burnett, 2013; Hanushek and Woessmann, 2012, 2015. Define Y_i as country-specific gross earnings, where the subscript i indicates the country, ESL_i as the country-specific share of early school leavers, X_i as a vector of country – specific variables and ε_i as an error term. Using data for different countries, the following regression is estimated.

$$Y_i = \gamma_0 + \gamma_1 ESL_i + \gamma_2 X_i + \varepsilon_i \qquad (6)$$

The vector X includes for instance the country-specific population, government spending, an index of openness to the global economy, geographical and climatic controls, and proxies of institutional quality.

While the survey - based approach computes the costs of ESL by comparing the earnings of early school leavers with those of school completers *within* a single country, the macro-economic approach uses instead the *cross - country* variability in average earnings and in the share of early school leavers to estimate the parameter γ_1, or the impact of the latter on the former. Rather than using the group of school completers as the counterfactual, this approach identifies the effect of ESL by comparing average labor earnings across countries with different proportions of ESL.

As in the survey-based method, the risk is comparing apples with oranges, as countries with different ESL might differ also in other dimensions that are relevant for labor earnings (for instance the demand for and the returns to skills). The task of neutralizing these confounding differences across countries is assigned to the control variables X_i and to the implementation of specific estimation strategies (*instrumental variables*).

The estimates of (6) can be used to predict earnings when ESL is either at its current value or is set at zero. The predicted value is $\hat{Y}_{i,ESL} = \hat{\gamma}_0 + \hat{\gamma}_1 ESL_i + \hat{\gamma}_2 X_i$ in the former case and $\hat{Y}_{i,0} = \hat{\gamma}_0 + \hat{\gamma}_2 X_i$in the latter case. The expected earnings losses in country i when ESL is at its current value rather than at zero are given by $\hat{Y}_{i,ESL} - \hat{Y}_{i,0} = \hat{\gamma}_1 ESL_i$, which depends on the estimated parameter $\hat{\gamma}_1$ - common across countries - and the country-specific share of early school leavers ESL_i.

3.3 *Choosing between alternative methodologies.*

While the survey-based approach requires for each country survey data that contain information on the relevant outcomes by group (for instance early school leavers and school completers), the macro-economic approach relies on data that contain cross - country information on aggregate outcomes and the share of early school leavers or children with less than basic skills.

The survey-based approach estimates the effects of ESL on individuals who prematurely abandon education (to be interpreted as a private effect), but does not capture the external effects of ESL, that is, the effects that ending education earlier has on other individuals. By completing less education, for instance, individuals can affect not only their own productivity but also the productivity of co-workers. Differently,

the cross-country analysis estimates aggregate effects by construction and thus captures both individual and external effects.

In this report, we plan to estimate the global private, fiscal, and social costs of ESL and these costs for a sub-sample of twenty countries where boys and girls are ad a disadvantage in education. For many of these countries, especially the low income and the lower middle-income ones, there is an issue of availability and access to the survey data required to implement the survey-based approach. Given our focus on global effects, the macro-economic approach has the clear advantage of relying on international data sources with enhanced comparability.

4. *The implementation of the macro-economic approach.*

In this section, we describe how we estimate the private, fiscal, and social costs of ESL. Each cost Q can be expressed in terms of per-capita GDP. For instance, public expenditure on health can be written as Q=λGDP, where λ is the share of expenditure on per-capita GDP.

The effect of ESL on Q is the combination of two effects: a) the effect on per-capita GDP; b) the effect on the share λ. Define Q^1 and Q^0 as the cost when ESL is at its current level (or *status quo*) and when it is set at 0 (or *intervention*); ESL^1 and ESL^0 as the status quo and the intervention share of early school leavers, where we assume that $ESL^0 = 0$. Finally, let GDP^1 and GDP^0 the values of per-capita GDP when ESL is at its status quo and intervention level. Then

$$\frac{\Delta Q}{\Delta ESL} = \frac{Q^1 - Q^0}{ESL^1} = \left[\frac{(\lambda^1 - \lambda^0)}{ESL^1} * GDP^1 + \frac{(GDP^1 - GDP^0)}{ESL^1} * \lambda^0\right] \qquad (7)$$

This relationship shows the change in cost Q induced by increasing ESL from its intervention value (0) to its status quo value (the current value). This change consists of two components: a) the change of per-capita GDP when ESL increases; b) the change in the share λ when ESL increases. We discuss the two components in turn.

4.1 The effect of ESL on per-capita GDP and costs Q.

To estimate the effect of ESL on (real) per-capita GDP $\frac{\Delta \text{GDP}}{\Delta ESL}$, we follow Hanushek and Wossmann, 2012, and consider a dynamic model that encompasses Eq. (6) as a special

case. We denote with $g_i = \frac{1}{T-2001}\frac{GDP_{iT}-GDP_{i2001}}{GDP_{i2001}}$ the average annual growth rate of per-capita GDP between 2001 and T in country *i*. Letting ESL_{i2001} be the share of early school leavers in 2001 in country *i*, we estimate the following empirical model

$$g_i = \pi_0 + \pi_1 \ln(GDP_{i2001}) + \pi_2 ESL_{i2001} + \pi_3 X_i + \varepsilon_i \quad (8)$$

where *ln* is for logarithm, GDP_{i2001} is the start-of-period (2001) (log-) per-capita GDP and X_i are country characteristics.

We expect parameter π_1 to be negative if countries with a lower initial per-capita GDP grow faster (*convergence*). We also expect parameter π_2 to be negative if higher ESL reduces economic growth and places a country on a path converging to a lower steady state value of GDP.

We estimate the effect of ESL on the share λ by using the following empirical specification:

$$\lambda_i = \beta_0 + \beta_1 ESL_i + \beta_2 W_i + \mu_i \quad (9)$$

where W_i are appropriate country-specific controls and the parameter β_1 is the effect of ESL on λ.

For many countries, the last year for which we have data for ESL is 2021, which becomes our *pivotal* year. We consider two alternative scenarios: the intervention (scenario 0) and status quo scenario (scenario 1). In the former case, ESL is set to zero in 2021 and kept at zero until 2041. In the latter case, ESL is set at its current value (2021) from 2021 until 2041. Using the estimates of (8) and (9), we compute for each scenario the expected values of per-capita GDP and the share λ from 2021 to 2041.

For each year between 2021 and 2041 we compute the difference between scenarios 1 and 0 for both GDP ($GDP^1 - GDP^0$) and the share λ ($\lambda^1 - \lambda^0$). Using the fact that $Q^j = \lambda^j GDP^j$, we also compute the difference between scenarios in cost Q ($Q^1 - Q^0$). The present discounted value (PDV) of these annual differences over the twenty-year period is the *lifetime cost* of ESL.[7] Since the pivotal year is 2021, we treat year 2021 as the present and discount accordingly. The *annual cost* of ESL is instead the value of

[7] The present discounted value is the sum of current and future differences, with future differences discounted using the interest rate.

$(Q^1 - Q^0)$ in 2030, the mid-point of the period 2021-2041, discounted at the pivotal year 2021.

As shown in Appendix A.1, the predicted value of Q at time 2021+t, where t=0,…,20, under the status quo scenario is

$$Q^1_{2021+t} = \hat{\lambda}^1_{\square}(1 + t\hat{g}^1_{\square})GDP_{2021} \quad (10)$$

where $\hat{g}^1_{\square}$ and $\hat{\lambda}^1_{\square}$ are the predicted annual rate of growth of per-capita GDP and the predicted cost share under this scenario (ESL at its 2021 value).

The predicted value of Q under the intervention scenario is instead:

$$Q^0_{2021+t} = \hat{\lambda}^0_{\square}(1 + t\hat{g}^0_{\square})GDP_{2021} \quad (11)$$

where $\hat{g}^0_{\square}$ and $\hat{\lambda}^0_{\square}$ are the predicted annual rate of growth of per-capita GDP and the predicted cost share under this scenario (ESL set at zero).

The estimated lifetime cost LQ is given by:

$$LQ = \sum_{t=0}^{20}(Q^1_{2021+t} - Q^0_{2021+t})\frac{1}{1+rt} \quad (12)$$

Where $\frac{1}{1+rt}$ is the discount factor and r is the real rate of interest. The average annual cost AQ, measured in 2030 and discounted at 2021, is:

$$AQ = \frac{Q^1_{2030} - Q^0_{2030}}{1+9r} \quad (13)$$

The lifetime cost, relative to lifetime GDP in the status quo scenario, is:

$$RLQ = \frac{\sum_{t=0}^{20}(Q^1_{2021+t} - Q^0_{2021+t})\frac{1}{1+rt}}{\sum_{t=0}^{20} GDP^1_{2021+t}\frac{1}{1+rt}} \quad (14)$$

and the average annual cost, relative to 2030 GDP, is:

$$RAQ = \frac{Q^1_{2030} - Q^0_{2030}}{GDP^1_{2030}} \quad (15)$$

4.2 *The effect of SES on per-capita GDP and cost components Q.*

In principle, SES can affect per-capita GDP and the costs Q both directly, conditional upon other measures of human capital such as ESL and LBS, and indirectly, by affecting either ESL or LBS. We show in Section 6 that there is no evidence that our

cross-country measures of SES affect directly per-capita GDP. There is evidence instead of an indirect effect, especially from SES to LBS.

We estimate the GDP costs of SES in two steps: first, we compute the change in LBS between the status quo scenario, corresponding to the observed levels of SES, and the counterfactual scenario, obtained by setting each measure of SES at its maximum value. Second, we compute the GDP costs associated with the change in LBS using our estimates of (8).

4.3 Estimates by gender.

Many costs cannot be meaningfully defined by gender. This is the case, for instance, of per-capita GDP and health, welfare, education, and crime expenditures. To evaluate the private, fiscal, and social costs by gender, we consider two different interventions: a) ESL of males is set to zero while ESL of females remains unchanged at its current value; b) ESL of females is set to zero while ESL of males at its current value.

Since ESL is given by

$$ESL_{\square} = s_m ESL_m + (1 - s_m) ESL_f \quad (16)$$

where the subscript m is for males and s_m is the share of males in the relevant population, the predicted growth rate of per-capita GDP when ESL of males is set at zero is:

$$\hat{g}_M^0 = \hat{\pi}_0 + \hat{\pi}_1 \log(GDP_{2001}) + \hat{\pi}_2 (1 - s_m) ESL_f + \hat{\pi}_3 X_{\square} \quad (17)$$

For females we have instead

$$\hat{g}_F^0 = \hat{\pi}_0 + \hat{\pi}_1 \log(GDP_{2021}) + \hat{\pi}_2 s_m ESL_m + \hat{\pi}_3 X_{\square} \quad (18)$$

Similarly, the predicted values of λ under the intervention scenario are:

$$\hat{\lambda}_M^0 = \hat{\beta}_0 + \hat{\beta}_1 (1 - s_m) ESL_f + \hat{\beta}_2 W_i \quad (19)$$

and

$$\hat{\lambda}_F^0 = \hat{\beta}_0 + \hat{\beta}_1 s_m ESL_m + \hat{\beta}_2 W_i \quad (20)$$

The predicted value of Q by gender under the status quo at time 2021+t, where t=0,…,20, is given by (10). The predicted value of Q under the intervention is:

$$Q_{2021+t}^{0d} = \hat{\lambda}_d^0(1 + t\hat{g}_d^0)GDP_{2021} \quad (21)$$

where $d = M, F$.

The gender-specific estimated lifetime cost by gender is given by:

$$LQ_d = \sum_{t=0}^{20}\left(Q_{2021+t}^{1} - Q_{2021+t}^{0d}\right)\frac{1}{1+rt} \quad (22)$$

Where $\frac{1}{1+rt}$ is the discount factor and r is the real rate of interest. The gender-specific average annual cost, measured in 2030, is:

$$AQ_d = Q_{2030}^{1d} - Q_{2030}^{0d} \quad (23)$$

As explained in Appendix A.1, the sum $LQ_M + LQ_F$ is only approximately equal to LQ. The same holds for average annual costs. The approximation is due the non-linear relationship between ESL and each cost. Intuitively, this means that the effect of simultaneously removing ESL for both genders may be larger than the one obtained by removing separately female or male ESL. In most cases, however, the gap between the sum of the gendered costs and the overall costs of ESL is moderate. Only for fiscal costs do we observe a significant gap, because in this case the non-linearity is more pronounced.

According to Wodon et al, 2018, the failure to educate girls is especially costly because low educational attainment increases the probability of child marriage and early childbearing, and leads to higher exposure to risks, both for young mothers and their children. Because of these effects, the estimated impact of ESL in Eq. (8) should be higher for girls than for boys. However, estimating (8) using both ESL_m and ESL_f as regressors is not feasible due to the very high correlation between these two variables.

4.4 Global costs

Annual and lifetime costs are aggregated to obtain country-specific private, fiscal and social costs. The *global* private, fiscal and social costs are obtained by further aggregating country-specific costs, using each country's share of total population as weight. Weighting by population implies that in the computation of global costs

poorer but very populated countries, such as India, China or Nigeria, weight relatively more.[8]

4.5 Causal estimates.

The key explanatory variable in Eq. (8) is ESL_{i2001} and the parameter of interest is π_2. We would like to interpret the OLS (*ordinary least squares*) estimate of π_2 as the causal effect of ESL on growth. However, this interpretation is complicated by the fact that ESL_{i2001} is correlated with unobservable country characteristics omitted from (8) because of lack of data. These characteristics could affect both ESL and the outcome g. In addition, ESL_{i2001} could be affected by measurement errors, both because the quality of country-specific statistics is poor and because the harmonization of skill scores across countries can introduce some bias. Last but not least, ESL_{i2001} could suffer from reverse causation. For instance, expectations of sustained economic growth and expanding employment opportunities could decrease the opportunity cost of early school living and increase ESL.

We address these problems using two complementary strategies. First, we estimate (8) using OLS and test whether the estimates are affected by un-observables using the Oster test (Oster, 2019). This test establishes bounds to the true value of the key parameter under two polar cases. In the first case, there are no un-observables, and the OLS estimate $\widehat{\pi_2}$ are consistent. We denote as $\hat{R}$ the estimated R squared in this case. In the second case, there are un-observables, but observables and un-observables are equally related to the outcome (δ = 1 in Oster's notation). When un-observables are included, we assume, as suggested by Oster, that the R squared is equal to Rmax = min (1.3$\hat{R}$; 1). Under these assumptions, this method produces an alternative estimate of $\pi_2, \widetilde{\pi_2}$. If zero can be excluded from the bounding set defined by $[\widehat{\pi_2}, \widetilde{\pi_2}]$, then accounting for un-observables would not change the direction of the OLS estimates of Eq. (8).

Second, we use instrumental variables (IV), or variables that are correlated with ESL but uncorrelated with the rate of growth, conditional on ESL (the so-called exclusion

[8] Alternatively, we could have weighted by the country share of global GDP. In this case richer countries, such as the US, would have had a more prominent role in global costs.

restriction). Our selected instrument is the pupil / teacher ratio in upper secondary schools (source: UNESCO statistical database). We expect a lower pupil/teacher ratio to improve student learning and reduce ESL.

A potential problem with the selected instrument is that it may fail to pass the exclusion restriction, because it affects growth independently of ESL. We address this problem by applying the methods of partial identification proposed by Conley, 2012, who tests the robustness of IV estimates in case of small deviations from the exclusion restriction, i.e., when the instrument has a (small) direct effect on the outcome.

As in Conley, 2012, we compute the largest direct effect compatible with a statistically significant effect of ESL on the outcome. We also implement the Nevo and Rosen, 2012, procedure to derive bounds for π_2, under the assumptions that the sign of the correlation between the endogenous variable ESL_{i2020} and the error term ε is the same as the sign of the correlation between the selected instrument and error term ε and that the error term is less correlated with the instrument than with ESL.

5. Data.

In this section we describe some of the data used to produce our estimates of the private, fiscal and social costs of ESL. We collect these data to produce both the global estimates and the estimates accruing to a selected sample of 20 countries, which are listed in Tables 5.1 and 5.2.

5.1 Disengaged youth (NEET).

We collect data by gender on disengaged youth aged 15 to 24 who are not in employment, education or training (NEET) from the World Bank World Development Indicators. These data are available for all the countries in the selected sample of 20 countries, with the exception of Morocco. We regress NEET on the share of out of school children OS, year, gender and continent dummies, using all available data, and predict NEET using the estimated coefficients as well as data on OS for Morocco.

5.2 Taxes, government expenditures and tax morale.

The ratio of taxes (compulsory transfers to the central government for public purposes) to GDP is from the World Bank database. We integrate these data with: OECD data

(OECD 2022a; 2022b) for Pakistan and Chad; UNICEF, 2017, and Ndoricimpa, 2021 for Burundi and the CEIC platform (https://www.ceicdata.com/en/yemen/government-revenue-and-expenditure/government-revenue-tax) for The Yemen Republic.

The ratio of government expenditure to GDP is also from the World Bank database and refers to cash payments for operating activities of the government in providing goods and services. It includes the compensation of employees (such as wages and salaries), interest and subsidies, grants, social benefits, and other expenses such as rent and dividends. For most countries, the data are from the World Bank. For Burundi, Chad and Yemen, we use data from the IMF.

Policies that reduce ESL improve health outcomes, equip people with the skills required to secure decent jobs and contribute directly to higher incomes and to improvements in living standards. As pointed out by Harding and Ward, 2020, they also contribute to higher tax revenues in the medium-long term. The impact of education on tax revenues occurs via two main avenues: a) the higher incomes associated with improved education; b) higher levels of tax morale.

To measure tax morale by country, we proceed in two steps: first, we use a question in the World Values Survey (https://www.worldvaluessurvey.org/wvs.jsp), which asks respondents from more than 200 countries whether they consider justifiable cheating on taxes. We reclassify this variable, that we call M, so that it ranges from 1 (always justifiable) to 10 (never justifiable), and compute country averages using the weights provided by the survey.

Second, we measure the perceived levels of public sector corruption with the corruption index, which is available for 180 countries.[9] We regress M on the corruption index and use the predicted values as the measure of county – specific tax morale. The

[9] The corruption index is produced by Transparency International (https://www.transparency.org/en/cpi/2022). See OECD, 2013, for a discussion of factors affecting tax morale.

underlying idea is that tax morale should be higher in countries with lower perceived corruption. Typically, countries with higher ESL rate have a lower tax morale.[10]

5.3 Gross and net labor incomes.

Data on average monthly gross labor incomes by country are from the International Labor Office (ILO). We multiply them by 12 to obtain annual values. We use data on the tax to GDP ratio and the assumption that this ratio is equal to the ratio of taxes to gross wages to obtain net labor incomes.

5.4 Crime.

There are several reasons why education may influence crime. Machin et al. 2011, consider income effects and time availability.[11] On the one hand, education increases the returns to legitimate work, raising the opportunity costs of illegal behavior. On the other hand, punishment for criminal offences may lead to imprisonment. By raising wage rates, schooling makes any time spent out of the labor market costlier. These arguments suggest that those who can earn more are less likely to engage in crime. But it is also possible that schooling raises the returns to crime. For example, certain white-collar crimes require higher levels of education (see Moretti 2007).

5.4.1 Public expenditure for crime.

We measure the fiscal burden of crime *Cf* with the share of government expenditure for public order and safety on GDP, which includes the costs of police service, fire protection, law courts and prisons. These data are available from the IMF (https://data.imf.org/regular.aspx?key=61037799). We impute missing values using the predicted values from a regression of expenditure on log GDP per-capita, an index of democratic institutions and continent dummies.

5.4.2 Victim costs of crime

[10] According to Rodriguez Justicia et al, 2018, the more highly educated because of their better knowledge on public affairs exhibit higher levels of tax morale in countries that have better quality public services, a fairer tax system and higher quality institutions.
[11] They also mention patience and risk aversion.

The social burden of crime includes the fiscal burden plus the costs directly imposed on victims and the avoidance costs by victims and potential victims.[12] In extreme cases, violent crimes lead to the victim's death. According to Soares, 2006, mortality due to violence reduces survival probabilities throughout the survival distribution and has a final cumulative effect that is reflected on a reduced life expectancy at birth. Using data from 73 countries and the 1990s, Soares estimates the expected years of life expectancy at birth lost because of homicides (compared to a counterfactual of no homicides). According to his data, the homicide of one individual (per 100,000) – or homicide rate - reduces life expectancy, on average, by 0.0245 years. This is a lifetime effect.

To evaluate the social cost of additional crime induced by ESL, we first estimate the effect of ESL on the homicide rate. Second, we evaluate the cost of the eventual increase in the homicide rate using the value of a statistical life (VSL) as computed by Viscusi and Masterman, 2017. To illustrate this concept, we use the example produced by EPA (https://www.epa.gov/environmental-economics/mortality-risk-valuation#means).

Suppose that each person in a sample of 100,000 people were asked how much he or she would be willing to pay for a reduction in their individual risk of dying by 1 in 100,000, or 0.001 percent, over the next year. Since this reduction in risk would mean that we would expect one fewer death among the sample of 100,000 people over the next year on average, this is sometimes described as "one statistical life saved." Now suppose that the average response to this hypothetical question was $100. Then the total dollar amount that the sample would be willing to pay to save one statistical life in a year would be $100 per person × 100,000 people, or $10 million. This is what is meant by the "value of a statistical life."

Viscusi and Masterman, 2017, tabulate the value of a statistical life (in dollars) for 189 countries. This value ranges from 0.046 million dollars for Burundi to 18.26 million

[12] Belfield, Levin and Rosen, 2012, point out that other social and fiscal costs include: avoidance costs by potential victims of crime, public restitution payments to victims; wage supplements to workers in crime-prone occupations (e.g. teachers in dangerous schools); productivity losses from participating in criminal activity; and transfers of assets from victims to criminals. These costs are omitted because of data limitations.

dollars in Bermuda. We interpret this value as the social value of reducing the homicide rate by 1 (per 100,000 people).

Although the private and social costs of murder crimes are the highest, other crimes are costly for the individual and society as well. Chalfin, 2016, shows that, while the estimated total cost of murder crimes in the US was about 80 billion dollars in 2012, the costs associated with assault and rape were 88 and 54 billion respectively. McCollister et al, 2010, evaluate for the United States the tangible and intangible costs of murder, rape, aggravated assault, and robbery. They estimate that the cost of a sexual assault/rape is 2.36 percent the cost of a homicide. On the other hand, the costs of an aggravated assault and a robbery are 1.12 and 0.2 percent of the cost of a murder.

To evaluate the social costs of violent offences, we use international data on the number of such offences per 100,000 people from UNODC (United Nations Office on Drugs and Crime). Assuming that the cost of a homicide per 100,000 inhabitants – expressed in terms of value of a statistical life – is x dollars, we set the cost of a sexual assault, other assaults and robbery per 100,000 inhabitants at 2.36, 1.12 and 0.2 percent of x.

5.5 Health.

The relationship between education and health—the 'health-education gradient'—is widely studied. There is abundant evidence that a gradient exists (Cutler and Lleras-Muney, 2010). Education improves decision-making abilities, which may lead to better health decisions and to a more efficient use of health inputs (Lochner, 2011). In addition, education reduces stress and generate healthier behaviors. Better-educated individuals are also more likely to have healthier jobs, live in healthier neighborhoods, and interact with healthier peers and friends. Education also leads to better health outcomes because it raises income levels (Brunello et al, 2016).

5.5.1 Public and private health expenditures.

Some of the health benefits associated to higher education accrue to the individual, and some accrue to society. In modern society, several health costs are borne by governments, which are often involved in the supply of health services. By worsening health, ESL has the potential of increasing public health costs. As argued by Muenning

2007, however, two countervailing effects may limit the losses attributable to ESL. First, individuals with lower education use public health services less intensively, for instance because they screen less frequently. Second, their lifespan is shorter and therefore they need fewer services later in life. The presence of these countervailing factors imply that it is difficult to pin down the public health costs associated with ESL.

Data on public and private (household out-of-pocket payments) health expenditure are from the WHO database (https://apps.who.int/nha/database/Select/Indicators/en) and from the World Bank.

5.6 *Welfare support programs and transfers*

ESL not only reduces incomes and tax payments but also increase reliance on public social protection programs. These programs include both active market policies such as training schemes, public works and direct job creation targeted at the unemployed, and passive policies such as out-of-work income maintenance. They also comprise social assistance policies (social pensions, food and in-kind transfers, school feeding and fee waivers and subsidies).

The incidence of unemployment benefit programs is strongly related to the level of development of a country. In developed countries, they typically offer good protection, by covering most employed persons, irrespective of occupation or industry, and by providing adequate smoothening of consumption patterns. These programs are less widespread in developing countries, where the balance between job and worker protection is tilted in the favor of the former: virtually all have – typically very restrictive – severance pay programs, and very few have UI programs (Vodopivec, M, 2009).

For developed countries, we use data on public social protection expenditure for families and children, incapacity, unemployment benefits and active labor market policies as share of GDP from the OECD. For developing countries, we use data on social assistance as percentage of GDP from the World Bank Aspire project,[13] that are

[13] See https://www.worldbank.org/en/data/datatopics/aspire.

however available only for a single point of time between 2015 and 2021. Social assistance includes unconditional and conditional cash transfers, non-contributory social pensions, food and in-kind transfers, school feeding, public works, workfare and direct job creation, fee waivers and subsidies and other expenses. We use the results of the regression of social transfers as share of GDP on the log of GDP per-capita to predict missing values.

5.7 Public and private savings on educational expenditures

Countries where students fail to complete upper secondary education spend less on education by saving on government subsidies, both for secondary and for tertiary education.[14] We use the data on government expenditure on secondary and tertiary education as share of GDP by UNESCO. We input missing values by using predictions from the regression of expenditure on GDP per-capita.

Private education savings due to ESL refer to the fees and other direct costs that households do not pay by failing to enroll their offspring in higher education. The data on private educational expenditure for secondary and tertiary education, expressed as share of GDP, are available from the OECD for developed countries. We impute missing values by using predicted values from the regression of expenditure on GDP per-capita.

6. Estimates.

In this section, we describe our estimates of equations (8) and (9).

6.1 The effect of inadequate human capital on GDP growth.

In equation (8), we define the annual rate of growth as the difference between real GDP per capita in the last available year, which for many countries is 2022, and real GDP per capita in 2001. This difference is divided by GDP per capita in 2001 and further

[14] Some education costs, however, including those associated with unfilled places in school buildings, cannot be saved. Sabates et al, 2010, point out that in Malawi, with a primary school dropout rate of 65 percent in 2007, nearly half a million school places were taken up by children who failed to complete primary school. In monetary terms, this broadly represented an annual expenditure of 60 million dollars, 1.3 percent of GDP in 2007, on the education of children who probably left schooling without any basic skills.

divided by the number of years between the last available year and 2001. As shown in Table 5, the average annual rate of growth in our sample of 159 countries is 3.2 percent.

We use four alternative measures of inadequate human capital: a) ESL, measured in 2001; b) the share of out of school young individuals, measured in 2001; c) LBS, which is measured using various datasets, including several waves of the OECD's Program for International Student Assessment (PISA) and of IEA's Trends in International Mathematics and Science Study (TIMSS); d) the share of students with less than basic skills, which is based on the same data used for LBS. As shown in Table 5, the average shares of ESL, out of school youngsters, children and students with less than basic skills in our sample of more than 150 countries are 57.2, 39.9, 61.6 and 57.7 percent respectively.

The vector of controls X includes: the log of population aged 15 plus (average 2000-2021); the ratio of government consumption to GDP (average 2000-2021); the ratio of the capital stock to GDP (average 2000-2021); the degree of openness, measures at the sum of the ratios of imports and exports to GDP; the log of the international property rights index, which measures the degree of protection of these rights (Property Rights Alliance, 2022); a binary variable indicating whether a country has never been colonized by a foreign power; a binary variable measuring whether the share of land in tropical or sub-tropical areas is above the sample median. The summary statistics of these variables are shown in Table 5.

We present the results of our estimates of (8) in Table 6. The first rows of the table show the ordinary least squares (OLS) estimates of the effect on inadequate capital on GDP growth, both with and without the covariates included in vector X. For all the four specifications, we find that inadequate capital reduces annual GDP growth. The estimated effect ranges between 0.068 and 0.086 (with covariates included). This means that a 10 percent reduction of ESL (LBS) with respect to the sample mean is expected to increase annual per-capita GDP growth by 0.39 (0.53) percentage points.

We verify whether these estimates are sensitive to the omission of unobservable variables using the Oster test. We find that the bounding set defined by the test never

includes zero, which supports the hypothesis that omitting un-observables does not alter the sign of the estimated effects.

The second part of the table shows the instrumental variables (IV) estimates. As mentioned above, we instrument our measures of inadequate human capital with the pupil / teacher ratio in upper secondary education. We first verify that the instrument is not weak by computing the F-test in the first stage regression of inadequate capital on the instruments and covariates. We find that the F-test is always above 10, the rule of thumb threshold, which suggests that the instrument is not weak.

Our IV estimates, which identify causal effects if the exclusion restriction holds, indicate that the four measures of inadequate human capital have a negative and statistically significant effect on annual GDP growth. The size of these effects is much larger than the OLS estimates, and ranges between 0.11 and 0.16 (with covariates included), implying that a 10 percent reduction of ESL (LBS) with respect to the sample mean increases annual GDP growth by 0.73 (0.99) percentage points.

Oster's test implies that the correlation between the metrics of inadequate human capital and the error term of equation (8) are negative. The inclusion of controls renders IV estimates more negative, suggesting that the correlation between the instrument (pupil teacher ratio) and the error term is positive. Hence, the condition required by Nevo and Rosen, 2012, (i.e., the concordance between the signs of the two correlations) is not met and it is not possible to bound the true effect of inadequate human capital. However, given that the exogeneity condition is more likely to be satisfied when controls are added, and that IV estimates become more negative as controls are included, we conclude that, if anything, we are underestimating the true effects of inadequate human capital (in absolute value). In other words, our IV estimates are likely to be conservative.

Finally, we perform the Conley, 2012, tests to check whether the estimated sign of the effect of inadequate human capital is robust to small violations of the exclusion restriction. We define these violations in terms of the reduced form effect of the instrument, which compounds two components: 1) the instrument's effect on GDP growth mediated by inadequate human capital; 2) a possible direct (i.e., unmediated)

effect. The reduced form effect is -0.0014. We find that the IV estimates remain negative and statistically significant even if a direct effect of the instrument exists and is relatively large (between 10.6 and 27.9 percent of the reduced form effect). For LBS the maximum deviation from the exclusion restriction compatible with a statistically significant negative effect of inadequate human capital on GDP growth is 26.9 percent of the reduced form effect. The corresponding value for ESL is 27.9 percent. Both are reassuringly large numbers.

6.2 The effect of inadequate human capital on the shares λ.

We estimate the effect of ESL and LBS on monetary and non - monetary outcomes, such as the labor share on GDP, the ratio of income taxes to GDP, the share of the government surplus or deficit on GDP, social transfers on GDP, public and private health expenditure on GDP, public and private education expenditure on GDP, public expenditure on law and order, the rate of homicides, robberies, sexual and other assaults per 1,000 inhabitants, the corruption index, tax morale, the share of NEET (in logs) and early pregnancies (in logs).

Monetary outcomes are typically expressed as shares of GDP. When these shares are close to zero, which happens in all cases but the labor income share, we use generalized linear models (GLM) rather than ordinary least squares (OLS). In these regressions, we control for most of the variables used in Eq. (8), with the addition of current per-capita GDP.

We estimate the impact of ESL or LBS on non-monetary outcomes using the IV strategy discussed in the previous sub-section, which consists of instrumenting ESL or LBS with the pupil/teacher ratio in upper secondary education. Since this approach produces very unsatisfactory results for the rate of homicides per 1,000 inhabitants, for this variable we turn to OLS estimates. We use OLS also to estimate regressions where the dependent variable is the (log of the) rate of sexual assaults, other assaults, and robberies per 1,000 inhabitants and the regressors include the (log of the) rate of

homicides per 1,000 inhabitants and the covariates used for non-monetary outcomes.[15] Table 7 reports the estimates of parameter β_1 in (9) when we use either ESL or LBS.

6.3 The effect of SES on GDP growth.

In our review of the literature in sub-section 1.3.1, we have discussed evidence showing that socio-emotional skills – or SES – affect educational outcomes. SES can impact on economic growth both indirectly, by affecting ESL or LBS, or directly (conditional on given values of ESL or LBS).

In this sub-section, we use cross-country data to estimate both indirect and direct effects. Compared to the previous section, we focus on associations rather than on causal effects, mainly because it is difficult to find a source of exogenous variation for SES. Therefore, the evidence presented here must be considered as suggestive. Our key result is that only indirect effects are present. This has important implications for the estimate of the costs borne by countries with low average levels of SES. We discuss these implications at the end of this section.

6.3.1 The effects of SES on ESL, LBS and GDP growth.

To evaluate the indirect effects of SES on growth, we regress - using ordinary least squares - ESL or LBS on both the set of controls used in Section 6.1 and either the motivation or the Big Five index. The summary statistics for these indices are reported in Table 8, which also indicates that they are available for 56 and 61 countries respectively. Table 9 shows instead our estimates of the effects of SES on ESL (columns (1) and (2)) and LBS (columns (3) and (4)).

We find that a higher motivation index is negatively associated with both ESL and LBS. We estimate that a 10 percent increase in this index above its mean (0.873) is associated with a decline of ESL and LBS by 8.3 (0.087 x -0.958) and 11.6 (0.087 x -1.331) percentage points respectively. There is also evidence of a negative association between the Big Five index, ESL and LBS, which is statistically significant only for LBS. We estimate that a one standard deviation increase in the index is associated to a 3.67

[15] We estimate that a one percent increase in homicides is associated with a 0.5 percent increase in robberies, a 0.174 percent increase in sexual assaults and a 0.05 percent increase in other assaults.

(0.021/0.572) percent reduction in ESL and with a 8.77 (0.054 / 0.616) percent reduction in LBS.

We test whether these estimates are affected by un-observables using the Oster test (Oster, 2019). As reported in Table 9, we find that the bounds defined by the test include zero only in in column (1). Therefore, there are reasons to interpret the estimated coefficient of motivation on ESL with caution, as it could be significantly affected by the inclusion of un-observables.

We evaluate the direct effects of SES on GDP growth by regressing the latter on the former, after controlling for ESL or LBS. As shown in Table 10, we find no evidence that SES directly affects growth, suggesting that, if any effect exists, it operates by affecting ESL and LBS.

An implication of these results is that we can evaluate the loss in per-capita GDP associated with low average SES in a country by computing ESL (LBS) under the status quo scenario (SES at its current level) and the intervention scenario (SES set at a target level) and by using (8) to evaluate the impact of ESL (LBS) on GDP growth. For the intervention scenario, we set the motivation index at its maximum sample value (0.958) and the Big Five index at 3, which roughly corresponds to the 95th percentile of the distribution.

7. Global estimates of the private, fiscal and social costs of ESL and LBS.

In this section we present the global estimates of private, fiscal and social costs associated with ESL (LBS) at its current level rather than at the intervention value (0). Using the estimation strategy explained in Section 4, we simulate, for each country, each cost Q over the period 2021 to 2041, under the status quo and the intervention scenarios. Our simulations assume that the estimates of (8) and (9), based upon historical data, remain valid for the near future. As mentioned above, the pivotal year is 2021, because this it is the last year for which data are available for ESL and for a large number of countries.

We estimate that, globally, the annual private costs of having ESL and LBS at their current (2021) levels rather than at zero exceed 6 trillion dollars (10.69 percent of expected GDP in 2030) and 9 trillion dollars (17.08 percent of GDP expected in 2030)

respectively, with the largest share due to male ESL and LBS. These are very large numbers, comparable to the effects of climate change. For instance, Winter and Kiehl (2022) estimate that, on aggregate, a global warming of 2.2°C can reduce by 2050 global GDP levels by 10 to 20 percent.

7.1 The global monetary costs of ESL and LBS.

Tables 11 and 12 report the private, fiscal and social costs of ESL in the status quo rather than in the intervention scenario, both global and by world region. While Table 11 reports the costs in billion US 2015 dollars,[16] lifetime and annual, aggregate and by gender, Table 12 shows these costs as percentage of GDP. Tables 13 and 14 show instead the costs of LBS in the status quo rather than in the intervention scenario, respectively in billion US dollars and as a share of GDP.

The global private lifetime costs of ESL are estimated at 134 trillion dollars, or 10.81 percent of global lifetime GDP. The global private lifetime costs of LBS are larger at 195 trillion dollars, corresponding to 17.28 percent of global lifetime GDP, which makes sense given that LBS measures both lack of schooling and poor school quality, while ESL only measures lack of schooling. In addition, the deviation of current values from zero is larger for LBS than for ESL.

Both lifetime and annual private costs are large. This is not surprising, however, given the high levels of ESL and LBS across the world, where 42 percent of youth prematurely abandon education and 57 percent have less than basic skills, implying that under-investment in human capital is massive.

The fiscal costs of ELS and LBS are also relevant. They are computed as the difference between total fiscal revenues and total government expenditures in the two scenarios (status quo versus intervention), and consist both of taxes paid by households and business companies (both income taxes and duties), and of all types of government expenses (including expenditures for the administrative machine, infrastructures, defense, and the service of public debt).

[16] To make these figures comparable across countries and comparable with World Bank GDP data, we always express values in constant 2015 US dollars.

The lifetime fiscal costs of ESL (LBS) are about 25 (68) trillion dollars, corresponding to 2.12 (7.42) percent of lifetime GDP. The annual fiscal cost of ESL (LBS) are 1,177 (3,247) billions USD (2.12 (7.41) percent of 2030 GDP). These numbers imply that, if ESL (LBS) was erased, governments would enjoy significantly higher financial resources, despite the additional public expenditures that a more educated and advanced economy implies. Remarkably, these fiscal surpluses would be structural.

Social costs include private and fiscal costs, but are lower than the sum of the two because the negative effect of ESL (LBS) on taxation mechanically reduces the shadow cost of public funds. Following the literature, the latter is set to 15 percent of fiscal revenues (Ballard and Fullerton, 1992). Since fiscal revenues decline when ESL (LBS) is set at the status quo scenario, shadow costs also decline, yielding social costs that are lower than the sum of private and fiscal costs.

Lifetime costs of ESL (LSB) amount to about 126 (213) trillion dollars, equivalent to 10.87 (20.96) percent of lifetime GDP. Annually, the social costs of ESL (LBS) correspond to 5,951 (10,051) billion dollars, or 10.77 (28.78) percent of 2030 GDP.

Generally, lifetime costs are one order of magnitude larger than annual costs, because they add up discounted annual costs for each year between 2021 and 2041. On the one hand, annual costs tend to become larger as time goes by. On the other hand, costs more distant in the future are more heavily discounted. Because of these two countervailing effects, lifetime costs can be roughly obtained by multiplying the annual costs by 20.

For instance, the global lifetime private costs of both ESL and LBS are 21.3 times the corresponding annual costs. This regularity also implies that the lifetime and annual costs expressed as percentages of lifetime and annual GDP are roughly equal. It also happens that the reduced shadow cost of public funds almost offsets fiscal costs, bringing social costs close to private costs. Leveraging on these regularities, we will only refer hereafter to annual private costs.

The world region bearing the highest costs of ESL (LBS) as percentage of GDP is Sub-Saharan Africa, where the share of ESL (LSB) and the potential for economic growth (because of the relatively low starting values) are also highest. In Sub-Saharan Africa,

the annual private costs of ESL (LBS) are estimated at 18.87 (26.34) percent of 2030 GDP.

The costs of ESL (LBS) as percentage of GDP are also high in South and West Asia, Latin America and the Caribbean and the Arab States. Unsurprisingly, these costs are lowest in economically advanced North America and Western Europe, which however bear, together with East Asia and the Pacific, the highest absolute costs of ESL (LBS).

Both in absolute and relative terms, the global costs of male ESL (LBS) exceed those of female ESL (LBS). The global annual private cost of female ESL (LBS) is 2.9 (4.6) trillion dollars, which corresponds to 5.40 (9.46) percent of 2030 GDP. The cost of male ESL (LBS) is instead 3.5 (5.2) trillion dollars, which amounts to 5.78 (10.14) percent of 2030 GDP. Differences by gender in the costs of ESL (LBS) depend mainly on the fact that, at a global level, the shares of ESL and LBS are higher for boys than for girls.[17]

Cost differences by gender vary also across regions and are correlated with the existing differences in the gender shares of ESL and LBS. For ESL, the gap is largest in East Asia and the Pacific, where the male share of ESL exceeds the female share by 10 percentage points. The opposite happens in Sub-Saharan Africa and in South and West Asia, where the female share of ESL is larger than the male share by 4 and 3 percentage points respectively.

The annual private costs of male ESL as share of GDP are 4.64 percent in East Asia and the Pacific, compared to 3.27 percent for the costs of female ESL. In Sub-Saharan Africa, the private costs of female ESL are 10.20 percent of GDP and slightly exceed those of male ESL (9.64 percent). The gaps in costs by gender for LBS do not necessarily have the same sign as those for ESL. This is the case, for instance, of South and West Asia, where the prevalence of LBS is higher among males than among females, while the opposite holds for the prevalence of ESL.

7.2 The breakdown of global economic costs into cost components.

[17] Another factor driving differences by gender is the non-linearity of the relationship between ESL (LBS) and costs, as shown in Appendix A.1. This driver is relatively more salient when the gap in the gender shares of ESL (LBS) is wider.

Tables 15 to 50 show the components of the private and fiscal costs of ESL and LBS.

7.2.1 Labor income.

Tables 15 to 18 show the loss of labor income when ESL (LBS) is in the status quo rather than in the intervention scenario, both in billion US dollars (Tables 15 and 17) and as percent of GDP (Tables 16 and 18). The global annual loss of labor income due to ESL (LBS) amounts to 11,632 (18,414) billion, which corresponds to 18.23 (32.26) percent of expected GDP in 2030. Without questions, the loss of labor income is the dominant component of the private (and eventually of the social) costs of ESL (LBS). This is not surprising, because it is well known that low education hampers productivity in the labor market and depresses wages. Moreover, labor income is the primary source of income for most people in the World.

There are marked regional differences in these costs, with the loss being highest in Sub-Saharan Africa, South and West Asia and the Arab States. The loss of labor income as percent of GDP associated with female ESL (8.55 percent) is smaller than the one associated with male ESL (9.29 percent). The same ranking by gender is observed globally when considering the loss of labor income as percent of GDP associated with LBS (14.82 percent for female LBS compared to 16.10 percent for male LBS).

7.2.2 Social transfers.

Social transfers, taxes and private expenditures for health and education decline as ESL (LBS) increases, while the cost of crime victimization increases. Since ESL (LBS) places the economy on a lower trajectory of economic development, because of its negative effects on labor income, both households and the government have fewer available resources, compared to what they could spend if ESL or LBS were eradicated. We call this a negative *income effect*.

With lower incomes, households pay lower taxes and can afford to buy fewer health and education services. Governments receive fewer fiscal revenues and can transfer fewer resources to households as income subsidies, in-kind benefits, unemployment benefits, and so on.

However, this is not the entire story, because ESL and LBS may also influence how the economy as a whole distributes its resources across different types of expenditure. Our evidence suggests that – for a given level of income - ESL and LBS reduce a country's propensity to spend for health and education services and increase the propensity to spend for law and order. This is coherent with the intuition that by reducing available resources, ESL and LBS force households and governments to focus on necessary expenses (such as food and shelter, or law and order) that cannot be delayed or reduced. We call *composition effect* the change in the distribution of spending for a given level of income.

Tables 19 to 22 show the costs of ESL and LBS in terms of lower social transfers from the government to the households. Focusing on annual costs, we find that global social transfers are 1,347 (1,319) billion dollars lower when ESL or LBS are set at their 2021 level than when they are set at zero. Expressed as percent of GDP, social transfers are on average 1.18 and 1.10 percent lower under the status quo scenario.

7.2.3 Labor income taxes.

Tables 23 to 26 show instead the estimated costs of ESL (LBS) in terms of lower labor income taxes.[18] Because ESL (LBS) reduces labor income compared to the scenario of zero ESL (LBS), global household transfers to the government are lower by 5,981 (9,731) billion dollars, which corresponds on average to 7.34 (14.16) of 2030 GDP. The reduction in labor income taxes partly compensates for the loss of labor income reported in Tables 15 to 18. Because of this, the loss of net labor income when ESL (LBS) are at their 2021 values is reduced to 5,651 (8,683) billion dollars.

7.2.4 Private health and education expenditures

Health expenditures include spending both for preventive care and for treatments (both pharmaceutical, inpatient and outpatient care). Private health expenditures are the share of health expenditures that is paid out of pocket by households. The

[18] Labor income taxes are obtained by multiplying the labor share of GDP by total fiscal revenues. Other types of taxes - such as for instance capital income and indirect taxes - are not considered here because of lack of data.

remaining share is public health expenditure, paid directly or indirectly by governments.

Overall, countries with higher ESL (LBS) spend structurally less on health (both privately and publicly), both because they have fewer resources and because the composition of expenditures tend to shift toward other items such as law and order. Lower expenditures produce negative outcomes in terms of higher mortality, morbidity and disability. In turn, negative health outcomes hamper economic development and produce lower labor incomes. In other words, high ESL (LBS) puts economies in a poverty trap: inadequate education reduces productivity and incomes; lower incomes constraint investments in health, which further depress productivity and incomes.

A similar mechanism applies to education. Poorer households and governments have less to invest in education. They also spend less because many pupils abandon prematurely education. As for health, there is a self-reinforcing loop at work: inadequate education reduces productivity and incomes, and this reduction constraints investment in education, which contributes to hamper productivity and income growth.

Considering private health (Tables 27 to 30) and education expenditures (Tables 31 to 34), the mutually reinforcing income and composition effects triggered by ESL or LBS at their 2021 level reduce both expenditures compared to a situation where ESL or LBS are set to zero. Globally, the loss of private health expenditures due to ESL (LBS) amounts to 1.07 (2.17) of 2030 GDP. The loss of private education expenditures is more limited and corresponds to 0.38 (0.44) percent of 2030 GDP.

7.2.5 The costs of crime victimization

The monetary costs of crime induced by ESL (LBS) should include: a) the costs to the victims; b) the consequences for criminals, such as incarceration, social exclusion, stigma, lost labor earnings; c) the disruption of economic activities in areas with high criminality; d) the costs required to prevent and deter crime. From this one should subtract both the additional economic activity that prevention and deterrence generate

and the transfer of resources from victims to criminals.[19] Some of these costs are private, as they are borne by criminals and their victims, while other costs, such as those caused by the disruption of economic activity in an area of high criminality, are social, and affect residents and businesses.

Mainly because of lack of data, it is difficult to assign a monetary value to all the consequences of crime. For the US, where the quality of data is relatively high, Anderson, 2021, estimates the annual costs of crime and finds that only a negligible amount accrues directly to criminals. The main cost component is the value of lost life and inflicted injuries to victims. Each crime causes a harm to the victim that can be quantified in monetary terms. We define the monetary cost of a homicide to be equal to the Value of a Statistical Life (VSL) and the monetary cost of robberies, assaults and sexual assaults as fractions of the cost of a homicide, following the proportions proposed by McCollister et al. (2010).

The effects of ESL (LBS) on the costs of crime victimization consist of two components that go in opposite directions. On the one hand, since VSL depends on GDP per capita, by depressing GDP both ESL and LBS reduce VSL and the costs of crime. On the other hand, the incidence of crimes increases with ESL (LBS).[20] For instance, the incidence of homicides per 100,000 inhabitants is 8.73 (56.74) percent higher when ESL (LBS) is at its status quo value than when it is at the intervention value.

Tables 35 to 38 report the estimated costs of ESL (LSB) in terms of crime victimization. Globally, and compared to the costs discussed above, these costs are relatively modest and amount to 34 billion dollars (0.07 percent of 2030 GDP) for ESL and to 354 billion dollars (0.50 of 2030 GDP) for LBS. Most likely these costs are a lower bound of actual costs, because available international data on crime contain information only on a subset of criminal offences.

7.2.6 Public health and education expenditures.[21]

[19] The outcome of a robbery is a cost for the victim but a benefit for the thief.

[20] See sub-section 7.3 on the non-monetary costs of ESL (LBS).

[21] While these expenditures account for an important share of government spending, especially in developed countries, they do not cover the full spending, which includes also the cost for the administration, national defense, public infrastructures, debt service and international donations

The costs of ESL (LBS) in terms of lower public health expenditures are reported in Tables 39 to 42. Globally, having ESL (LBS) at the 2021 level rather than at zero reduces annual public health expenditures by 1,545 (1,994) billion dollars, which corresponds to 1.55 (2.12) percent of expected GDP for 2030.

The costs of ESL (LBS) in terms of lower public education expenditures are reported in Tables 43 to 46. Globally, annual public education expenditures are 406 (829) billion dollars lower when ESL (LBS) is at the 2021 level rather than at zero, which is equivalent to 0.59 (1.41) percent of 2030 GDP. Overall, the loss of national income due to lower productivity far exceeds the financial resources saved by the government.

As discussed in the case of private health and education expenditures, lower public expenditures are inefficient, as they contribute to keep productivity and GDP at lower levels. However, governments do not spend less in health and education because they are myopic and do not realize the benefits of such investments. Rather, they are forced to spend less because they are financially constrained due to the lower fiscal revenues caused by ESL and LBS.

7.2.7 Public expenditures on law and order

Higher ESL (LBS) causes an increase in the incidence of crime. Additional crime increases the costs of crime victimization borne by the households, and triggers government's response in terms of crime prevention, deterrence, and repression. In Tables 47 to 50 we report the effect of ESL (LBS) on government expenditures for law and order.

Overall, government expenditures decline when ESL (LBS) is set at its 2021 level rather than at zero. In particular, global annual expenditures for law and order are 0.27 (0.63) percent lower under the status quo than under the intervention scenario. This decline is the outcome of a negative income effect and a positive composition effect. The income effect is negative because the government has fewer resources. The composition effect is positive because – for given resources – the government shifts expenditures towards law and order.

7.3 *The non-monetary costs of ESL and LBS*

ESL and LBS are deeply connected with human capital development, which in turn impacts on a wide set of outcomes, that include those considered in the previous section as well as other outcomes, some non-pecuniary, such as the propensity to commit crimes, fertility decisions, and economic and social engagement.

Unfortunately, the costs produced by the effects of ESL and LBS on these outcomes are difficult to measure in monetary terms, and thus it is hard to assess their relative importance. In this section, we provide evidence on the impact of ESL (LBS) on criminal activities, corruption, tax morale, early pregnancies and youth disengagement, and discuss both the technical difficulties of producing monetary evaluations and the attempts made by the relevant literature.

7.3.1 The incidence of crime

The global and regional effects of ESL (LBS) on the incidence of homicides, robberies, physical assaults, and sexual assaults are reported in Tables 51 and 52. For these crimes, we have computed in sub-section 7.2.5 the costs borne by the victims. While ESL set at its current 2021 level rather than at zero causes only a moderate increase in global crime incidence, that ranges between 2.88 and 8.73 percent (Table 51) depending on the type of crime, the effect of LBS is much stronger, ranging between 26.48 and 56.74 percent (Table 52), making it a major source of crime.

7.3.2 Corruption

The effect of ESL (LBS) on the corruption index is reported in Tables 53 and 54. Globally, ESL (LBS) at its current 2021 value increases corruption, compared to ESL (LBS) set at zero, by 6.84 (11.05) on average. Not only has corruption large fiscal costs, estimated by Mauro et al., 2019, at about 4 percent of GDP, but it also distorts the functioning of markets, generates inefficiencies and eventually hampering economic growth (Dreher and Herzfeld 2005). While there are no reliable estimates of the overall cost of corruption, several commentators report it to be close to 5 percent of world GDP each year (Hartmann and Ferreyra, 2022).

7.3.3 Tax morale

ESL (LBS) affects also tax morale (Tables 55 and 56) which we estimate to be 0.35 (0.51) percent lower at the global level compared to what would prevail if ESL (LBS) was eliminated. The estimated effect is relatively minor and contributes only marginally to explain the reduction in fiscal revenues discussed above.

7.3.4 Early pregnancies

The economic costs of early pregnancies accrue to both the mother and the child. Teen mothers are more likely to abandon education before attaining a degree and are disadvantaged in the labor market, which may negatively affect their babies. Teen mothers may also be less mature and might transmit their anxiety and fragility to their children.

Children of teenage mothers are more likely to drop out of school, end up in prison, experience abuse and become teenage parents (Hoffman, 2006). Sullentrop, 2010, estimates that in the US (one of the countries with the highest incidence of teenage pregnancies) the fiscal cost of teenage childbearing is close to 9 billion dollars per year.

While there is no monetary evaluation of the private costs of early pregnancies, the literature warns that simple comparisons of the educational and labor market outcomes of teenage and older mothers are plagued by severe selection bias (Hoffman, 1998), driven by the fact that early pregnancies typically affect women with specific characteristics.

Holtz et al. 2005, who have attempted to estimate the causal effect of teenage pregnancies on future outcomes, suggest – perhaps surprisingly - that the overall effect is positive. Ashcraft et al., 2013, who criticize the approach taken by Holtz et al. 2015, conclude instead that early pregnancies have modest effects. These findings suggest that, even if ESL (LBS) affects the incidence of teenage pregnancies, the costs due to these pregnancies are unlikely to be large.

We estimate that female ESL (LBS) at the 2021 level is associated with a global increase in early pregnancies by about 59 (69) percent, as reported in Tables 57 and 58. The world regions where ELS (LBS) have the largest effect on early pregnancies are Sub-Saharan Africa, South and West Asia and the Arab States.

7.3.5 NEET

Eurofund, 2012, estimates the economic costs of NEET in the European Union (EU), by taking into account both lost earnings and additional welfare benefit payments. The key finding is that the estimated loss to the economies of EU member states was almost €120 billion in 2008, corresponding to around 1 percent of EU GDP, and €153 billion in 2011, or more than 1.2 percent of EU GDP.

Higher levels of ESL (LBS) are associated with a higher incidence of NEET. We estimate that, globally, NEET are close to 26 (38) percent higher when ESL (LBS) is set at its current 2021 value rather than at zero (see Tables 59 and 60). We also estimate the effects of gender-specific ESL (LBS) on the incidence of same-gender NEET, and find that they are stronger for females (34.1 percent for ESL and 42.3 percent for LBS) than for males (23.6 percent for ESL and 28.2 percent for LBS).

8. The costs of low SES

One reason why an average low level of socio-emotional skills SES is costly to a country is because it reduces economic growth. We have argued above that this happens because low SES increases the share of early school leavers ESL and the percentage of children with less than basic skills (LBS), which in turn affect GDP growth.

We recognize that countries with low average SES are also likely to bear non-pecuniary costs, in terms for instance of lower wellbeing and lower life satisfaction (OECD, 2023). In this section, however, we focus exclusively on the pecuniary costs of low SES in terms of lower GDP. We have argued above that these costs are a key driver of global private, fiscal and social costs. Since ESL and LBS are positively correlated and partially overlapping measures of inadequate human capital, with the latter more encompassing than the former, we discuss in the text the GDP costs of low SES that result from an increase in LBS.

Consider first the Big Five index. For each country, we compare the status quo scenario with the intervention scenario. We obtain the status quo by setting the index at its current value, measured in 2018. For the intervention scenario, we set the maximum value of the index at 3, which corresponds to 0.998 percent of the standard normal

distribution. We use the estimates in Table 9 to compute the expected decline in LBS when the index switches from the status quo to the intervention scenario, and the estimates in Table 10 to simulate the path of GDP between 2021 and 2041 under both scenarios. The (discounted) differences between these paths are used to compute the lifetime and annual costs of having average SES at its status quo value rather than at the intervention value. These costs are expressed as GDP losses.

Table 61 presents our simulations for the 58 countries for which we have data and for the aggregation of these countries (using population shares as weights). The current value of the Big Five index ranges from -3.21 for the Dominican Republic to 1.39 for the Republic of Korea. For the former country, the distance from the intervention scenario is highest, and so is the increase in LBS (33 percentage points).

In other words, if we could set the Big Five index at its maximum rather than at the current value, LBS is this country would fall from 91 to 58 percent. We estimate that the annual and lifetime costs in terms of lower GDP associated with the status quo are 25.4 and 25.6 percent of lifetime and annual GDP. For Korea, the increase of LBS in the status quo is much lower (9 percentage points), and so are the costs, that we estimate at 10.1 percent (annual) and 10.2 percent (lifetime).

The estimates for the Dominican Republic may appear to be exceedingly high. This is due, however, to the substantial gap between the current and the intervention value. If we were to assume that the intervention value is equal to the sample average of the index (equal to zero), the expected annual GDP cost of deviating from the average would be much smaller, at 13.13 percent of GDP.

As for the Big Five index, we compare the status quo and the intervention scenarios when the motivation index is set at its current and at its maximum value. Maximal motivation occurs when there is no decline of performance during the test, which corresponds to the index being equal to 1. Table 62 presents our results for the 53 countries for which we have data. The index ranges from a minimum of 0.65 in Colombia to a maximum of 0.96 in Finland. We estimate that the expected increase in LBS when motivation is set at its status quo scenario (rather than at the intervention one) ranges from 46 percentage points in Colombia to 6 percent in Finland.

We estimate that the annual and lifetime costs in terms of lower GDP of deviating from the intervention scenario are equal for Colombia to 50.6 and 51.2 percent of annual and lifetime GDP. For Finland, these costs are substantially lower and equal to 6.7 and 6.8 percent respectively. For the aggregate of 53 countries, we estimate that annual and lifetime costs of deviating from the intervention scenario are equal to 18.9 and 19.1 percent of annual and lifetime GDP.

As in the case of the Dominican Republic, the very sizeable effect that we estimate for Colombia is due to the large deviation of the status quo from the intervention scenario (35 percentage points). If we were to define the intervention scenario more moderately by setting the motivation index at the sample average (0.85), the annual GDP cost for Colombia would be much smaller, but still sizeable, at 28.9 percent of annual GDP.

8. Policies addressing inadequate human capital.

In this section, we review the policies adopted by governments to reduce inadequate human capital, with a focus on the evaluations of their effectiveness. The lessons learned from previous policies or policies still in place constitute our policy recommendations.

a. The effectiveness of policies combating early school leaving.

Early school leaving and poor educational outcomes are the result of multiple and interrelated factors, which include poor early school experience, lack of ability, low perceived labor market returns to education, heavy discounting of future benefits, poor social environment and peer influence. There has been extensive research of these factors, that can be classified as individual or social, school and systemic (OECD, 2012).

From an individual or social point of view, low school grades, and certain types of student behaviors, such as absenteeism, lack of motivation, or delinquent behavior, are solid predictors of dropout. These behaviors are also very connected to the student's background, be it past experiences in education (*e.g.,* whether participation in pre-primary education), or family background (*e.g.* living with one or two parents, the socio-economic situation of the family, and parental engagement). Examples of school factors are the supply of schools in the area, which affects distance, class size

and the quality of teachers. Examples of systemic factors are compulsory school rules, the use of grade repetition and the organization of school curricula into separate tracks.

Numerous policies have been pursued around the world to reduce early school leaving and improve learning outcomes, and the debate on which policies are more effective is still ongoing among both academics and politicians. While some policies are aimed at students at-risk or are targeted to disadvantaged pupils, other policies affect the entire school system with actions involving all pupils in school. Policies can also be ostensibly gender neutral or explicitly target girls or boys (see Glick, 2008).

Unfortunately, policies are rarely evaluated using approaches that identify causal effects (see UNESCO, 2022), partly because the design and implementation of many programs disregard that a source of exogenous variation in the treatment should be available. For instance, several policies implemented in EU countries do not even define outcome targets, such as the percentage of participants who are expected to achieve a qualification (Meierkord and Mascherini, 2012).

Relatively rare are also evaluations that quantify the benefits obtained by individuals who have achieved the target qualification, relative to those accruing when the target is not reached. On top of this, we often do not know whether the benefits outweigh the program costs. Unfortunately, the virtual absence of careful studies providing guidance to policy-makers can lead to an inefficient allocation of (scarce) public resources.

In this review, we focus almost exclusively on the evidence from studies that rely on credible identification strategies. As discussed by Damon et al, 2016, credible studies are those based on quantitative analyses, where the causality between intervention and educational outcome has been established through one of the following methods: randomized control trials, instrumental variables, regression discontinuity design and differences-in-differences.

An implication of this approach is that some policies are excluded, either because no credible study is available or because there is so far no evidence of causal effects. An example is policies affecting grade repetition. Although there is evidence that grade repetition and school dropout are correlated (UNESCO, 2022), we are not aware of any

evidence establishing a causal relationship. Results from international learning assessments like LLECE, PASEC and SACMEQ show that low student performance is found both in education systems that practice grade repetition and in those that practice automatic promotion. For more developed countries, PISA 2009 results show that countries performing above the OECD average also tend to practice either automatic promotion (e.g., Finland, Iceland and Norway) or grade repetition (e.g. Belgium, the Netherlands and the United States) (UNESCO, 2012)

b. Policies that work, with a focus on developing countries

Damon et al, 2016, conduct an extensive review of policies addressing early school leaving and learning outcomes in developing countries. Using strict selection criteria that consider only studies establishing causal relationships between policies and outcomes, they selected 114 studies conducted from 1990 to 2014 in 36 developing countries. The large majority of these studies (75) are based on a randomized control trial, that randomly assigns the application of the policy to a group of individuals (treatment group) and compare outcomes with a group of similar individuals not receiving the treatment (control group).

The authors consider policies affecting time spent in school (enrolment, completion, dropout) and policies improving learning outcomes (test scores). They define policies as: a) policies that work (at least 3 studies finding positive and statistically significant outcomes); b) policies that often work (at least 3 studies with a roughly equal mix of positive and statistically significant effects and negative or non-significant effects); c) promising policies that need more evidence; d) policies that do not work.

When the purpose is to increase time in school, the most effective interventions in communities where attendance and/or enrollment are low are conditional cash transfers (which increase demand) and building new schools (a major school input). Two additional policies that also reduce the cost (or opportunity cost) of attendance that appear to be effective in increasing students' time in school are the provision of school meals (a school input) and providing vouchers to reduce the cost of enrolling in a private school (a school governance intervention). On the other hand,

interventions that do not work include monitoring teacher performance and implementing school-based management.

Conditional cash transfer (CCT) programs were first introduced in Brazil and Mexico more than a decade ago and have since spread around the world. These programs aim to alleviate current poverty and, in addition, reduce future poverty by augmenting human-capital levels of children and youth from poor families, thus increasing their lifetime earnings potential. The Mexican *Progresa/Oportunidades* program began in 1997 and conditions transfers to poor families on children's school attendance and family visits to health clinics.

The program's novelty and the finding of positive initial impacts contributed to both a large scaling up within Mexico and an impressive spreading of the program's key features to new programs around the world. Many governments were persuaded by the idea of simultaneously reducing current poverty and inhibiting its intergenerational transmission. CCT programs have now been implemented in over sixty countries in five continents, ranging from among the poorest countries in the world, such as Malawi, to recent initiatives in developed countries, including England and the United States (see Parker and Todd, 2017 and Attanasio et al. 2010).

Where schools are in short supply, or of poor quality, the construction of additional infrastructure designed to promote girls' education can also have positive spillover effects for boys. An impact evaluation of the construction of 'girl-friendly' schools with facilities such as clean water and separate toilets for girls and boys, alongside other gender-sensitive initiatives, was shown to significantly increase enrolment ratios for both girls (22 percent) and boys (16 percent). In India, the construction of toilets decreased girls' and boys' dropout rate by 12 and 11 percentage points respectively (UNESCO, 2022).

When the purpose is to improve learning outcomes, Damon et al, 2016, find that there are at least four interventions that have proved to be quite effective at improving students' learning outcomes once they get to school: merit-based scholarships, providing supplemental or remedial instruction, decreasing pupil-teacher ratios, and building new schools. Interventions that often work by increasing test scores include

conditional cash transfers, the provision of school-based meals and computers and electronic games. Changes in school governance that implement school-based management, provide teacher performance pay, and provide opportunities to attend a private school have all been shown, in some contexts, to increase student learning. Interventions that do not work include monitoring of teaching attendance, without specific attention to incentive pay.

Less optimistic conclusions are drawn by Glewwe et al, 2011, who examine studies published between 1990 and 2010, in both the education literature and the economics literature, to investigate which specific school and teacher characteristics, if any, appear to have strong positive impacts on learning and time in school. They select 43 "high quality" studies, 13 of which are based on randomized trials. They find that the estimated impacts on time in school and learning of most school and teacher characteristics are statistically insignificant. The conclude that the few variables that do have significant effects – e.g., availability of desks, teacher knowledge of the subjects they teach, and teacher absence – are not particularly surprising and thus provide little guidance for future policies and programs.

Kremer, Brannen, and Glennerster, 2013, provide a review of education interventions in developing countries but include only randomized control trials. They conclude that school enrolment for poor families depends heavily on costs of enrolment and thus programs that reduce either the explicit costs (merit scholarships) or implicit costs (conditional cash transfers) help to increase enrolment. In addition, they find that providing information to families on the extent to which additional years of schooling leads to increased earnings, and child health interventions (such as providing deworming medicine), both provide cost effective ways to increase school enrolment.

They identify several interventions that increase student learning, such as matching pedagogical methods to students' learning levels and improving teacher accountability. In contrast, they find that "traditional" interventions, such as providing textbooks, hiring teachers, and providing grants that schools can choose to use in a variety of ways do little to change learning outcomes as measured by test scores.

McEwan, 2013, also reviews only randomized controlled trials, and focuses on interventions that attempt to improve test scores. He finds that deworming children has no effect on student learning outcomes (Kremer et al. focused on time in school), and that the same is true of monetary grants. He also finds that learning outcomes are most responsive to pedagogical interventions such as computer-based learning and instructional technology, teacher training, teacher performance incentives, and peer learning, as well as school inputs such as smaller class sizes and instructional materials.

According to UNESCO, 2012, improving education quality, especially in the crucial early grades, is an important policy intervention for reducing repetition and early school leaving, and for improving literacy and learning levels. One measure of the resources invested in primary education is related to class size. For example, in all of the middle or high-income countries with available data, primary school classes have fewer than 30 pupils, and in a majority of them, there are fewer than 20 pupils per class. On the other hand, in sub-Saharan Africa, the average class size in public primary schools ranges from 26 pupils in Cape Verde to 84 in Central African Republic. In four out of ten countries reporting data for this region there are on average 50 or more pupils per class. In this context, UNESCO, 2012, argues that policymakers should seek cost effective measures to reduce class size, especially in rural regions or disadvantaged areas, like the slums surrounding big cities in Burkina Faso and Kenya.

Glewwe et al, 2011, express a less optimistic view on the effect of class size on time in school or school outcomes. In their review of the literature for developing countries, they conclude that increases in class size usually have negative impacts on student learning, as one would expect, but this is not always the case. They suggest that another interpretation is that the effect is negative but quite small, so that random variation in estimates often yield positive point estimates, which on occasion are significantly positive. That changes in class size have small effects on schooling is confirmed by recent research by Fredriksson, Ockert and Oosterbeek, 2013, using very rich data from Sweden and the exogenous variation in class size induced by a maximum class size rule. They show that reducing class size by one pupil during the

final three years of primary school increases years of schooling by only 0.05 years (or two-thirds of a month).

Many countries, including Kenya, Mozambique, and Ethiopia, have taken steps to foster the demand for schooling by abolishing school fees, and have observed an increase in enrolment (World Bank 2009). However, other financial obstacles remain. On top of school fees, books, supplies, clothing, transportation costs, and private tutoring are all expenses that richer families are better equipped to defray.

As of 2020, 51 countries of 188 with data had yet to establish legal frameworks guaranteeing 10 or more years of free, compulsory education (UNESCO, 2022). In many of these countries, including Bangladesh, Burundi, Croatia, the Gambia, Haiti, Jamaica, Lesotho, Myanmar and Samoa, secondary education charges fees. Yet a policy shift to free secondary education is likely to be limited in impact in countries where large numbers of children fail to complete primary education or cannot meet the additional costs that accrue to a transition to secondary education (e.g., transport, uniform, accommodation and families' opportunity costs).

The analysis of low- and lower-middle-income countries where fee-free secondary education has recently been introduced, including in Rwanda and the United Republic of Tanzania, indicates that the share of the poorest, most disadvantaged children progressing into, and completing, secondary school is extremely small. Targeting of government resources to provide additional financial support for the most disadvantaged – beyond the removal of school fees – can help support their completion of a full cycle of primary and secondary education (UNESCO, 2022).

Summary. There seems to be a reasonable consensus that conditional cash transfers, building new schools and providing merit-based scholarships may work to reduce school dropout and increase school learning in developing countries. There is instead much more controversy about the effects of reducing class size. Policies that eliminate school fees are often insufficient and need to be accompanied by additional financial support to families in need.

c. Policies that work, with a focus on developed countries

Lyche's review (Lyche, 2012) of policies preventing early school leaving and dropout focuses on developed countries. She selects 68 policies that were tested using econometric methods, mostly but not exclusively from the US. These policies are classified according to where they were implemented: within a particular school (both curricular and other activities set in the environment of the regular school day), outside of school (extra-curricular activities carried out on school grounds or elsewhere, as well as activities external to the educational system), and purely systemic changes at a macro level.

She finds that the great majority of successful measures fitted all three categories simultaneously. In other words, successful measures combined components within school, outside school and at a systemic macro level. An example is the US School Transitional Environment Program (STEP), which targets children who are transitioning from primary to large lower secondary schools. This measure seeks to make the transition less painful for the students by creating subgroups of learning environments (65-100 students) within the larger school and locating the STEP classrooms in proximity to each other. Students also remain together for a set of core classes such as Mathematics and English, thus avoiding the need to constantly adapt to a new set of peers.

In addition, emotional counselling and academic guidance is provided and the students' homeroom teacher serves as the primary link between the school and home and vice-versa, in order to increase the students' sense of connectedness and belonging to school. As a result of the implementation of the measure, the dropout rate was halved compared to the control group.

There is growing consensus that preventive measures to reduce early school leaving should start at pre-primary level. Early childhood education and care (ECEC) has a positive effect on long-term cognitive, social and emotional development of the child. These skills interconnect and have been shown to reduce chances of early school leaving later on (Heckman *et al.*, 2006).

The Perry Preschool Program is one of these measures and involves the provision of ECEC to US children from disadvantaged backgrounds, focusing on both cognitive

and non-cognitive skills. Understanding that the lack of engagement of students may also stem from lack of involvement in education on the family's part, the program intervenes within the children's families through weekly home visits during the school year. These visits try to involve the parents in the educational process and help them provide education support within the home.

Early childhood parenting interventions have been tried also in developing countries over the last few decades. One of the best known is Care for Development (CfD), which has been adopted in Colombia and promoted extensively by the WHO and UNICEF. An intervention somewhat similar in spirit to CfD is the JHV program, which was first implemented in the 1970s and, unlike others, was rigorously and continuously evaluated. The JHV was not the first home-visiting intervention ever implemented in developing countries, but it is one of the few interventions that have repeatedly followed up with the participants to evaluate long-term impacts. Recent evaluations of this program show that the labor market earnings of the treated group improved by 25 percent by the time children were 22 years old (Attanasio et al, 2022).

In primary schools, parental involvement is important to avoid conduct problems and strengthen pro-social bonds and school attachment. Pro-social bonds may also be developed through mentoring which is a more selective intervention. The creation of a connection with an adult mentor can reduce problematic behavior among at risk primary and lower-secondary students. One example is *Across Ages* in the US which involves older (age 55 and over) role models for youth between ages 9 and 13 that live in communities with little possibilities in terms of positive extra-curricular activities and few positive adult role models. In addition to mentoring, the program involves classroom-based life-skills, problem solving, substance abuse curricula and the involvement of the youth in community service (Hammond *et al.*, 2007).

Mentoring programs can involve also secondary schools. Goux et al, 2017, evaluate a French program implemented in 2010-2011 in 37 schools in Paris, involving 4,300 students in 181 classes. The intervention was randomized at the class level within each school (respectively 98 treated and 83 control classes). The principals of the secondary schools involved in the program were required to identify students at risk of dropping

out and to help their families form less unrealistic aspirations and make better school choices by providing adequate information. Two meetings were held between the principal and the selected families with the purpose of illustrating the complexity of the choices available in the French educational system. These meetings had also the purpose of identifying the specific aspirations of families, evaluate whether these were realistic, provide information on alternative options, and explain the merits of vocational education.

The authors find that, as a result of the mentoring program, involved parents became less confident that their children would be able to graduate from high school. Enrolment in vocational tracks increased, and both dropout rates and grade repetition fell by one third, a large effect. This effect persisted two years after the treatment, as differences between treated and control students further increased rather than to diminish as time went by. Although the authors do not provide a cost -benefit analysis, the costs of the program appear to have been small compared to the large effects produced by the policy on early school leaving.

At the upper secondary level, ensuring completion becomes more difficult because in most countries the education level is past the compulsory schooling age. What seems crucial at upper secondary level is the provision of attractive alternatives involving a connection to the world of work. Lamb, 2008, shows that countries with separate alternative vocational education and training (VET) pathways seem to have higher overall rates of graduation.

These findings are supported by the study of the 1990's Swedish educational reform by Hall, 2009, who evaluates the results of a six-year pilot scheme that preceded the reform implementation, and finds that the prolongation of the VET tracks and the increase of academic content led to an increase in the probability of dropout among the low performing students, although the overall achievement level increased among all VET students.

Shorter and less academic oriented VET programs have been offered in Norway to keep low performing students in school. The certificate of practice initiative has been piloted since 2007 and provides at-risk students with the possibility of choosing a two-

year upper-secondary program leading to a lower level degree recognized by industry, rather than the full four-year VET upper secondary. The students enrolled are offered a mix of school days and work placement within the week and the academic studies are vocationally oriented. Upon completion, they may complete their full upper-secondary degree by adding on the remaining two years. Research-based evaluation of the pilot has so far yielded positive results (Markussen *et al.*, 2009).

An alternative option to avoid early school leaving and favor school completion consists of second-chance programs, or opportunities for young people who leave the K–12 education system in the US without earning a diploma. Ranging from large national programs or networks like the Job Corps (more than 100 sites nationwide) and Youth Build (more than 200 programs) to small independent programs run by churches or community-based organizations, these programs typically provide some combination of education, training, employment, counseling and social services (Bloom, 2010).

Bloom, 2010, considers eleven rigorous evaluations of programs serving high school dropouts in the US – major studies that used random assignment designs – and concludes that, in several programs, young people in the program group were substantially more likely than their control group counterparts to earn a GED (General Educational Development) or another credential. Many of the positive effects produced by the programs, however, were modest or relatively short-lived.

In the US, early school leavers in the past four decades have been encouraged to obtain an alternative credential – a high school equivalency – by taking a GED test, which the American Council of Education administers. Over the years, however, the number of students doing so has risen to such a point that the credential's economic value has been put into question (cf. Rumberger & Lamb, 2003).

The European Union's recognition of the urgent need to address ESL has been channeled through a series of strategic policy declarations establishing a European framework of action and targets, as well as financial and organizational supports of Member States. A key target is the reduction of early school leaving to at most 10 percent of the relevant population (European Commission, 2013).

Since early school leavers are often young individuals who find academic secondary education either not attractive or difficult, several Member States of the Union have implemented reforms of school curricula that enhance vocational pathways (VET) as an alternative to academic ones. VET can respond to several of the factors leading to ESL. It can increase the motivation to learn and can offer students more flexibility and a more appropriate pedagogy. It can also address the labor market aspirations of young people, in particular when it is combined with company training (European Commission, 2013).

Tracking into differentiated curricula may affect early school leaving for two reasons. On the one hand, by segregating low performers in the VET track it may induce some students in this track to drop out from school too soon. On the other hand, by providing a more flexible set of curricula and a vocational track that places less emphasis on academic abilities, tracking may be able to keep longer in schools those students who prefer practical trades to more academic education.

A potential concern is that evidence suggests that early school leaving is more frequent in VET than in general education in several countries. Reasons include the structure of VET provision, its image and social status, but also the generally weaker socio-economic background of VET students and their often-weaker academic performance. However, the observed rates of early school leaving in secondary school systems that combine VET and academic tracks could still be lower when compared to the counterfactual where no VET pathway is available.

The relevant policy decision may be not whether one should have differentiated pathways, but when this differentiation should start. In particular, a potentially relevant concern is that *early* tracking may exacerbate the negative effect on of test scores, leading to higher early school leaving (see for instance UNESCO, 2022).

Evidence on this issue is mixed. Hanushek and Woessmann, 2006, for instance, use a differences-in-differences approach to compare the mean and the dispersion of test scores before and after tracking in two samples of countries: a treatment sample with early tracking (before age 15) and a control sample where tracking occurs after age 15 if ever. They find that early tracking increases inequality in test scores but has limited

effects on average achievement. Pekkarinen et al, 2009, examine the gradual introduction of a comprehensive school system in Finland and find that the reform had a small positive effect on verbal test scores but no effect on mean performance in arithmetic or logical reasoning tests. In addition, the reform improved the test scores of students with poorly educated parents, suggesting that early tracking could penalize disadvantaged students. This evidence, however, is in contrast with that produced by Figlio and Page, 2002, who find that tracking in the US does not harm low-ability students.

As discussed above, the use of conditional cash transfers to reduce early school leaving is fairly widespread in developing countries. Similar programs have also been implemented in developed countries. In the United States, for instance, following the "Helping Outstanding Pupils Educationally" (HOPE) program implemented in Georgia, several other states have introduced analogous scholarship programs. About 27,000 students benefitted from the financial incentives offered by a number of schools in Chicago, Dallas and New York (Fryer, 2011).

In the 1990s, England introduced the Earnings Maintenance Allowance (EMA). The target population consisted of pupils who had completed their last year of compulsory education in 1999. The program intended to change the opportunity cost of education by paying a means tested benefit to 16 to 18-year-olds from low-income families who remained in full-time education after compulsory education. The benefit could be claimed for up to two years (or three for young people with special educational needs) and could be used to attend any form of full-time post-16 educational program.

Additional bonuses were paid for regular attendance (at the end of a term of regular attendance, the student would receive £50 or £80) and for successful completion of examinations. By inducing students to stay on until completion of upper secondary education, this policy could directly affect dropout rates. Dearden et al, 2009, evaluate EMA and find that it had a positive and significant effect on post-compulsory education, with a 6.7 percentage points increase in the percentage of individuals from

income-eligible families completing two years of post-compulsory education (from 54.3 percent before the treatment to 61.0 percent after the treatment).[22]

Early school leaving is often correlated to bad school performance. As a consequence, programs that try to improve student performance can also induce individuals to stay in education longer. A key factor in determining student performance and attainment is teacher quality. In the late 1990s, two programs were introduced in England with the aim of improving the teaching of literacy and numeracy in primary schools. At the beginning, these programs were implemented only in few cities, but were subsequently extended nationally as the 'National Literacy Strategy' and the 'National Numeracy Strategy' (in 1998 and 1999 respectively).

These programs tried to improve the quality of teaching by providing more focused instruction and a more effective classroom management. For instance, a daily literacy hour was introduced and divided into 10-15 minutes of reading or writing for the entire class, 10-15 minutes of whole-class session on word work (phonics, spelling and vocabulary) and sentence work (grammar and punctuation), 25-30 minutes of directed group activities (on aspects of writing or reading), and a plenary session at the end to revisit the objectives of the lesson.

Machin and McNally, 2008, evaluate the effects of the 'literacy hour' relying on a differences-in-differences strategy. Since the implementation of the policy was preceded by pilot projects, they could compare educational attainment at the end of primary school in treatment schools and in schools in an appropriately defined comparison group, before and after the pilot project was introduced. Results show that the literacy hour produced a 2-3 percentage point improvement in the reading and English skills of primary school children involved in the program. The authors estimate the costs per pupil of the program at £25.52 per annum, and the present discounted value of benefits in the range of £1,918-£4,995, suggesting that the policy had a very high payoff.

[22] No relevant differences between males and females were detected. The effect of EMA was estimated to be largest for children with lower levels of prior educational achievement.

Students at risk of dropping out display easily identifiable characteristics, including among others low income, scarcely educated parents, and low attendance rates. Policies can try to reduce early school laving by devoting additional resources to schools with disadvantaged pupils. An example is the Education Priority Zones program (ZEP), first established in France in 1982, which was targeted at both primary and junior-high schools located in disadvantaged zones. Schools included in the program received additional resources, which were mainly used for additional hours of instruction and to pay bonuses to teachers and other personnel.

Benabou et al, 2009, use a sample of 24,455 students who entered sixth grade in 1989 and information on school and teacher characteristics to evaluate the effects of this policy on the probability that targeted students move up either to the eighth or to the tenth grade of the academic track rather than switching to a vocational track after the seventh or the ninth grade, and on the likelihood of success at the "Baccalaureat" (the French national exam at the end of high school). They find that the impact of ZEP on the academic achievement of students in targeted schools was never significantly different from zero, after conditioning for pre-existing differences between treated and control schools. One reason why the policy was not successful was that it was not well focused. Furthermore, the bonuses awarded to teachers were not a sufficient incentive to attract experienced or highly qualified teachers.

Devoting additional resources to schools with disadvantaged students has been a poorly performing policy also in the Netherlands. Leuven et al, 2007, use regression discontinuity design (RDD) to evaluate two subsidies implemented in the Netherlands, which gave additional funds to schools with a share of disadvantaged pupils above 70 percent. While one subsidy provided extra resources to improve the working conditions of teachers, the other subsidy offered additional funding for the purchase of computers and software. By comparing schools with shares of disadvantaged students around a threshold value, the authors find that the policy has failed to increase student performance in nationwide tests and had led to lower attainment. These negative results could depend on the fact that the extra payment to teachers was not conditional on performance. The negative effect of additional computer resources might have occurred because instruction methods that use

intensively computers are less effective than more traditional methods. These negative findings cannot be easily generalized to other contexts. The fact that these interventions focusing on schools with a large share of disadvantaged students did not succeed in increasing test scores does not imply that these policies would be ineffective if implemented in other schools.

Excellence in Cities (EiC) was introduced in England in September 1999 to encourage participation in higher education. Schools in disadvantaged areas of England were given extra resources to try to improve standards. The original program was expanded over time to cover about one-third of all secondary (state) schools. The main features of the EiC program were the employment of learning mentors, to help students overcome educational or behavioral problems; the provision of learning support units to provide short-time teaching and support programs for difficult pupils; a gifted and talented program, to provide extra support for 5–10 per cent of pupils in each school.

Machin, Meghir and McNally, 2004, evaluate the impact of the Excellence in Cities (EiC) policy in secondary schools by assessing the extent to which the whole range of activities implemented by the program have led to an improvement in both learning and school attendance at age 14. Using a differences-in-differences approach, they find that EiC has contributed both to better learning, in term of higher scores in Mathematics (although not in English), and to higher pupil attendance. The cost-benefit analysis suggests that the expected benefits of EiC are about 0.02 years of schooling and about £400 over the lifetime (assuming a rate of return to a year of education of 8 percent and linear wage profiles). Since these expected benefits are close to the costs of the policy, one might conclude that the policy was not particularly cost-effective.

Summary

Compared to developing countries, students in developed countries are more likely to enroll in upper secondary education. School dropout at this level of education is therefore an important issue in these countries. There is some consensus in the literature that the design of high school curricula is important to limit dropout. In particular, the presence of short and less academic oriented vocational tracks may help

keeping in school longer less talented students, who often come from disadvantaged families.

There is also evidence that providing additional resources to schools is unlikely to limit the dropout problem. As for developing countries, parental involvement and financial support to individuals are likely to be more effective. There is also a broad consensus that early childhood education can play an important role in improving learning outcomes and time in school.

d. Policies affecting boys and girls.

It is often found that girls' schooling is more sensitive than boys' to changes in fees and other direct costs. When this is the case, demand side interventions that subsidize households' schooling costs have larger benefits for girls (Glick, 2008). Angrist, Bettinger, Bloom, King, & Kremer, 2002, study the Colombia's national voucher system for private secondary schooling, in which a limited supply of vouchers was assigned to qualified low-income students in public primary schools based on a lottery system (hence was randomly assigned). Eligible girls and boys were equally likely to receive the subsidy. Although voucher recipients of both sexes did modestly better in terms of school attainment and test scores, the effects were larger for girls.

In a rather different demand side intervention, Mexico's PROGRESA program, poor rural communities were randomly assigned to receive inducements for school enrollment in the form of education and food grants to mothers, conditional on their children attending primary school and being brought in for regular medical checkups. Estimates by Schultz, 2004, indicate overall enrollment impacts that were larger for girls: between 3.4 and 3.7 percentage points, depending on sample and method, compared with 2.5–2.8 points for boys, with larger differences for secondary enrollment. In contrast, assessments of the impact on school attendance of other conditional cash transfer programs in Latin America, including in Nicaragua, Ecuador, and Brazil, show similar gains for boys and girls (Glick, 2008)

A very different source of evidence on the impacts of changes in direct costs is the recent experience of several countries in which primary school fees were eliminated or sharply reduced nationwide. In Uganda, Tanzania, and Malawi, such policies resulted

in sudden and very large surges in enrolments, with girls' enrolments increasing the most (Herz & Sperling, 2004).

Where gender imbalances are large or cultural barriers to female education remain strong, policies could directly target girls' schooling. A number of such interventions have had large positive impacts on female enrolment. In particular, on the demand side, several careful program evaluations indicate that households respond to incentives in the form of subsidies for enrolling girls. An early example is the Bangladesh school stipend program, begun in 1982 to subsidize household expenditures on girls' secondary education. In the first five years of the program, girls' secondary enrollment rates in program areas rose from 27 percent to 44 percent, more than twice the increase observed nationally (Glick, 2008).

Kremer, Miguel, & Thornton, 2004, report about a policy experiment in rural Kenya that combined demand and supply side incentives. Half of the schools in the study were randomly chosen to offer merit-based scholarships to girls scoring above a certain percentile on standardized examinations. In addition to this price incentive to households, schools had an incentive to improve girl's attendance and performance, as the schools directly received a portion of the scholarships. Girl's attendance as well as test scores in intervention schools were significantly higher than in controls, as was teacher attendance (Glick, 2008).

A few other randomized experiments involved initiatives that combined several gender targeted measures, such as having female teachers, creating girls-only schools, and reducing distances to schools deemed suitable for girls. The favorable outcomes for these programs suggest that they can be models for use elsewhere, though it remains unclear which components led to the outcomes or if all of them did, or if an important element of success was interactions among them (Glick, 2008).

Using a randomized natural experiment in India, Beaman et al, 2012, show that female leadership influences adolescent girls' career aspirations and educational attainment. A 1993 law reserved leadership positions for women in randomly selected village councils. Using 8,453 surveys of adolescents aged 11–15 and their parents in 495 villages, the authors find that, compared to villages that were never reserved, the

gender gap in aspirations closed by 25 percent in parents and 32 percent in adolescents in villages assigned to a female leader for two election cycles. The gender gap in adolescent educational attainment was erased and girls spent less time on household chores.

e. Policies to develop SES.

Some education specialists and psychologists believe that if schools teach youngsters to work well with others, regulate their emotions and be constructive in solving problems, students will be better equipped to deal with life's challenges, including academic ones (see De Angelis, 2010).

Following the lead of David Goleman, who in his best-selling "Emotional Intelligence" strongly argued in favor of schools teaching emotional intelligence, several programs have been developed across both sides of the Atlantic. In the US, for instance, the Collaborative for Academic, Social, and Emotional learning (CASEL) has been actively promoting social and emotional learning (SEL), a program which focuses on the development of the following five competencies: 1) self- awareness; 2) social awareness; 3) responsible decision making; 4) self-management; 5) relationship skills.

SEL consists of a set of lessons taught by trained teachers, who seek to induce pupils to recognize and manage their emotions, set and achieve positive goals, demonstrate caring and concern for others, establish and maintain positive relationships, make responsible decisions and handle interpersonal relationships effectively.

Did this program work? According to a meta-analysis carried out by Payton and co-authors, 2009, who reviewed 180 studies on the effects of SEL on individual behavior and school performance, SEL programming increased test scores by 11 to 17 percentage points. However, since only 45 percent of the reviewed studies are based on an explicit randomization mechanism, which allocates randomly students to treatment and control groups, this positive result could be partly inflated by self-selection, if better schools with higher quality pupils are more likely to adopt SEL.

An evidence-based approach with emotional development at its center is known as *RULER*: recognizing, understanding, labelling, expressing and regulating emotions. Applied for almost 20 years in the United States, it has been adopted by more than

2,000 schools in other high- and middle-income countries. In addition to integrating social and emotional learning into the curriculum, its implementation model adopts a community-wide approach, with training for school leaders, teachers and school staff, as well as systematic engagement with families (Brackett et al., 2019).

The promotion of social and emotional competencies among children aged 5 to 16 is the focus of *The Children's Plan*, a UK government plan which aims at developing greater resilience and preparedness for change, both in learning and socially. One program in this plan is SEAL (Social and Emotional Aspects of Learning), which has been used by approximately 80 percent of primary schools and 30 percent of secondary schools by July 2008 (see Duckworth et al, 2009). The key competencies taught by SEAL are self-awareness, managing feelings, motivation, empathy and social skills.

SEAL focuses on whole-school development work designed to create the ethos and climate within which social and emotional skills can be most effectively promoted. It also involves small group interventions for children who require additional support to develop their social and emotional skills. The goals of these brief, early interventions include helping children by facilitating their personal development; exploring key issues with them in more depth; allowing them to practice new skills in an environment in which they feel safe, can take risks and learn more about themselves; developing their ways of relating to others; promoting reflection.

Case study evidence suggests that schools using SEAL resources report positive effects, but no broad quantitative evidence of impact on behavior is available to date. Also in the UK, the program "Values Schools" was started in Oxford-shire schools and has been replicated in several other primary schools. According to Layard, 2007, the aim of this program is to help children control their emotions by familiarity with uplifting ideas and role models, and the practice of silent reflection. Children practice silent reflection during whole-school assembly and at the beginning of most classes. Informal evaluation suggests improved mood, conduct and academic performance.

Some cost-benefit analysis of SEL interventions have been performed. Applied to the context in Washington state in the US, Lee et al., 2012, have calculated costs, benefits, and net benefits for the Seattle Social Development Project (SSDP) and Life Skills

Training (LST). For the SSDP, the participant costs are $3030, and the benefits are $5800. Therefore, the net benefits are strongly positive at $2770. For LST, the costs are $30, and the benefits are $1290. The net benefits are thus $1260.

Belfield et al, 2015, compute the costs and benefits of four selected SEL interventions in the US: 4Rs; Second Step, Life Skills Training, and Responsive Classroom, and find that the benefits of these interventions substantially outweigh the costs.

There are few examples of educational interventions outside the traditional classroom environment in the US that have reduced the disruptive and anti-social behaviors of students: the Perry Preschool program, for instance, targeted disadvantaged four- and five-year-olds, providing weekly home visits with parents and intensive preschool services for two years. When in their late 20's, participants exhibited substantially fewer arrests. Heckman et al, 2006, show that the Perry experiment did not raise IQ for boys and infer that its effect on crime must be due to improved personality traits.

The US Job Corps program targeted adolescents and provided seven months of education and vocational training for 16-21 year olds, and reduced criminal behavior. How do schools and educational programs manage to alter individual behaviors and personality? A plausible hypothesis is that they do this by "… subjecting students to types of social interactions and systems of reward that replicate the social interactions and reward systems of the workplace, providing positive reinforcement for some behaviors and personalities and sanctions for others…" (see Bowles, Gintis and Osborne, p.38).

Another example is the US Junior Reserve Officers' Training Corps (JROTC), which supports at-risk students at high school level in order to improve their academic achievement. This is a multidimensional program, which does not only focus on the provision of non-cognitive, extracurricular skills, but includes also 'standard' classroom teaching (see Pema and Mehay 2009).

Programs that are explicitly targeted at the improvement of non-cognitive skills exist in Europe as well. The first example is the entrepreneurial classes implemented in Dutch Vocational Colleges, i.e., at the tertiary level. These courses are a component of the Junior Achievement Young Enterprise student mini-company (SMC) program,

which exists in several European countries. The goal of this program is to teach students to put theory into practice and to understand what entrepreneurship is about. Students taking these classes are assumed to gain self-confidence and motivation, become proactive, creative and learn how to work in a team (see Oosterbeek et al. 2010, p. 443).

Oosterbeek and co-authors, 2010, evaluated whether such direct transfer of entrepreneurial knowledge increased the entrepreneurial intentions of the participants in the program. They find no significant effect on students' self-assessed entrepreneurial skills. In addition, the results on the intention to become an entrepreneur are even negative. While this does not speak in favor of the effectiveness of special programs focusing on the provision of entrepreneurial knowledge, the results should be interpreted with caution, because the authors can only rely on the evaluation of the program in one school. Therefore, it is not clear whether these findings can be generalized.

The second example Is a remedial education program for English secondary school students, who are at risk of school exclusion and with worsening educational pathways. The *xl*-program was applied to students aged 14 in 500 English secondary schools over two years and for three hours per week. The most important element of the *xl* club program was its explicit goal of improving crucial non cognitive skills of students, including confidence, self-esteem, motivation and locus of control which, in turn, are expected to affect school attendance and ultimately young people's achievements at the end of compulsory education at age 16 (see Holmlund and Silva, 2009).

Participants in the program did experience an increase in their non-cognitive skills in terms of better motivation, better behavior towards other students and more self-esteem and confidence (see Browne and Evans 2007). In this regard, the program was successful in the development of non – cognitive skills. However, no significant positive effects on cognitive outcomes at the age of 16 could be found. One reason why the increase in non – cognitive skills was not reflected in higher cognitive achievement could have been the dynamic process of skill formation described by Heckman and

co-authors (see for example Cunha and Heckman 2007): increasing non cognitive skills during adolescence cannot compensate for cognitive deficits that have been accumulated since early childhood. As the program explicitly focuses on at-risk children with low cognitive achievement at earlier ages, this could be a reasonable explanation.

The third example Is a program Implemented in Portugal mostly for 13-15 years old pupils in 7th and 8th grade, who were at risk of failing or dropping out. The intervention called EPIS especially concentrated on the improvement of non-cognitive skills and included motivational discussions, self-control, problem-solving techniques but also group techniques such as study methods, social competences training, management of criticism, anxiety self-control (see Martins 2010). The participants were treated in one--to-one interventions or small groups by psychologists or education scientists. Unlike in many other remedial programs, Martins finds significant that participation in EPIS reduced grade retention by 10 percentage points.

In summary, the evidence from programs explicitly targeted at the provision of non-cognitive skills is somewhat mixed and still scarce. While entrepreneurial classes do not seem to affect non-cognitive skills in terms of more entrepreneurial knowledge and, thus, do not increase entrepreneurial intentions, other programs in the UK and Portugal were both successful in enhancing the non-cognitive skills of program participants. The EPIS program in Portugal even managed to translate higher non-cognitive skills in higher cognitive outcomes of students. Yet, more research has to be done to get a clearer picture of the effects of such programs, not least because programs are mostly targeted to special groups of at-risk students and, thus, results cannot be easily generalized.

Conclusions

In this report, we have provided estimates of the private, fiscal and social costs of inadequate human capital for countries, macro regions and the world at large. We have used two alternative measures of inadequate human capital, the share of early school leavers ESL and the share of children with less than basic skills LBS. While the former measure focuses on the average quantity of education, the latter measure is more

encompassing by combining quantity and quality. We have supplemented these measures with two indicators of non-cognitive skills, the motivation and the Big Five indices and argued that low values of these indices produce private, fiscal and social costs because they affect both the quantity and the quality of education.

The costs of inadequate human capital in a country, a macro-region or in the world at large are estimated by comparing two scenarios, the status quo, where the selected measures of inadequate human capital are set at their current level (2021), and an intervention scenario, where these measures are set at a target level. This level is zero for early school leaving or the share of children with less than basic skills, and at the maximum possible level for the indices of non-cognitive skills.

Our estimates indicate that the costs of inadequate human capital are large. We find that, in 2030, the global annual private costs of having ESL and LBS at their 2021 value rather than at zero are equal to 6,265 and 9,154 billion 2015 dollars, or 10.7 and 17.1 percent of global GDP in 2030. Over a 20-year horizon, ranging from 2021 to 2041, the lifetime costs of ESL and LBS are estimated at 133,396 and 195,000 billion 2015 US dollars, or 10.8 and 17.3 percent of global lifetime GDP.

We also estimate that the global annual social costs, which consist of private and fiscal costs, net of the costs of raising taxes, are close to the private costs and equal to 5,951 billion dollars for ESL and to 10,051 billion dollars for LBS. The global lifetime social costs are instead equal to 126,505 billion for ESL and to 213,485 billion US dollars for LBS.

Although often disregarded, the costs of having average levels of socio-emotional skills SES below the highest attainable levels are also high. We estimate that the annual costs in terms of lost GDP, evaluated in 2030 but discounted at 2021, are equal to 6,554.87 billion 2015 US dollars (15.83 percent of annual GDP) when we measure SES with the Big Five index, and to 9,841.89 (18.88 percent of annual GDP) billion 2015 US dollars when we measure SES with the motivation index.

Since the share of ESL and LBS is on average higher for males than for females, we find that the costs associated with the former are higher than those associated with the latter. We estimate that the annual costs attributed to having gender-specific levels of

ESL (LBS) above zero are equal to 2,957.07 (3,507.27) billions for females and to 4,645.90 (5,219.67) billions for males.

In this study, we have focused on the pecuniary costs of inadequate human capital and covered only some non-pecuniary costs (in terms of higher corruption, lower tax morale, higher early pregnancies and crime). The loss of personal fulfillment, intellectual growth, and quality of life are important effects of inadequate human capital that are not considered here. We have also not considered the impact of early school leaving and inadequate skills on individual well-being, which includes self-esteem, life satisfaction, and mental health.

We recognize that these aspects are essential for a comprehensive understanding of the consequences of inadequate education. Future research in this area would be particularly useful. At the same time, we need better comparative data on socio-emotional skills that allow us to fully grasp the implications of these skills for economic and social wellbeing.

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Appendix

A.1 The lifetime and annual costs of ESL.

We use the estimated parameters in (8) and (9) to simulate each cost component Q over a 20-years horizon, from 2021 to 2041. Ignoring the subscript *i* hereafter for convenience and using the estimates of (8), the predicted growth rate of per- capita GDP when ESL is set at the status quo ESL_{2021} – is:

$$\hat{g}_1 = \hat{\pi}_0 + \hat{\pi}_1 \log(GDP_{2021}) + \hat{\pi}_2 ESL_{2021} + \hat{\pi}_3 X_{\square} \quad \text{(A.1)}$$

where $\hat{z}_{\square}$ is the predicted or estimated value of z. The predicted growth rate when ESL is set at zero is:

$$\hat{g}_0 = \hat{\pi}_0 + \hat{\pi}_1 \log(GDP_{2021}) + \hat{\pi}_3 X_{\square} \quad \text{(A.2)}$$

The predicted values of GDP in the two scenarios are

$$GDP^1_{2021+t} = (1 + t\hat{g}_1) GDP_{2021} \quad \text{(A.3)}$$

and

$$GDP^0_{2021+t} = (1 + t\hat{g}_0) GDP_{i2021} \quad \text{(A.4)}$$

Using the estimates of (9), the predicted values of the cost shares in the two scenarios are

$$\hat{\lambda}^1{}_{\square} = \hat{\beta}_0 + \hat{\beta}_1 ESL_{2021} + \hat{\beta}_2 W_i \quad \text{(A.5)}$$

and

$$\hat{\lambda}^0{}_{\square} = \hat{\beta}_0 + \hat{\beta}_2 W_i \quad \text{(A.6)}$$

and the predicted value of Q under the status quo at time 2021+t, where t=0,…,20, is

$$Q^1_{2021+t} = \hat{\lambda}^1_{\square} (1 + t\hat{g}_1) GDP_{2021} \quad \text{(A.7)}$$

The predicted value of Q under the intervention scenario is:

$$Q^0_{2021+t} = \hat{\lambda}^0_{\square} (1 + t\hat{g}_0) GDP_{2021} \quad \text{(A.8)}$$

The estimated lifetime cost associated with Q is – in absolute values -

$$LQ_{\square} = \sum_{t=0}^{20} (Q^1_{2021+t} - Q^0_{2021+t}) \frac{1}{1+rt} \quad \text{(A.9)}$$

where $\frac{1}{1+rt}$ is the discount factor and r is the real rate of interest. Relative to lifetime GDP in the status quo scenario, this cost is:

$$RLQ_{\square} = \frac{\sum_{t=0}^{19}(Q^1_{2021+t} - Q^0_{2021+t})\frac{1}{1+rt}}{\sum_{t=0}^{19} GDP^1_{2021+t}\frac{1}{1+rt}} \quad \text{(A.10)}$$

The average annual cost, measured in 2030, is:

$$AQ = \frac{Q^1_{2030} - Q^0_{2030}}{1+9r} \quad \text{(A.11)}$$

The cost is discounted at year 2021. Relative to GDP in the status quo scenario, the annual cost is:

$$RAQ = \frac{Q^1_{2030} - Q^0_{2030}}{GDP^1_{2030}} \quad \text{(A.12)}$$

Since these costs are per capita, the total costs of ESL and the costs per early school leaver are obtained by multiplying the per-capita values by the population size and by dividing the overall costs by the number of early school leavers.

In our derivations of the costs, we have deliberately avoided using compound capitalization and discounting to limit the role of non-linear dynamics, which tend to explode and become overwhelming when projections are carried out over long time periods.

The estimated difference between GDP in scenarios 1 and 0 at each point in time is

$$\Delta GDP_{2021+t} = GDP^1_{2021+t} - GDP^0_{2021+t} = t(\hat{g}_1 - \hat{g}_0)GDP_{2021} =$$

$$t(\hat{\pi}_2 ESL_{2021})GDP_{2021} \quad \text{(A.13)}$$

where t= 0…, 20. The difference in 2030 is

$$GDP^1_{2030} - GDP^0_{2030} = 9(\hat{g}^{\square}_1 - \hat{g}^{\square}_0)GDP_{2021}$$

The present discounted value of all GDP differences is

$$PDV_{GDP} = (\hat{\pi}_2 ESL_{2021})\, GDP_{2021} \sum_{t=0}^{20} \frac{t}{(1+rt)} \quad \text{(A.14)}$$

The present discounted value of the differences between scenarios for cost Q is

$$PDV_Q = \sum_{t=0}^{20} \frac{1}{(1+rt)} [Q^1_{2001+t} - Q^0_{2001+t}] \quad \text{(A.15)}$$

We notice that

$$[Q^1_{2021+t} - Q^0_{2021+t}] = \lambda^1_{\square}[GDP^1_{2021+t} - GDP^0_{2021+t}] + GDP^0_{2021+t}[\lambda^1_{\square} - \lambda^0_{\square}]$$

Since $GDP^0_{2021+t} = (1 + t\hat{g}_{i0})\, GDP^{\square}_{2021}$, we can write the PDV as

$$PDV_Q = \left(GDP^{\square}_{2021} \times ESL_{2021}\right) \sum_{t=0}^{20} \frac{1}{(1+rt)} \left[\lambda^1_{\square} t\widehat{\pi_2} + (1 + t\hat{g}_0)\hat{\beta}\right] \qquad \text{(A.16)}$$

The estimated annual difference in Q between scenarios is

$$Q^1_{2030} - Q^0_{2030} = (GDP^{\square}_{2021}\, x\, ESL_{2021})\left[9\lambda^1_{\square}\widehat{\pi_2} + (1 + 9\hat{g}_0)\hat{\beta}\right]$$

The relative lifetime cost $RLQ_{\square}$ can therefore be expressed as percent of lifetime GDP in the status quo scenario as

$$RLQ_{\square} = \frac{\left(GDP^{\square}_{2021} \times ESL_{2021}\right) \sum_{n=0}^{20} \frac{1}{(1+rt)} \left[\lambda^1_{\square} t\widehat{\pi_2} + (1+t\hat{g}_0)\hat{\beta}\right]}{\sum_{n=0}^{20} \frac{1}{(1+rt)} GDP_{2021+n}} \qquad \text{(A.17)}$$

The relative annual cost of ESL $RAQ_{\square}$ can also be expressed as share of GDP in the status quo scenario

$$RAQ_{\square} = \frac{Q^1_{2030} - Q^0_{2030}}{GDP^1_{2030}} = \frac{(GDP^{\square}_{2021}\, x\, ESL_{2021})\left[9\lambda^1_{\square}\widehat{\pi_2} + (1+9\hat{g}_0)\hat{\beta}\right]}{GDP^1_{2030}} \qquad \text{(A.18)}$$

Let LQ_M and LQ_F be the absolute lifetime costs for males and females. We show that the sum $LQ_M + LQ_F$ is only approximately equal to LQ. For this, consider that the difference in costs $Q^1_{2021+t} - Q^0_{2021+t}$ can be written as

$$Q^1_{2021+t} - Q^0_{2021+t} = \hat{\lambda}^1_{\square}\left(1 + t\hat{g}^1_{\square}\right)GDP_{2021} - \hat{\lambda}^0_{\square}(1 + t\hat{g}^0_{\square})GDP_{2021} \qquad \text{(A.19)}$$

Comparing (A.4.19) with the differences when ESL of either females or males is reduced to zero, we have:

$$Q^1_{2021+t} - Q^{0F}_{2021+t} = \hat{\lambda}^1_{\square}\left(1 + t\hat{g}^1_{\square}\right)GDP_{2021} - \hat{\lambda}^0_F(1 + t\hat{g}^0_F)GDP_{2021} \qquad \text{(A.20)}$$

$$Q^1_{2021+t} - Q^{0M}_{2021+t} = \hat{\lambda}^1_{\square}\left(1 + t\hat{g}^1_{\square}\right)GDP_{2021} - \hat{\lambda}^0_M(1 + t\hat{g}^0_M)GDP_{2021} \qquad \text{(A.21)}$$

Adding up (A.4.20) and (A.4.21) yields

$$(1 - s_m)[Q^1_{2021+t} - Q^{0F}_{2021+t}] + s_m[Q^1_{2021+t} - Q^{0M}_{2021+t}] = \hat{\lambda}^1_{\square}\left(1 + t\hat{g}^1_{\square}\right)GDP_{2021} - (1 - s_m)\hat{\lambda}^0_F(1 + t\hat{g}^0_F)GDP_{2021} - s_m\hat{\lambda}^0_M(1 + t\hat{g}^0_M)GDP_{2021} \qquad \text{(A.22)}$$

which is equal to $Q^1_{2021+t} - Q^0_{2021+t}$ only if:

$$(1-s_m)\left[\left(\hat{\lambda}_F^0-\hat{\lambda}_{\square}^0\right)+t\left(\hat{\lambda}_F^0\hat{g}_F^0-\hat{\lambda}_{\square}^0\hat{g}_{\square}^0\right)GDP_{2021}\right]+s_m\left[\left(\hat{\lambda}_M^0-\hat{\lambda}_{\square}^0\right)+t\left(\hat{\lambda}_M^0\hat{g}_M^0-\hat{\lambda}_{\square}^0\hat{g}_{\square}^0\right)GDP_{2021}\right]=0 \quad \text{(A.23)}$$

Tables

Table 1. The global costs of ESL and LBS (bln US dollars)

Type of cost	Lifetime cost - bln$	Annual cost - bln$
ESL		
Private -level	-133395.77	-6265.04
Private -percent	-10.81%	-10.69%
Fiscal -level	-24651.27	-1177.03
Fiscal - percent	-2.12%	-2.12%
Social - level	-126505.52	-5951.36
Social -percent	-10.87%	-10.77%
LBS		
Private -level	-195000.43	-9153.71
Private -percent	-17.28%	-17.08%
Fiscal -level	-68206.12	-3247.25
Fiscal - percent	-7.42%	-7.41%
Social - level	-213485.57	-10051.45
Social -percent	-20.96%	-20.78%

Note: ESL: share of early school leavers; LBS: share of children with less than basic cognitive skills; bln: billion

Table 2 The GDP costs of low socio-emotional skills

Type of cost	Lifetime cost - bln$	Annual cost - bln$
SES		
Big Five Index	-132751.44	-6554.87
	-15.70%	-15.83%
Motivation index	-209,208.30	-9841.89
	-19.08%	-18.88%

Note: SES: socio-emotional skills; bln: billion

Table 3. The global costs of female ESL and LBS (bln US dollars)

Type of cost	Lifetime cost - bln$	Annual cost - bln$
ESL		
Private -level	-62947.9	-2957.07
Private -percent	-5.45%	-5.40%
Fiscal -level	-8997.88	-431.02
Fiscal - percent	-0.76%	-0.77%
Social - level	-58579.9	-2756.31
Social -percent	-5,35%	-5.30%
LBS		
Private -level	-98905.53	-4645.90
Private -percent	-9.56%	-9.46%
Fiscal -level	-22246.28	-1064.28
Fiscal - percent	-2.34%	-2.35%
Social - level	-101169.75	-4765.60
Social -percent	-10.48%	-10.40%

Note: ESL: share of early school leavers; LBS: share of children with less than basic cognitive skills; bln: billion

Table 4. The global costs of male ESL and LBS (bln US dollars)

Type of cost	Lifetime cost - bln$	Annual cost - bln$
ESL		
Private -level	-74669.76	-3507.37
Private -percent	-5.85%	-5.78%
Fiscal -level	-11680.03	-559.09
Fiscal - percent	-0.85%	-0.86%
Social - level	-70156.78	-3301.02
Social -percent	-5.74%	-5.69%
LBS		
Private -level	-111113.39	-5218.67
Private -percent	-10.25%	-10.14%
Fiscal -level	-26413.39	-1262.78
Fiscal - percent	-2.59%	-2.60%
Social - level	-114276.69	-5382.44
Social -percent	-11.28%	-11.19%

Note: ESL: share of early school leavers; LBS: share of children with less than basic cognitive skills; bln: billion

Table 5. Summary statistics

	number of observations	mean	standard deviation
GDP per capita growth	159	0.032	0.034
Share of children with less than basic skills	159	0.616	0.290
Share of early school leavers	156	0.572	0.291
Share of out of school children	154	0.399	0.262
Share of students with less than basic skills	159	0.577	0.280
Degree of economic openness	159	0.878	0.547
Log (International property rights index)	159	1.506	0.453
Timing of independence: old	159	0.314	0.466
Log capital / GDP ratio	159	3.154	0.272
Log government consumption / GDP ratio	159	-1.885	0.369
Log population	159	15.794	1.594
Higher than median share of land in tropics	159	0.478	0.501

Table 6. Estimates of the effects of ESL, LBS and other human capital indicators on growth

	share of children with less than basic skills (LBS)	share of students with less than basic skills	early school leavers (ESL)	proportion of young people who are out of school
OLS				
Without controls	-0.0900***	-0.0890***	-0.0689***	-0.0758***
	(0.016)	(0.017)	(0.012)	(0.013)
With controls	-0.0864***	-0.0838***	-0.0681***	-0.0747***
	(0.014)	(0.015)	(0.013)	(0.012)
Oster (2019) beta	-0.0804	-0.076	-0.0672	-0.0738
IV				
without controls	-0.1532***	-0.1577***	-0.1081***	-0.1063***
	(0.048)	(0.050)	(0.034)	(0.036)
with controls	-0.1607***	-0.1616***	-0.1282***	-0.1104***
	(0.047)	(0.047)	(0.038)	(0.032)
Reduced form effect of the instrument		-0.0014		
Conley (2012) deviation (%)	26.9	27.5	27.9	10.6
F stat. first stage	10.77	11.31	13.96	22.31
Obs.	159	159	156	154

Notes to Table 6. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence. Note: ESL: share of early school leavers; LBS: share of children with less than basic cognitive skills. All specifications include the log of 2001 pre capita GDP in constant 2015 US dollars. In addition specifications "With controls" include the average in the period between 2001 and 2021 of the log of population aged 15 plus; the ratio of government consumption to GDP; the ratio of the capital stock to GDP; the degree of openness (measured as the sum of the ratios of imports and exports to GDP); the log of the international property rights index, which measures the degree of protection of these rights (Property Rights Alliance, 2022); a binary variable indicating whether a country has never been colonized by a foreign power; a binary variable measuring whether the share of land in tropical or sub-tropical areas is above the sample median.

Table 7. Effects of ESL and LBS on monetary and non monetary costs

	early school leavers ESL	share of children with less than basic skills LBS	type of estimate
Labor share of GDP	-0.051	-0.084**	OLS
	(0.034)	(0.042)	
Income taxes on GDP	-0.158***	-0.197***	GLM
	(0.042)	(0.058)	
Government surplus or deficit (share of GDP)	-0.064*	-0.129**	OLS
	(0.033)	(0.050)	
Social transfers on GDP	-0.025**	-0.009	GLM
	(0.009)	(0.012)	
Public health expenditures on GDP	-0.021**	-0.017	GLM
	(0.008)	(0.013)	
Public education expenditures on GDP	-0.002	-0.007**	GLM
	(0.002)	(0.003)	
Public expenditures on law and order on GDP	0.007*	0.005	GLM
	-0.004	-0.006	
Private health expenditures on GDP	-0.008*	-0.013*	GLM
	(0.004)	(0.007)	
Private expenditure in education	-0.002***	0.0003	GLM
	(0.0006)	-0.0007	
Homicides (per 1,000 inhabitants)	0.231	1.913***	OLS
	(0.493)	(0.630)	
Corruption index	9.701**	10.240**	IV
	(4.295)	(4.619)	
Tax morale	-0.073	-0.077	IV
	(0.702)	(0.771)	
log(NEET)	0.746***	0.933***	IV
	(0.272)	(0.318)	
log(early pregnancies)	2.458***	2.993***	IV
	(0.500)	(0.533)	

Notes. For early pregnancies we use female ESL and LBS. One, two and three stars for statistical significance at 10, 5 and 1 percent level of confidence. ESL: share of early school leavers; LBS: share of children with less than basic cognitive skills.

Table 8. Motivation and Big Five indices. Summary statistics

	number of observations	mean	standard deviation	minimum	maximum
Motivation index	56	0.873	0.064	0.653	0.958
Big Five index	61	0.024	1.000	-3.210	1.395

Table 9. The effect of SES on ESL and LBS

	(1)	(2)	(3)	(4)
VARIABLES	early school leavers	early school leavers	share of children with less than basic skills	share of children with less than basic skills
Motivation Index	-0.958*		-1.331**	
	(0.527)		(0.553)	
Big Five Index		-0.021		-0.054***
		(0.016)		(0.016)
Observations	54	58	54	59
Oster (2019) beta	2.862	-0.041	-4.255	-0.020
R-squared	0.527	0.559	0.781	0.678

Notes. Robust standard errors within parentheses. Each regression includes a constant, real GDP per capita in 2001, the average degree of openness, the log of average population aged 15+, the log of average capital to GDP ratio, the log of the average ratio between government consumption and GDP, the log of the international property rights index and binary variables for locations with a higher than median percentage of land in tropical and sub-tropical areas and for countries that have not become independent only recently. ESL: share of early school leavers; LBS: share of children with less than basic cognitive skills.

Table 10. The correlation between SES and GDP growth. Dependent variable: GDP growth

	(1)	(3)	(4)	(5)
ESL	-0.111***	-0.111***		
	(0.029)	(0.029)		
LBS			-0.052*	-0.047**
			(0.030)	(0.018)
Motivation index	0.069		0.107	
	(0.083)		(0.136)	
Big Five index		-0.004		-0.006
		(0.004)		(0.004)
Observations	53	57	53	58
R-squared	0.573	0.598	0.502	0.576

Notes: ESL: share of early school leavers; LBS: share of children with less than basic cognitive skills.

Table 11. The global costs of ESL (bln US dollars)

World Region	Type of cost	Share of ESL	Share of female ESL	Share of male ESL	Lifetime cost of ESL bln$	Lifetime cost of female ESL bln$	Lifetime cost of male ESL bln$	Annual cost of ESL bln$	Annual cost of female ESL bln$	Annual cost of male ESL bln$
Arab States	Private	0.51	0.49	0.53	-6020.58	-3035.45	-3184.38	-282.96	-142.69	-149.69
Arab States	Fiscal	0.51	0.49	0.53	-663.72	-161.67	-224.75	-32.02	-7.99	-10.99
Arab States	Social	0.51	0.49	0.53	-5443.47	-2668.45	-2827.50	-256.31	-125.68	-133.17
Central Asia	Private	0.12	0.12	0.11	-689.27	-311.04	-383.14	-32.41	-14.63	-18.02
Central Asia	Fiscal	0.12	0.12	0.11	-10.46	-3.73	0.27	-0.52	-0.19	0.00
Central Asia	Social	0.12	0.12	0.11	-579.43	-261.86	-318.69	-27.26	-12.32	-14.99
Central and Eastern Europe	Private	0.14	0.14	0.15	-4074.95	-1864.66	-2290.82	-191.34	-87.57	-107.57
Central and Eastern Europe	Fiscal	0.14	0.14	0.15	-505.96	-183.11	-238.39	-24.35	-8.86	-11.52
Central and Eastern Europe	Social	0.14	0.14	0.15	-3424.20	-1553.94	-1911.90	-161.04	-73.09	-89.92
East Asia and the Pacific	Private	0.40	0.35	0.45	-46779.84	-19978.31	-28765.76	-2196.64	-938.47	-1351.05
East Asia and the Pacific	Fiscal	0.40	0.35	0.45	-10921.20	-3609.57	-5833.44	-521.15	-172.76	-278.85
East Asia and the Pacific	Social	0.40	0.35	0.45	-47151.51	-19638.60	-28760.27	-2219.00	-924.48	-1353.78
Latin America and the Caribbean	Private	0.36	0.35	0.38	-11188.22	-5452.39	-6195.31	-525.40	-256.11	-290.99
Latin America and the Caribbean	Fiscal	0.36	0.35	0.38	-1991.99	-730.92	-867.27	-95.12	-35.04	-41.55
Latin America and the Caribbean	Social	0.36	0.35	0.38	-10604.44	-5089.64	-5782.34	-498.78	-239.45	-272.02
North America and Western Europe	Private	0.16	0.16	0.16	-40879.41	-19585.09	-21686.35	-1919.61	-919.68	-1018.34
North America and Western Europe	Fiscal	0.16	0.16	0.16	-6414.67	-2742.36	-3039.19	-306.76	-131.38	-145.60
North America and Western Europe	Social	0.16	0.16	0.16	-35411.33	-16865.49	-18644.27	-1664.86	-792.93	-876.54
South and West Asia	Private	0.46	0.48	0.45	-15816.70	-8349.77	-8209.60	-743.15	-392.40	-385.81
South and West Asia	Fiscal	0.46	0.48	0.45	-2631.86	-1026.20	-1019.30	-125.15	-48.94	-48.63
South and West Asia	Social	0.46	0.48	0.45	-15900.40	-8241.58	-8091.90	-747.95	-387.75	-380.72
Sub-Saharan Africa	Private	0.70	0.72	0.68	-7946.80	-4371.18	-3954.40	-373.53	-205.52	-185.91
Sub-Saharan Africa	Fiscal	0.70	0.72	0.68	-1511.42	-540.31	-457.96	-71.95	-25.86	-21.95
Sub-Saharan Africa	Social	0.70	0.72	0.68	-7990.75	-4260.32	-3819.92	-376.16	-200.60	-179.87

World	Private	0.42	0.41	0.43	-133395.77	-62947.90	-74669.76	-6265.04	-2957.07	-3507.37
World	Fiscal	0.42	0.41	0.43	-24651.27	-8997.88	-11680.03	-1177.03	-431.02	-559.09
World	Social	0.42	0.41	0.43	-126505.52	-58579.90	-70156.78	-5951.36	-2756.31	-3301.02

Notes: . ESL: share of early school leavers; bln: billion. The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. Private costs are the costs borne by households, computed as the difference between the changes in private incomes and the changes in private expenditures induced by ESL. Private incomes include labour income and social transfers. Private expenditures include income taxes, private health and education expenditures and the costs of crime victimization. Fiscal costs are the costs borne by the public sector, computed as the difference between the changes in fiscal revenues and the changes in government expenditures induced by ESL. Social costs are the sum of private costs, fiscal costs and the shadow costs of public funds, which is set at 15 percent of fiscal revenues, as in Ballard and Fullerton, 1992. Global and regional costs are obtained by aggregating country costs. For each country, we forecast the values of incomes and cost components between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. All costs are expressed in 2015 US dollars.

Table 12. The global costs of ESL (as percentage of GDP)

World Region	Type of cost	Share of ESL	Share of female ESL	Share of male ESL	Lifetime cost of ESL %	Lifetime cost of female ESL %	Lifetime cost of male ESL %	Annual cost of ESL %	Annual cost of female ESL %	Annual cost of male ESL %
Arab States	Private	0.51	0.49	0.53	-13.93	-7.08	-7.47	-13.75	-6.99	-7.38
Arab States	Fiscal	0.51	0.49	0.53	-2.19	-0.64	-0.77	-2.21	-0.65	-0.79
Arab States	Social	0.51	0.49	0.53	-13.28	-6.54	-6.94	-13.14	-6.47	-6.86
Central Asia	Private	0.12	0.12	0.11	-4.79	-2.28	-2.56	-4.75	-2.26	-2.54
Central Asia	Fiscal	0.12	0.12	0.11	-0.28	-0.13	-0.09	-0.29	-0.13	-0.09
Central Asia	Social	0.12	0.12	0.11	-4.18	-2.00	-2.19	-4.15	-1.98	-2.18
Central and Eastern Europe	Private	0.14	0.14	0.15	-4.19	-1.81	-2.44	-4.13	-1.79	-2.41
Central and Eastern Europe	Fiscal	0.14	0.14	0.15	-0.44	-0.16	-0.21	-0.44	-0.16	-0.22
Central and Eastern Europe	Social	0.14	0.14	0.15	-3.58	-1.54	-2.08	-3.54	-1.52	-2.05
East Asia and the Pacific	Private	0.40	0.35	0.45	-7.65	-3.30	-4.68	-7.57	-3.27	-4.64
East Asia and the Pacific	Fiscal	0.40	0.35	0.45	-1.86	-0.63	-0.97	-1.87	-0.63	-0.97
East Asia and the Pacific	Social	0.40	0.35	0.45	-7.95	-3.35	-4.79	-7.88	-3.32	-4.76
Latin America and the Caribbean	Private	0.36	0.35	0.38	-8.84	-4.34	-4.88	-8.74	-4.29	-4.82
Latin America and the Caribbean	Fiscal	0.36	0.35	0.38	-1.68	-0.63	-0.73	-1.68	-0.64	-0.73
Latin America and the Caribbean	Social	0.36	0.35	0.38	-8.57	-4.14	-4.65	-8.49	-4.10	-4.61
North America and Western Europe	Private	0.16	0.16	0.16	-4.92	-2.34	-2.63	-4.86	-2.31	-2.60
North America and Western Europe	Fiscal	0.16	0.16	0.16	-0.68	-0.29	-0.32	-0.69	-0.29	-0.32
North America and Western Europe	Social	0.16	0.16	0.16	-4.20	-1.98	-2.23	-4.15	-1.96	-2.20
South and West Asia	Private	0.46	0.48	0.45	-13.85	-7.42	-7.14	-13.71	-7.35	-7.07
South and West Asia	Fiscal	0.46	0.48	0.45	-2.34	-0.92	-0.86	-2.34	-0.92	-0.87
South and West Asia	Social	0.46	0.48	0.45	-13.95	-7.33	-7.03	-13.82	-7.27	-6.97
Sub-Saharan Africa	Private	0.70	0.72	0.68	-19.09	-10.32	-9.75	-18.87	-10.20	-9.64
Sub-Saharan Africa	Fiscal	0.70	0.72	0.68	-4.30	-1.50	-1.39	-4.30	-1.51	-1.40
Sub-Saharan Africa	Social	0.70	0.72	0.68	-19.94	-10.36	-9.76	-19.74	-10.26	-9.66
World	Private	0.42	0.41	0.43	-10.81	-5.45	-5.85	-10.69	-5.40	-5.78

World	Fiscal	0.42	0.41	0.43	-2.12	-0.76	-0.85	-2.12	-0.77	-0.86
World	Social	0.42	0.41	0.43	-10.87	-5.35	-5.74	-10.77	-5.30	-5.69

Notes: . ESL: share of early school leavers; bln: billion. The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. Private costs are the costs borne by households, computed as the difference between the changes in private incomes and the changes in private expenditures induced by ESL. Private incomes include labour income and social transfers. Private expenditures include income taxes, private health and education expenditures and the costs of crime victimization. Fiscal costs are the costs borne by the public sector, computed as the difference between the changes in fiscal revenues and the changes in government expenditures induced by ESL. Social costs are the sum of private costs, fiscal costs and the shadow costs of public funds, which is set at 15 percent of fiscal revenues, as in Ballard and Fullerton, 1992. Global and regional costs are obtained by aggregating country costs. For each country, we forecast the values of incomes and cost components between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. All costs are expressed in 2015 US dollars.

Table 13. The global costs of LBS (bln US dollars)

World Region	Type of cost	Share of LBS	Share of female LBS	Share of male LBS	Lifetime cost of LBS bln$	Lifetime cost of female LBS bln$	Lifetime cost of male LBS bln$	Annual cost of LBS bln$	Annual cost of female LBS bln$	Annual cost of male LBS bln$
Arab States	Private	0.74	0.72	0.77	-13305.80	-6823.27	-7382.19	-625.35	-320.89	-347.16
Arab States	Fiscal	0.74	0.72	0.77	-3184.02	-545.85	-705.46	-152.57	-26.98	-34.61
Arab States	Social	0.74	0.72	0.77	-13776.36	-6367.87	-6960.26	-649.62	-300.50	-328.43
Central Asia	Private	0.62	0.62	0.63	-1888.88	-930.54	-1002.47	-88.72	-43.74	-47.12
Central Asia	Fiscal	0.62	0.62	0.63	-871.41	-258.51	-285.76	-41.44	-12.36	-13.66
Central Asia	Social	0.62	0.62	0.63	-2245.46	-999.47	-1079.80	-105.83	-47.13	-50.92
Central and Eastern Europe	Private	0.30	0.32	0.35	-7814.17	-2720.25	-3312.43	-366.47	-127.66	-155.41
Central and Eastern Europe	Fiscal	0.30	0.32	0.35	-3626.15	-853.37	-1115.41	-172.52	-40.76	-53.24
Central and Eastern Europe	Social	0.30	0.32	0.35	-8716.87	-2765.11	-3392.75	-410.31	-130.21	-159.74
East Asia and the Pacific	Private	0.24	0.23	0.25	-31088.30	-14688.75	-18427.73	-1459.46	-689.90	-865.41
East Asia and the Pacific	Fiscal	0.24	0.23	0.25	-12579.35	-4528.90	-5947.19	-597.91	-215.77	-283.20
East Asia and the Pacific	Social	0.24	0.23	0.25	-35773.88	-16054.24	-20324.51	-1684.42	-756.18	-957.20
Latin America and the Caribbean	Private	0.64	0.64	0.65	-26637.17	-14655.91	-15761.98	-1251.41	-689.12	-741.03
Latin America and the Caribbean	Fiscal	0.64	0.64	0.65	-9576.80	-2982.26	-3378.39	-455.56	-142.70	-161.56
Latin America and the Caribbean	Social	0.64	0.64	0.65	-29914.96	-15152.56	-16371.55	-1409.29	-714.30	-771.67
North America and Western Europe	Private	0.23	0.23	0.24	-69696.26	-34249.10	-38919.84	-3268.10	-1606.52	-1825.45
North America and Western Europe	Fiscal	0.23	0.23	0.24	-20406.48	-7796.35	-9204.39	-974.44	-373.49	-440.73
North America and Western Europe	Social	0.23	0.23	0.24	-68816.66	-32717.40	-37297.75	-3236.68	-1539.13	-1754.49
South and West Asia	Private	0.88	0.86	0.89	-32821.95	-17939.87	-19548.26	-1542.22	-843.64	-919.21
South and West Asia	Fiscal	0.88	0.86	0.89	-11698.77	-3308.82	-3862.68	-555.63	-158.16	-184.49
South and West Asia	Social	0.88	0.86	0.89	-39068.80	-19316.37	-21216.03	-1840.22	-910.43	-999.91
Sub-Saharan Africa	Private	0.94	0.94	0.93	-11747.90	-6897.85	-6758.50	-551.99	-324.41	-317.87
Sub-Saharan Africa	Fiscal	0.94	0.94	0.93	-6263.14	-1972.22	-1914.11	-297.18	-94.06	-91.29
Sub-Saharan Africa	Social	0.94	0.94	0.93	-15172.57	-7796.73	-7634.05	-715.06	-367.72	-360.06
World	Private	0.57	0.57	0.58	-195000.43	-98905.53	-111113.39	-9153.71	-4645.90	-5218.67

World	Fiscal	0.57	0.57	0.58	-68206.12	-22246.28	-26413.39	-3247.25	-1064.28	-1262.78
World	Social	0.57	0.57	0.58	-213485.57	-101169.75	-114276.69	-10051.45	-4765.60	-5382.44

Notes: . LBS: share of children with less than basic skills; bln: billion. The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. Private costs are the costs borne by households, computed as the difference between the changes in private incomes and the changes in private expenditures induced by ESL. Private incomes include labour income and social transfers. Private expenditures include income taxes, private health and education expenditures and the costs of crime victimization. Fiscal costs are the costs borne by the public sector, computed as the difference between the changes in fiscal revenues and the changes in government expenditures induced by ESL. Social costs are the sum of private costs, fiscal costs and the shadow costs of public funds, which is set at 15 percent of fiscal revenues, as in Ballard and Fullerton, 1992. Global and regional costs are obtained by aggregating country costs. For each country, we forecast the values of incomes and cost components between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. All costs are expressed in 2015 US dollars.

Table 14. The global costs of LBS (as percentage of GDP)

World Region	Type of cost	Share of LBS	Share of female LBS	Share of male LBS	Lifetime cost of LBS %	Lifetime cost of female LBS %	Lifetime cost of male LBS %	Annual cost of LBS %	Annual cost of female LBS %	Annual cost of male LBS %
Arab States	Private	0.74	0.72	0.77	-24.99	-13.78	-14.45	-24.66	-13.61	-14.27
Arab States	Fiscal	0.74	0.72	0.77	-9.53	-2.59	-2.86	-9.53	-2.62	-2.89
Arab States	Social	0.74	0.72	0.77	-28.69	-14.15	-14.90	-28.40	-14.02	-14.77
Central Asia	Private	0.62	0.62	0.63	-11.81	-6.54	-6.99	-11.71	-6.48	-6.93
Central Asia	Fiscal	0.62	0.62	0.63	-6.26	-2.14	-2.37	-6.27	-2.16	-2.39
Central Asia	Social	0.62	0.62	0.63	-14.67	-7.30	-7.85	-14.58	-7.27	-7.81
Central and Eastern Europe	Private	0.30	0.32	0.35	-8.57	-4.53	-5.62	-8.45	-4.47	-5.54
Central and Eastern Europe	Fiscal	0.30	0.32	0.35	-4.45	-1.71	-2.35	-4.43	-1.71	-2.35
Central and Eastern Europe	Social	0.30	0.32	0.35	-10.01	-4.88	-6.15	-9.90	-4.82	-6.08
East Asia and the Pacific	Private	0.24	0.23	0.25	-7.07	-3.55	-4.22	-7.00	-3.51	-4.17
East Asia and the Pacific	Fiscal	0.24	0.23	0.25	-3.25	-1.10	-1.38	-3.25	-1.10	-1.38
East Asia and the Pacific	Social	0.24	0.23	0.25	-8.67	-4.02	-4.82	-8.60	-3.99	-4.79
Latin America and the Caribbean	Private	0.64	0.64	0.65	-19.77	-10.90	-11.65	-19.57	-10.80	-11.54
Latin America and the Caribbean	Fiscal	0.64	0.64	0.65	-7.84	-2.52	-2.80	-7.84	-2.54	-2.81
Latin America and the Caribbean	Social	0.64	0.64	0.65	-22.85	-11.55	-12.39	-22.68	-11.46	-12.30
North America and Western Europe	Private	0.23	0.23	0.24	-8.28	-4.03	-4.65	-8.17	-3.97	-4.59
North America and Western Europe	Fiscal	0.23	0.23	0.24	-2.33	-0.88	-1.06	-2.34	-0.89	-1.07
North America and Western Europe	Social	0.23	0.23	0.24	-8.09	-3.82	-4.42	-8.01	-3.77	-4.37
South and West Asia	Private	0.88	0.86	0.89	-27.16	-14.98	-16.09	-26.87	-14.84	-15.93
South and West Asia	Fiscal	0.88	0.86	0.89	-9.77	-2.77	-3.11	-9.76	-2.79	-3.13
South and West Asia	Social	0.88	0.86	0.89	-32.37	-16.13	-17.41	-32.10	-16.01	-17.28
Sub-Saharan Africa	Private	0.94	0.94	0.93	-26.66	-15.49	-15.44	-26.34	-15.32	-15.26
Sub-Saharan Africa	Fiscal	0.94	0.94	0.93	-15.77	-5.18	-5.19	-15.72	-5.19	-5.19
Sub-Saharan Africa	Social	0.94	0.94	0.93	-36.05	-18.30	-18.25	-35.73	-18.14	-18.10
World	Private	0.57	0.57	0.58	-17.28	-9.56	-10.25	-17.08	-9.46	-10.14

World	Fiscal	0.57	0.57	0.58	-7.42	-2.34	-2.59	-7.41	-2.35	-2.60
World	Social	0.57	0.57	0.58	-20.96	-10.48	-11.28	-20.78	-10.40	-11.19

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. Private costs are the costs borne by households, computed as the difference between the changes in private incomes and the changes in private expenditures induced by LBS. Private incomes include labour income and social transfers. Private expenditures include income taxes, private health and education expenditures and the costs of crime victimization. Fiscal costs are the costs borne by the public sector, computed as the difference between the changes in fiscal revenues and the changes in government expenditures induced by LBS. Social costs are the sum of private costs, fiscal costs and the shadow costs of public funds, which is set at 15 percent of fiscal revenues, as in Ballard and Fullerton, 1992. Global and regional costs are obtained by aggregating country costs. For each country, we forecast the values of incomes and cost components between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF.

Table 15. The global costs of ESL - lower labour income (bln US dollars)

World Region	Share of ESL	Share of female ESL	Share of male ESL	labour share - baseline value	Lifetime cost of ESL bln$	Lifetime cost of female ESL bln$	Lifetime cost of male ESL bln$	Annual cost of ESL bln$	Annual cost of female ESL bln$	Annual cost of male ESL bln$
Arab States	0.51	0.49	0.53	0.41	-9972.32	-4722.40	-5031.82	-469.76	-222.46	-237.04
Central Asia	0.12	0.12	0.11	0.42	-1089.36	-487.65	-596.22	-51.27	-22.95	-28.06
Central and Eastern Europe	0.14	0.14	0.15	0.53	-7947.29	-3511.15	-4369.05	-374.30	-165.37	-205.77
East Asia and the Pacific	0.40	0.35	0.45	0.52	-88310.91	-35208.13	-51940.18	-4160.25	-1658.64	-2446.92
Latin America and the Caribbean	0.36	0.35	0.38	0.53	-20798.14	-9521.99	-10966.41	-979.53	-448.46	-516.49
North America and Western Europe	0.16	0.16	0.16	0.60	-78653.68	-37020.35	-41135.37	-3704.07	-1743.43	-1937.22
South and West Asia	0.46	0.48	0.45	0.55	-26943.72	-13339.08	-13143.45	-1268.58	-628.04	-618.85
Sub-Saharan Africa	0.70	0.72	0.68	0.50	-13251.96	-6734.61	-6113.75	-624.09	-317.16	-287.93
World	0.42	0.41	0.43	0.53	-246967.37	-110545.36	-133296.24	-11631.85	-5206.51	-6278.29

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. The "labour share - baseline value" is the ratio between labour income and GDP in 2021. Global and regional costs, in terms of lower labour income, are obtained by aggregating country costs. For each country, we forecast labour income between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. All costs are expressed in 2015 US dollars. ESL: share of early school leavers; bln: billion.

Table 16. The global costs of ESL - lower labour income (as percentage of GDP)

World Region	Share of ESL	Share of female ESL	Share of male ESL	labour share - baseline value	Lifetime cost of ESL %	Lifetime cost of female ESL %	Lifetime cost of male ESL %	Annual cost of ESL %	Annual cost of female ESL %	Annual cost of male ESL %
Arab States	0.51	0.49	0.53	0.41	-23.52	-11.04	-11.86	-23.27	-10.92	-11.74
Central Asia	0.12	0.12	0.11	0.42	-7.70	-3.63	-4.03	-7.65	-3.60	-4.00
Central and Eastern Europe	0.14	0.14	0.15	0.53	-7.60	-3.20	-4.35	-7.52	-3.17	-4.30
East Asia and the Pacific	0.40	0.35	0.45	0.52	-13.55	-5.44	-7.91	-13.45	-5.39	-7.84
Latin America and the Caribbean	0.36	0.35	0.38	0.53	-15.77	-7.27	-8.25	-15.63	-7.20	-8.18
North America and Western Europe	0.16	0.16	0.16	0.60	-9.10	-4.24	-4.80	-9.00	-4.20	-4.75
South and West Asia	0.46	0.48	0.45	0.55	-23.32	-11.68	-11.20	-23.12	-11.58	-11.11
Sub-Saharan Africa	0.70	0.72	0.68	0.50	-30.88	-15.31	-14.47	-30.56	-15.15	-14.31
World	0.42	0.41	0.43	0.53	-18.40	-8.63	-9.37	-18.23	-8.55	-9.29

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. The "labour share - baseline value" is the ratio between labour income and GDP in 2021. Global and regional costs, in terms of lower labour income, are obtained by aggregating country costs. For each country, we forecast labour income between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. ESL: share of early school leavers; bln: billion.

Table 17. The global costs of LBS - lower labour income (bln US dollars)

World Region	Share of LBS	Share of female LBS	Share of male LBS	labour share - baseline value	Lifetime cost of LBS bln$	Lifetime cost of female LBS bln$	Lifetime cost of male LBS bln$	Annual cost of LBS bln$	Annual cost of female LBS bln$	Annual cost of male LBS bln$
Arab States	0.74	0.72	0.77	0.41	-23026.04	-10187.75	-11152.25	-1085.03	-480.11	-525.56
Central Asia	0.62	0.62	0.63	0.42	-3812.97	-1603.60	-1745.27	-179.67	-75.57	-82.24
Central and Eastern Europe	0.30	0.32	0.35	0.53	-18638.24	-5746.40	-7238.72	-878.06	-270.73	-341.03
East Asia and the Pacific	0.24	0.23	0.25	0.52	-63337.74	-27195.04	-34776.04	-2983.62	-1281.12	-1638.21
Latin America and the Caribbean	0.64	0.64	0.65	0.53	-50893.90	-23254.62	-25549.46	-2397.50	-1095.54	-1203.64
North America and Western Europe	0.23	0.23	0.24	0.60	-149943.06	-68643.13	-79086.94	-7063.23	-3233.58	-3725.55
South and West Asia	0.88	0.86	0.89	0.55	-58242.26	-26241.26	-29059.24	-2743.35	-1236.11	-1368.85
Sub-Saharan Africa	0.94	0.94	0.93	0.50	-23007.64	-10808.72	-10521.00	-1084.01	-509.31	-495.76
World	0.57	0.57	0.58	0.53	-390901.85	-173680.51	-199128.91	-18414.47	-8182.06	-9380.85

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. The "labour share - baseline value" is the ratio between labour income and GDP in 2021. Global and regional costs, in terms of lower labour income, are obtained by aggregating country costs. For each country, we forecast labour income between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. All costs are expressed in 2015 US dollars. LBS: share of children with less than basic skills; bln: billion.

Table 18. The global costs of LBS - lower labour income (as percentage of GDP)

World Region	Share of LBS	Share of female LBS	Share of male LBS	labour share - baseline value	Lifetime cost of LBS %	Lifetime cost of female LBS %	Lifetime cost of male LBS %	Annual cost of LBS %	Annual cost of female LBS %	Annual cost of male LBS %
Arab States	0.74	0.72	0.77	0.41	-47.21	-21.67	-23.01	-46.70	-21.43	-22.77
Central Asia	0.62	0.62	0.63	0.42	-24.36	-11.30	-12.27	-24.21	-11.23	-12.19
Central and Eastern Europe	0.30	0.32	0.35	0.53	-20.22	-9.51	-12.39	-20.00	-9.40	-12.25
East Asia and the Pacific	0.24	0.23	0.25	0.52	-13.51	-5.87	-7.14	-13.39	-5.82	-7.08
Latin America and the Caribbean	0.64	0.64	0.65	0.53	-38.28	-17.57	-19.08	-37.96	-17.42	-18.92
North America and Western Europe	0.23	0.23	0.24	0.60	-17.24	-7.82	-9.17	-17.06	-7.74	-9.08
South and West Asia	0.88	0.86	0.89	0.55	-48.49	-22.07	-23.90	-48.08	-21.88	-23.70
Sub-Saharan Africa	0.94	0.94	0.93	0.50	-51.24	-23.92	-23.79	-50.73	-23.69	-23.56
World	0.57	0.57	0.58	0.53	-32.56	-14.95	-16.25	-32.26	-14.82	-16.10

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. The "labour share - baseline value" is the ratio between labour income and GDP in 2021. Global and regional costs, in terms of lower labour income, are obtained by aggregating country costs. For each country, we forecast labour income between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. LBS: share of children with less than basic skills; bln: billion.

Table 19. The global costs of ESL - lower social expenditures (bln US dollars)

World Region	Share of ESL	Share of female ESL	Share of male ESL	social exp - baseline value	Lifetime cost of ESL bln$	Lifetime cost of female ESL bln$	Lifetime cost of male ESL bln$	Annual cost of ESL bln$	Annual cost of female ESL bln$	Annual cost of male ESL bln$
Arab States	0.51	0.49	0.53	0.02	-924.87	-371.47	-419.36	-43.77	-17.59	-19.85
Central Asia	0.12	0.12	0.11	0.01	-76.01	-32.78	-40.16	-3.59	-1.55	-1.89
Central and Eastern Europe	0.14	0.14	0.15	0.02	-915.11	-380.83	-475.92	-43.28	-18.02	-22.51
East Asia and the Pacific	0.40	0.35	0.45	0.01	-6717.87	-2599.92	-3522.06	-317.88	-123.05	-166.68
Latin America and the Caribbean	0.36	0.35	0.38	0.02	-1576.68	-635.73	-756.50	-74.59	-30.08	-35.80
North America and Western Europe	0.16	0.16	0.16	0.05	-16375.36	-7347.33	-8154.34	-775.14	-347.84	-386.04
South and West Asia	0.46	0.48	0.45	0.01	-1034.54	-423.70	-441.92	-48.90	-20.03	-20.90
Sub-Saharan Africa	0.70	0.72	0.68	0.01	-836.39	-344.05	-316.42	-39.54	-16.27	-14.97
World	0.42	0.41	0.43	0.02	-28456.83	-12135.82	-14126.68	-1346.70	-574.42	-668.65

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. The "social exp - baseline value" is the ratio between government social expenditures and GDP in 2021. Social expenditures are a transfer by the government to households and concur to form households disposable income. Global and regional costs, in terms of lower social expenditure, are obtained by aggregating country costs. For each country, the values of social expenditures are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. All costs are expressed in 2015 US dollars. ESL: share of early school leavers; bln: billion.

Table 20. The global costs of ESL - lower social expenditures (as percentage of GDP)

World Region	Share of ESL	Share of female ESL	Share of male ESL	social exp - baseline value	Lifetime cost of ESL %	Lifetime cost of female ESL %	Lifetime cost of male ESL %	Annual cost of ESL %	Annual cost of female ESL %	Annual cost of male ESL %
Arab States	0.51	0.49	0.53	0.02	-1.80	-0.69	-0.79	-1.78	-0.69	-0.78
Central Asia	0.12	0.12	0.11	0.01	-0.56	-0.25	-0.28	-0.56	-0.25	-0.28
Central and Eastern Europe	0.14	0.14	0.15	0.02	-0.78	-0.31	-0.42	-0.77	-0.31	-0.42
East Asia and the Pacific	0.40	0.35	0.45	0.01	-0.81	-0.30	-0.42	-0.81	-0.30	-0.42
Latin America and the Caribbean	0.36	0.35	0.38	0.02	-1.16	-0.47	-0.55	-1.15	-0.47	-0.54
North America and Western Europe	0.16	0.16	0.16	0.05	-1.90	-0.85	-0.95	-1.89	-0.84	-0.95
South and West Asia	0.46	0.48	0.45	0.01	-0.92	-0.38	-0.37	-0.92	-0.38	-0.37
Sub-Saharan Africa	0.70	0.72	0.68	0.01	-1.94	-0.76	-0.72	-1.93	-0.76	-0.71
World	0.42	0.41	0.43	0.02	-1.19	-0.48	-0.53	-1.18	-0.48	-0.53

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. The "social exp - baseline value" is the ratio between government social expenditures and GDP in 2021. Social expenditures are a transfer by the government to households and concur to form households disposable income. Global and regional costs, in terms of lower social expenditure, are obtained by aggregating country costs. For each country, the values of social expenditures are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. ESL: share of early school leavers; bln: billion.

Table 21. The global costs of LBS - lower social expenditures (bln US dollars)

World Region	Share of LBS	Share of female LBS	Share of male LBS	social exp - baseline value	Lifetime cost of LBS bln$	Lifetime cost of female LBS bln$	Lifetime cost of male LBS bln$	Annual cost of LBS bln$	Annual cost of female LBS bln$	Annual cost of male LBS bln$
Arab States	0.74	0.72	0.77	0.02	-1199.34	-495.08	-570.91	-56.58	-23.36	-26.94
Central Asia	0.62	0.62	0.63	0.01	-173.65	-70.24	-77.28	-8.19	-3.31	-3.65
Central and Eastern Europe	0.30	0.32	0.35	0.02	-1099.62	-372.07	-473.73	-51.87	-17.55	-22.35
East Asia and the Pacific	0.24	0.23	0.25	0.01	-3487.03	-1496.00	-1855.50	-164.47	-70.57	-87.52
Latin America and the Caribbean	0.64	0.64	0.65	0.02	-2007.25	-861.92	-959.15	-94.68	-40.66	-45.25
North America and Western Europe	0.23	0.23	0.24	0.05	-18185.83	-8170.19	-9406.99	-857.86	-385.42	-443.76
South and West Asia	0.88	0.86	0.89	0.01	-1032.73	-424.63	-481.51	-48.71	-20.03	-22.71
Sub-Saharan Africa	0.94	0.94	0.93	0.01	-779.55	-341.61	-330.44	-36.77	-16.12	-15.59
World	0.57	0.57	0.58	0.02	-27964.99	-12231.74	-14155.52	-1319.13	-577.02	-667.77

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. The "social exp - baseline value" is the ratio between government social expenditures and GDP in 2021. Social expenditures are a transfer by the government to households and concur to form households disposable income. Global and regional costs, in terms of lower social expenditure, are obtained by aggregating country costs. For each country, the values of social expenditures are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. All costs are expressed in 2015 US dollars. LBS: share of children with less than basic skills; bln: billion.

Table 22. The global costs of LBS - lower social expenditures (as percentage of GDP)

World Region	Share of LBS	Share of female LBS	Share of male LBS	social exp - baseline value	Lifetime cost of LBS %	Lifetime cost of female LBS %	Lifetime cost of male LBS %	Annual cost of LBS %	Annual cost of female LBS %	Annual cost of male LBS %
Arab States	0.74	0.72	0.77	0.02	-1.94	-0.83	-0.90	-1.92	-0.82	-0.90
Central Asia	0.62	0.62	0.63	0.01	-1.09	-0.48	-0.53	-1.09	-0.48	-0.53
Central and Eastern Europe	0.30	0.32	0.35	0.02	-1.12	-0.57	-0.74	-1.11	-0.56	-0.74
East Asia and the Pacific	0.24	0.23	0.25	0.01	-0.49	-0.21	-0.25	-0.49	-0.21	-0.25
Latin America and the Caribbean	0.64	0.64	0.65	0.02	-1.43	-0.62	-0.68	-1.42	-0.61	-0.67
North America and Western Europe	0.23	0.23	0.24	0.05	-2.10	-0.94	-1.10	-2.08	-0.93	-1.09
South and West Asia	0.88	0.86	0.89	0.01	-0.86	-0.36	-0.39	-0.86	-0.36	-0.39
Sub-Saharan Africa	0.94	0.94	0.93	0.01	-1.62	-0.70	-0.70	-1.60	-0.70	-0.69
World	0.57	0.57	0.58	0.02	-1.11	-0.48	-0.53	-1.10	-0.48	-0.53

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. The "social exp - baseline value" is the ratio between government social expenditures and GDP in 2021. Social expenditures are a transfer by the government to households and concur to form households' disposable income. Global and regional costs, in terms of lower social expenditure, are obtained by aggregating country costs. For each country, the values of social expenditures are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF.

Table 23. The global costs of ESL - lower labour income tax (bln US dollars)

World Region	Share of ESL	Share of female ESL	Share of male ESL	income tax - baseline value	Lifetime cost of ESL bln$	Lifetime cost of female ESL bln$	Lifetime cost of male ESL bln$	Annual cost of ESL bln$	Annual cost of female ESL bln$	Annual cost of male ESL bln$
Arab States	0.51	0.49	0.53	0.06	-4023.94	-1680.43	-1853.93	-190.35	-79.52	-87.73
Central Asia	0.12	0.12	0.11	0.12	-375.28	-163.98	-199.52	-17.70	-7.74	-9.41
Central and Eastern Europe	0.14	0.14	0.15	0.20	-4231.08	-1788.00	-2251.47	-199.99	-84.53	-106.43
East Asia and the Pacific	0.40	0.35	0.45	0.10	-42705.07	-15730.65	-23515.44	-2019.79	-744.13	-1112.39
Latin America and the Caribbean	0.36	0.35	0.38	0.16	-10044.03	-4213.41	-4944.98	-474.88	-199.26	-233.85
North America and Western Europe	0.16	0.16	0.16	0.24	-49695.94	-22722.27	-25309.37	-2349.43	-1074.36	-1196.66
South and West Asia	0.46	0.48	0.45	0.06	-10460.98	-4635.74	-4572.73	-494.15	-219.02	-216.06
Sub-Saharan Africa	0.70	0.72	0.68	0.08	-4961.43	-2145.17	-1972.55	-234.45	-101.40	-93.26
World	0.42	0.41	0.43	0.12	-126497.75	-53079.66	-64619.98	-5980.76	-2509.95	-3055.79

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. The "income tax - baseline value" is the ratio between labour income taxes and GDP in 2021. Labour income taxes are a transfer from households to the government and reduce household disposable income. Global and regional costs, in terms of lower labour income taxes, are obtained by aggregating country costs. For each country, the values of labour income taxes are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. All costs are expressed in 2015 US dollars. ESL: share of early school leavers; bln: billion.

Table 24. The global costs of ESL - lower labour income tax (as percentage of GDP)

World Region	Share of ESL	Share of female ESL	Share of male ESL	income tax - baseline value	Lifetime cost of ESL %	Lifetime cost of female ESL %	Lifetime cost of male ESL %	Annual cost of ESL %	Annual cost of female ESL %	Annual cost of male ESL %
Arab States	0.51	0.49	0.53	0.06	-8.98	-3.60	-4.03	-8.91	-3.57	-4.00
Central Asia	0.12	0.12	0.11	0.12	-2.68	-1.23	-1.35	-2.67	-1.22	-1.34
Central and Eastern Europe	0.14	0.14	0.15	0.20	-3.60	-1.47	-1.99	-3.58	-1.46	-1.98
East Asia and the Pacific	0.40	0.35	0.45	0.10	-5.79	-2.08	-3.12	-5.76	-2.07	-3.11
Latin America and the Caribbean	0.36	0.35	0.38	0.16	-7.12	-2.98	-3.44	-7.09	-2.96	-3.42
North America and Western Europe	0.16	0.16	0.16	0.24	-5.57	-2.52	-2.86	-5.53	-2.50	-2.84
South and West Asia	0.46	0.48	0.45	0.06	-8.82	-3.90	-3.73	-8.77	-3.88	-3.71
Sub-Saharan Africa	0.70	0.72	0.68	0.08	-10.79	-4.40	-4.16	-10.71	-4.37	-4.13
World	0.42	0.41	0.43	0.12	-7.38	-3.04	-3.39	-7.34	-3.02	-3.37

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. The "income tax - baseline value" is the ratio between labour income taxes and GDP in 2021. Labour income taxes are a transfer from households to the government and reduce household disposable income. Global and regional costs, in terms of lower labour income taxes, are obtained by aggregating country costs. For each country, the values of labour income taxes are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. ESL: share of early school leavers; bln: billion.

Table 25. The global costs of LBS - lower labour income tax (bln US dollars)

World Region	Share of LBS	Share of female LBS	Share of male LBS	income tax - baseline value	Lifetime cost of LBS bln$	Lifetime cost of female LBS bln$	Lifetime cost of male LBS bln$	Annual cost of LBS bln$	Annual cost of female LBS bln$	Annual cost of male LBS bln$
Arab States	0.74	0.72	0.77	0.06	-9232.81	-3249.72	-3662.85	-436.76	-153.86	-173.40
Central Asia	0.62	0.62	0.63	0.12	-1744.28	-618.62	-683.75	-82.46	-29.26	-32.34
Central and Eastern Europe	0.30	0.32	0.35	0.20	-10569.49	-3050.15	-3946.26	-499.59	-144.21	-186.57
East Asia and the Pacific	0.24	0.23	0.25	0.10	-32604.33	-12841.63	-16631.78	-1541.09	-607.15	-786.29
Latin America and the Caribbean	0.64	0.64	0.65	0.16	-25944.18	-9864.12	-11035.96	-1226.62	-466.67	-522.08
North America and Western Europe	0.23	0.23	0.24	0.24	-91435.04	-39543.70	-45985.96	-4323.28	-1870.19	-2174.79
South and West Asia	0.88	0.86	0.89	0.06	-23980.65	-8096.60	-9178.88	-1133.53	-383.02	-434.19
Sub-Saharan Africa	0.94	0.94	0.93	0.08	-10321.60	-3696.82	-3560.55	-487.90	-174.90	-168.45
World	0.57	0.57	0.58	0.12	-205832.39	-80961.36	-94685.98	-9731.24	-3829.26	-4478.11

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. The "income tax - baseline value" is the ratio between labour income taxes and GDP in 2021. Labour income taxes are a transfer from households to the government and reduce household disposable income. Global and regional costs, in terms of lower labour income taxes, are obtained by aggregating country costs. For each country, the values of labour income taxes are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. All costs are expressed in 2015 US dollars. LBS: share of children with less than basic skills; bln: billion.

Table 26. The global costs of LBS - lower labour income tax (as percentage of GDP)

World Region	Share of LBS	Share of female LBS	Share of male LBS	income tax - baseline value	Lifetime cost of LBS %	Lifetime cost of female LBS %	Lifetime cost of male LBS %	Annual cost of LBS %	Annual cost of female LBS %	Annual cost of male LBS %
Arab States	0.74	0.72	0.77	0.06	-19.68	-7.02	-7.65	-19.52	-6.97	-7.60
Central Asia	0.62	0.62	0.63	0.12	-10.95	-4.17	-4.63	-10.91	-4.15	-4.62
Central and Eastern Europe	0.30	0.32	0.35	0.20	-11.03	-4.82	-6.51	-10.93	-4.78	-6.46
East Asia and the Pacific	0.24	0.23	0.25	0.10	-6.10	-2.23	-2.79	-6.07	-2.22	-2.78
Latin America and the Caribbean	0.64	0.64	0.65	0.16	-18.63	-6.99	-7.73	-18.53	-6.96	-7.69
North America and Western Europe	0.23	0.23	0.24	0.24	-10.23	-4.36	-5.18	-10.15	-4.33	-5.14
South and West Asia	0.88	0.86	0.89	0.06	-19.55	-6.56	-7.22	-19.45	-6.52	-7.18
Sub-Saharan Africa	0.94	0.94	0.93	0.08	-21.62	-7.49	-7.41	-21.46	-7.44	-7.36
World	0.57	0.57	0.58	0.12	-14.25	-5.12	-5.69	-14.16	-5.09	-5.66

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. The "income tax - baseline value" is the ratio between labour income taxes and GDP in 2021. Labour income taxes are a transfer from households to the government and reduce household disposable income. Global and regional costs, in terms of lower labour income taxes, are obtained by aggregating country costs. For each country, the values of labour income taxes are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. LBS: share of children with less than basic skills; bln: billion.

Table 27. The global costs of ESL - lower private health expenditures (bln US dollars)

World Region	Share of ESL	Share of female ESL	Share of male ESL	priv health exp - baseline value	Lifetime cost of ESL bln$	Lifetime cost of female ESL bln$	Lifetime cost of male ESL bln$	Annual cost of ESL bln$	Annual cost of female ESL bln$	Annual cost of male ESL bln$
Arab States	0.51	0.49	0.53	0.02	-668.18	-292.87	-322.67	-31.55	-13.83	-15.24
Central Asia	0.12	0.12	0.11	0.03	-82.14	-37.10	-43.55	-3.87	-1.75	-2.05
Central and Eastern Europe	0.14	0.14	0.15	0.02	-449.53	-192.77	-243.27	-21.22	-9.10	-11.48
East Asia and the Pacific	0.40	0.35	0.45	0.02	-3990.56	-1497.51	-2274.08	-188.49	-70.74	-107.42
Latin America and the Caribbean	0.36	0.35	0.38	0.02	-1008.55	-437.93	-511.27	-47.61	-20.68	-24.14
North America and Western Europe	0.16	0.16	0.16	0.02	-3078.05	-1416.69	-1578.04	-145.35	-66.90	-74.52
South and West Asia	0.46	0.48	0.45	0.02	-1296.81	-586.17	-609.57	-61.19	-27.66	-28.76
Sub-Saharan Africa	0.70	0.72	0.68	0.02	-918.86	-434.83	-389.09	-43.35	-20.52	-18.36
World	0.42	0.41	0.43	0.02	-11492.69	-4895.87	-5971.53	-542.63	-231.17	-281.98

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. "Priv health exp - baseline value" is the ratio between private health expenditures and GDP in 2021. Global and regional costs, in terms of lower private health expenditures, are obtained by aggregating country costs. For each country, the values of private health expenditure are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. All costs are expressed in 2015 US dollars. ESL: share of early school leavers; bln: billion.

Table 28. The global costs of ESL - lower private health expenditures (as percentage of GDP)

World Region	Share of ESL	Share of female ESL	Share of male ESL	priv health exp - baseline value	Lifetime cost of ESL %	Lifetime cost of female ESL %	Lifetime cost of male ESL %	Annual cost of ESL %	Annual cost of female ESL %	Annual cost of male ESL %
Arab States	0.51	0.49	0.53	0.02	-1.97	-0.86	-0.94	-1.95	-0.85	-0.93
Central Asia	0.12	0.12	0.11	0.03	-0.66	-0.31	-0.33	-0.65	-0.31	-0.33
Central and Eastern Europe	0.14	0.14	0.15	0.02	-0.48	-0.20	-0.27	-0.48	-0.19	-0.27
East Asia and the Pacific	0.40	0.35	0.45	0.02	-0.68	-0.26	-0.38	-0.68	-0.26	-0.38
Latin America and the Caribbean	0.36	0.35	0.38	0.02	-0.83	-0.36	-0.41	-0.82	-0.36	-0.41
North America and Western Europe	0.16	0.16	0.16	0.02	-0.36	-0.16	-0.19	-0.36	-0.16	-0.18
South and West Asia	0.46	0.48	0.45	0.02	-1.21	-0.56	-0.54	-1.20	-0.55	-0.54
Sub-Saharan Africa	0.70	0.72	0.68	0.02	-2.28	-1.04	-0.97	-2.26	-1.03	-0.97
World	0.42	0.41	0.43	0.02	-1.08	-0.47	-0.51	-1.07	-0.47	-0.51

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. "Priv health exp - baseline value" is the ratio between private health expenditures and GDP in 2021. Global and regional costs, in terms of lower private health expenditures, are obtained by aggregating country costs. For each country, the values of private health expenditure are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. ESL: share of early school leavers; bln: billion.

Table 29. The global costs of LBS - lower private health expenditures (bln US dollars)

World Region	Share of LBS	Share of female LBS	Share of male LBS	priv health exp - baseline value	Lifetime cost of LBS bln$	Lifetime cost of female LBS bln$	Lifetime cost of male LBS bln$	Annual cost of LBS bln$	Annual cost of female LBS bln$	Annual cost of male LBS bln$
Arab States	0.74	0.72	0.77	0.02	-1604.59	-611.09	-676.48	-75.80	-28.88	-31.97
Central Asia	0.62	0.62	0.63	0.03	-354.50	-130.97	-141.88	-16.74	-6.19	-6.70
Central and Eastern Europe	0.30	0.32	0.35	0.02	-1299.18	-345.47	-440.40	-61.36	-16.32	-20.80
East Asia and the Pacific	0.24	0.23	0.25	0.02	-3026.93	-1203.62	-1555.24	-142.94	-56.85	-73.45
Latin America and the Caribbean	0.64	0.64	0.65	0.02	-2732.74	-1088.80	-1210.83	-129.08	-51.44	-57.21
North America and Western Europe	0.23	0.23	0.24	0.02	-6115.45	-2657.37	-3087.52	-288.96	-125.58	-145.90
South and West Asia	0.88	0.86	0.89	0.02	-3053.73	-1135.59	-1303.16	-144.20	-53.64	-61.56
Sub-Saharan Africa	0.94	0.94	0.93	0.02	-1904.67	-748.86	-728.02	-89.94	-35.37	-34.39
World	0.57	0.57	0.58	0.02	-20091.78	-7921.76	-9143.53	-949.01	-374.27	-431.98

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. "Priv health exp - baseline value" is the ratio between private health expenditures and GDP in 2021. Global and regional costs, in terms of lower private health expenditures, are obtained by aggregating country costs. For each country, the values of private health expenditure are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. All costs are expressed in 2015 US dollars. LBS: share of children with less than basic skills; bln: billion.

Table 30. The global costs of LBS - lower private health expenditures (as percentage of GDP)

World Region	Share of LBS	Share of female LBS	Share of male LBS	priv health exp - baseline value	Lifetime cost of LBS %	Lifetime cost of female LBS %	Lifetime cost of male LBS %	Annual cost of LBS %	Annual cost of female LBS %	Annual cost of male LBS %
Arab States	0.74	0.72	0.77	0.02	-4.36	-1.73	-1.84	-4.32	-1.72	-1.83
Central Asia	0.62	0.62	0.63	0.03	-2.59	-1.06	-1.15	-2.58	-1.06	-1.15
Central and Eastern Europe	0.30	0.32	0.35	0.02	-1.69	-0.73	-0.98	-1.67	-0.72	-0.97
East Asia and the Pacific	0.24	0.23	0.25	0.02	-0.79	-0.31	-0.37	-0.78	-0.30	-0.37
Latin America and the Caribbean	0.64	0.64	0.65	0.02	-2.23	-0.89	-0.97	-2.22	-0.89	-0.97
North America and Western Europe	0.23	0.23	0.24	0.02	-0.72	-0.31	-0.37	-0.71	-0.31	-0.36
South and West Asia	0.88	0.86	0.89	0.02	-2.69	-1.02	-1.10	-2.67	-1.02	-1.10
Sub-Saharan Africa	0.94	0.94	0.93	0.02	-4.54	-1.77	-1.77	-4.51	-1.76	-1.76
World	0.57	0.57	0.58	0.02	-2.19	-0.86	-0.93	-2.17	-0.85	-0.92

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. "Priv health exp - baseline value" is the ratio between private health expenditures and GDP in 2021. Global and regional costs, in terms of lower private health expenditures, are obtained by aggregating country costs. For each country, the values of private health expenditure are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. LBS: share of children with less than basic skills; bln: billion.

Table 31. The global costs of ESL - lower private education expenditures (bln US dollars)

World Region	Share of ESL	Share of female ESL	Share of male ESL	priv edu exp - baseline value	Lifetime cost of ESL bln$	Lifetime cost of female ESL bln$	Lifetime cost of male ESL bln$	Annual cost of ESL bln$	Annual cost of female ESL bln$	Annual cost of male ESL bln$
Arab States	0.51	0.49	0.53	0.01	-215.17	-99.80	-106.75	-10.14	-4.71	-5.03
Central Asia	0.12	0.12	0.11	0.01	-20.59	-9.22	-11.18	-0.97	-0.43	-0.53
Central and Eastern Europe	0.14	0.14	0.15	0.01	-125.01	-54.73	-68.18	-5.89	-2.58	-3.21
East Asia and the Pacific	0.40	0.35	0.45	0.01	-1720.02	-670.83	-998.16	-81.12	-31.64	-47.08
Latin America and the Caribbean	0.36	0.35	0.38	0.01	-406.80	-183.05	-210.85	-19.18	-8.63	-9.94
North America and Western Europe	0.16	0.16	0.16	0.01	-1460.18	-683.92	-755.41	-68.84	-32.25	-35.62
South and West Asia	0.46	0.48	0.45	0.01	-497.69	-239.29	-238.89	-23.45	-11.28	-11.26
Sub-Saharan Africa	0.70	0.72	0.68	0.01	-315.43	-156.67	-141.09	-14.86	-7.38	-6.65
World	0.42	0.41	0.43	0.01	-4760.88	-2097.53	-2530.50	-224.47	-98.89	-119.32

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. "Priv edu exp - baseline value" is the ratio between private education expenditures and GDP in 2021. Global and regional costs, in terms of lower private expenditures, are obtained by aggregating country costs. For each country, the values of private health expenditure are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. All costs are expressed in 2015 US dollars. ESL: share of early school leavers; bln: billion.

Table 32. The global costs of ESL - lower private education expenditures (as percentage of GDP)

World Region	Share of ESL	Share of female ESL	Share of male ESL	priv edu exp - baseline value	Lifetime cost of ESL %	Lifetime cost of female ESL %	Lifetime cost of male ESL %	Annual cost of ESL %	Annual cost of female ESL %	Annual cost of male ESL %
Arab States	0.51	0.49	0.53	0.01	-0.54	-0.25	-0.27	-0.53	-0.25	-0.26
Central Asia	0.12	0.12	0.11	0.01	-0.15	-0.07	-0.08	-0.15	-0.07	-0.08
Central and Eastern Europe	0.14	0.14	0.15	0.01	-0.12	-0.05	-0.07	-0.12	-0.05	-0.07
East Asia and the Pacific	0.40	0.35	0.45	0.01	-0.28	-0.11	-0.16	-0.28	-0.11	-0.16
Latin America and the Caribbean	0.36	0.35	0.38	0.01	-0.32	-0.14	-0.16	-0.32	-0.14	-0.16
North America and Western Europe	0.16	0.16	0.16	0.01	-0.16	-0.07	-0.08	-0.16	-0.07	-0.08
South and West Asia	0.46	0.48	0.45	0.01	-0.43	-0.21	-0.20	-0.43	-0.21	-0.20
Sub-Saharan Africa	0.70	0.72	0.68	0.01	-0.77	-0.37	-0.35	-0.77	-0.37	-0.35
World	0.42	0.41	0.43	0.01	-0.39	-0.18	-0.19	-0.38	-0.18	-0.19

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. "Priv edu exp - baseline value" is the ratio between private education expenditures and GDP in 2021. Global and regional costs, in terms of lower private expenditures, are obtained by aggregating country costs. For each country, the values of private health expenditure are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. ESL: share of early school leavers; bln: billion.

Table 33. The global costs of LBS - lower private education expenditures (bln US dollars)

World Region	Share of LBS	Share of female LBS	Share of male LBS	priv edu exp - baseline value	Lifetime cost of LBS bln$	Lifetime cost of female LBS bln$	Lifetime cost of male LBS bln$	Annual cost of LBS bln$	Annual cost of female LBS bln$	Annual cost of male LBS bln$
Arab States	0.74	0.72	0.77	0.01	-353.42	-167.41	-182.15	-16.62	-7.87	-8.57
Central Asia	0.62	0.62	0.63	0.01	-50.87	-22.67	-24.51	-2.39	-1.07	-1.15
Central and Eastern Europe	0.30	0.32	0.35	0.01	-208.82	-65.85	-82.18	-9.82	-3.10	-3.86
East Asia and the Pacific	0.24	0.23	0.25	0.01	-836.79	-372.64	-468.83	-39.35	-17.52	-22.05
Latin America and the Caribbean	0.64	0.64	0.65	0.01	-683.05	-329.85	-360.10	-32.12	-15.51	-16.93
North America and Western Europe	0.23	0.23	0.24	0.01	-2204.38	-1033.11	-1179.50	-103.67	-48.58	-55.47
South and West Asia	0.88	0.86	0.89	0.01	-714.25	-343.85	-380.11	-33.59	-16.17	-17.88
Sub-Saharan Africa	0.94	0.94	0.93	0.01	-346.60	-176.63	-172.59	-16.30	-8.31	-8.12
World	0.57	0.57	0.58	0.01	-5398.18	-2512.01	-2849.97	-253.86	-118.13	-134.03

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. "Priv edu exp - baseline value" is the ratio between private education expenditures and GDP in 2021. Global and regional costs, in terms of lower private expenditures, are obtained by aggregating country costs. For each country, the values of private health expenditure are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. All costs are expressed in 2015 US dollars. LBS: share of children with less than basic skills; bln: billion.

Table 34. The global costs of LBS - lower private education expenditures (as percentage of GDP)

World Region	Share of LBS	Share of female LBS	Share of male LBS	priv edu exp - baseline value	Lifetime cost of LBS %	Lifetime cost of female LBS %	Lifetime cost of male LBS %	Annual cost of LBS %	Annual cost of female LBS %	Annual cost of male LBS %
Arab States	0.74	0.72	0.77	0.01	-0.74	-0.36	-0.38	-0.73	-0.36	-0.38
Central Asia	0.62	0.62	0.63	0.01	-0.33	-0.16	-0.18	-0.33	-0.16	-0.18
Central and Eastern Europe	0.30	0.32	0.35	0.01	-0.23	-0.11	-0.14	-0.23	-0.11	-0.14
East Asia and the Pacific	0.24	0.23	0.25	0.01	-0.20	-0.09	-0.11	-0.19	-0.09	-0.11
Latin America and the Caribbean	0.64	0.64	0.65	0.01	-0.52	-0.25	-0.27	-0.52	-0.25	-0.27
North America and Western Europe	0.23	0.23	0.24	0.01	-0.23	-0.11	-0.13	-0.23	-0.11	-0.12
South and West Asia	0.88	0.86	0.89	0.01	-0.59	-0.29	-0.31	-0.59	-0.29	-0.31
Sub-Saharan Africa	0.94	0.94	0.93	0.01	-0.79	-0.40	-0.40	-0.78	-0.40	-0.40
World	0.57	0.57	0.58	0.01	-0.45	-0.22	-0.24	-0.44	-0.22	-0.23

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. "Priv edu exp - baseline value" is the ratio between private education expenditures and GDP in 2021. Global and regional costs, in terms of lower private expenditures, are obtained by aggregating country costs. For each country, the values of private health expenditure are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. LBS: share of children with less than basic skills; bln: billion.

Table 35. The global costs of ESL - crime victimization (bln US dollars)

World Region	Share of ESL	Share of female ESL	Share of male ESL	private cost crime - baseline value	Lifetime cost of ESL bln$	Lifetime cost of female ESL bln$	Lifetime cost of male ESL bln$	Annual cost of ESL bln$	Annual cost of female ESL bln$	Annual cost of male ESL bln$
Arab States	0.51	0.49	0.53	0.79	30.69	14.69	16.55	1.46	0.70	0.79
Central Asia	0.12	0.12	0.11	0.58	1.92	0.93	1.01	0.09	0.04	0.05
Central and Eastern Europe	0.14	0.14	0.15	0.56	18.17	8.19	8.78	0.86	0.39	0.42
East Asia and the Pacific	0.40	0.35	0.45	0.46	166.71	69.24	91.18	7.92	3.29	4.33
Latin America and the Caribbean	0.36	0.35	0.38	3.30	272.78	129.06	139.49	12.96	6.13	6.63
North America and Western Europe	0.16	0.16	0.16	0.48	84.55	40.29	39.45	4.02	1.92	1.88
South and West Asia	0.46	0.48	0.45	0.95	93.92	48.18	45.42	4.46	2.29	2.16
Sub-Saharan Africa	0.70	0.72	0.68	0.93	54.16	29.19	26.97	2.57	1.39	1.28
World	0.42	0.41	0.43	0.90	722.89	339.77	368.85	34.34	16.14	17.52

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. "Private cost crime - baseline value" is the ratio between the monetary costs of homicides, robberies, assaults and sexual assaults, and GDP in 2021 (x100). The cost of a homicide is given by the country-specific Value of Statistical Life VSL (Viscusi and Masterman, 2017). The costs of other crimes are fractions of VSL, as defined in McCollister et al. 2010. Global and regional costs, in terms of higher costs of crime victimization, are obtained by aggregating country costs. For each country, the values of the costs of crime victimization are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. All costs are expressed in 2015 US dollars. . ESL: share of early school leavers; bln: billion.

Table 36. The global costs of ESL - crime victimization (as percentage of GDP)

World Region	Share of ESL	Share of female ESL	Share of male ESL	private cost crime - baseline value	Lifetime cost of ESL %	Lifetime cost of female ESL %	Lifetime cost of male ESL %	Annual cost of ESL %	Annual cost of female ESL %	Annual cost of male ESL %
Arab States	0.51	0.49	0.53	0.79	0.10	0.05	0.05	0.10	0.05	0.05
Central Asia	0.12	0.12	0.11	0.58	0.01	0.01	0.01	0.01	0.01	0.01
Central and Eastern Europe	0.14	0.14	0.15	0.56	0.01	0.01	0.01	0.01	0.01	0.01
East Asia and the Pacific	0.40	0.35	0.45	0.46	0.03	0.01	0.02	0.03	0.01	0.02
Latin America and the Caribbean	0.36	0.35	0.38	3.30	0.18	0.09	0.09	0.18	0.09	0.09
North America and Western Europe	0.16	0.16	0.16	0.48	0.01	0.00	0.00	0.01	0.00	0.00
South and West Asia	0.46	0.48	0.45	0.95	0.07	0.04	0.03	0.07	0.04	0.03
Sub-Saharan Africa	0.70	0.72	0.68	0.93	0.11	0.06	0.06	0.11	0.06	0.06
World	0.42	0.41	0.43	0.90	0.07	0.03	0.03	0.07	0.03	0.03

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. "Private cost crime - baseline value" is the ratio between the monetary costs of homicides, robberies, assaults and sexual assaults, and GDP in 2021 (x100). The cost of a homicide is given by the country-specific Value of Statistical Life VSL (Viscusi and Masterman, 2017). The costs of other crimes are fractions of VSL, as defined in McCollister et al. 2010. Global and regional costs, in terms of higher costs of crime victimization, are obtained by aggregating country costs. For each country, the values of the costs of crime victimization are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. ESL: share of early school leavers; bln: billion.

Table 37. The global costs of LBS - crime victimization (bln US dollars)

World Region	Share of LBS	Share of female LBS	Share of male LBS	private cost crime - baseline value	Lifetime cost of LBS bln$	Lifetime cost of female LBS bln$	Lifetime cost of male LBS bln$	Annual cost of LBS bln$	Annual cost of female LBS bln$	Annual cost of male LBS bln$
Arab States	0.74	0.72	0.77	0.88	271.25	168.67	180.52	12.91	8.03	8.59
Central Asia	0.62	0.62	0.63	0.55	51.92	28.95	30.06	2.46	1.37	1.43
Central and Eastern Europe	0.30	0.32	0.35	0.40	157.16	63.25	68.82	7.47	3.00	3.27
East Asia and the Pacific	0.24	0.23	0.25	0.43	731.57	415.61	452.04	34.75	19.74	21.47
Latin America and the Caribbean	0.64	0.64	0.65	3.67	3095.99	1822.13	1860.25	147.05	86.54	88.35
North America and Western Europe	0.23	0.23	0.24	0.64	1322.24	669.95	678.89	62.92	31.88	32.30
South and West Asia	0.88	0.86	0.89	1.47	1295.59	850.02	869.66	61.48	40.34	41.27
Sub-Saharan Africa	0.94	0.94	0.93	1.30	533.59	369.84	368.20	25.35	17.57	17.49
World	0.57	0.57	0.58	1.12	7459.31	4388.42	4508.44	354.39	208.47	214.18

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. "Private cost crime - baseline value" is the ratio between the monetary costs of homicides, robberies, assaults and sexual assaults, and GDP in 2021 (x100). The cost of a homicide is given by the country-specific Value of Statistical Life VSL (Viscusi and Masterman, 2017). The costs of other crimes are fractions of VSL, as defined in McCollister et al. 2010. Global and regional costs, in terms of higher costs of crime victimization, are obtained by aggregating country costs. For each country, the values of the costs of crime victimization are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. All costs are expressed in 2015 US dollars. LBS: share of children with less than basic skills; bln: billion.

Table 38. The global costs of LBS - crime victimization (as percentage of GDP)

World Region	Share of LBS	Share of female LBS	Share of male LBS	private cost crime - baseline value	Lifetime cost of LBS %	Lifetime cost of female LBS %	Lifetime cost of male LBS %	Annual cost of LBS %	Annual cost of female LBS %	Annual cost of male LBS %
Arab States	0.74	0.72	0.77	0.88	0.61	0.40	0.41	0.61	0.40	0.41
Central Asia	0.62	0.62	0.63	0.55	0.23	0.15	0.15	0.23	0.15	0.15
Central and Eastern Europe	0.30	0.32	0.35	0.40	0.18	0.11	0.12	0.18	0.11	0.12
East Asia and the Pacific	0.24	0.23	0.25	0.43	0.16	0.10	0.11	0.16	0.10	0.11
Latin America and the Caribbean	0.64	0.64	0.65	3.67	1.44	0.86	0.87	1.45	0.86	0.87
North America and Western Europe	0.23	0.23	0.24	0.64	0.11	0.06	0.06	0.11	0.06	0.06
South and West Asia	0.88	0.86	0.89	1.47	0.64	0.42	0.43	0.64	0.43	0.43
Sub-Saharan Africa	0.94	0.94	0.93	1.30	0.77	0.53	0.53	0.77	0.53	0.53
World	0.57	0.57	0.58	1.12	0.49	0.32	0.33	0.50	0.32	0.33

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. "Private cost crime - baseline value" is the ratio between the monetary costs of homicides, robberies, assaults and sexual assaults, and GDP in 2021 (x100). The cost of a homicide is given by the country-specific Value of Statistical Life VSL (Viscusi and Masterman, 2017). The costs of other crimes are fractions of VSL, as defined in McCollister et al. 2010. Global and regional costs, in terms of higher costs of crime victimization, are obtained by aggregating country costs. For each country, the values of the costs of crime victimization are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. LBS: share of children with less than basic skills; bln: billion.

Table 39. The global costs of ESL - lower government health expenditures (bln US dollars)

World Region	Share of ESL	Share of female ESL	Share of male ESL	public health exp - baseline value	Lifetime cost of ESL bln$	Lifetime cost of female ESL bln$	Lifetime cost of male ESL bln$	Annual cost of ESL bln$	Annual cost of female ESL bln$	Annual cost of male ESL bln$
Arab States	0.51	0.49	0.53	0.02	-1035.76	-453.21	-478.83	-48.96	-21.43	-22.64
Central Asia	0.12	0.12	0.11	0.02	-91.04	-39.66	-48.99	-4.29	-1.87	-2.31
Central and Eastern Europe	0.14	0.14	0.15	0.04	-1104.08	-465.23	-589.04	-52.17	-21.99	-27.84
East Asia and the Pacific	0.40	0.35	0.45	0.03	-10389.27	-3944.65	-5717.28	-491.16	-186.51	-270.32
Latin America and the Caribbean	0.36	0.35	0.38	0.04	-2809.08	-1188.19	-1388.32	-132.75	-56.16	-65.62
North America and Western Europe	0.16	0.16	0.16	0.08	-14794.85	-6732.80	-7498.98	-699.45	-318.33	-354.55
South and West Asia	0.46	0.48	0.45	0.01	-1363.70	-601.15	-612.27	-64.40	-28.39	-28.92
Sub-Saharan Africa	0.70	0.72	0.68	0.01	-1107.95	-485.94	-456.03	-52.33	-22.96	-21.55
World	0.42	0.41	0.43	0.03	-32695.72	-13910.82	-16789.74	-1545.51	-657.63	-793.74

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. "Public health exp - baseline value" is the ratio between public health expenditures and GDP in 2021. Global and regional costs, in terms of lower public health expenditures, are obtained by aggregating country costs. For each country, the values of public health expenditure are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. All costs are expressed in 2015 US dollars. ESL: share of early school leavers; bln: billion.

Table 40. The global costs of ESL - lower government health expenditures (as percentage of GDP)

World Region	Share of ESL	Share of female ESL	Share of male ESL	public health exp - baseline value	Lifetime cost of ESL %	Lifetime cost of female ESL %	Lifetime cost of male ESL %	Annual cost of ESL %	Annual cost of female ESL %	Annual cost of male ESL %
Arab States	0.51	0.49	0.53	0.02	-2.00	-0.83	-0.91	-1.98	-0.83	-0.91
Central Asia	0.12	0.12	0.11	0.02	-0.63	-0.29	-0.32	-0.62	-0.28	-0.32
Central and Eastern Europe	0.14	0.14	0.15	0.04	-0.93	-0.38	-0.51	-0.92	-0.38	-0.50
East Asia and the Pacific	0.40	0.35	0.45	0.03	-1.38	-0.51	-0.75	-1.37	-0.51	-0.75
Latin America and the Caribbean	0.36	0.35	0.38	0.04	-2.06	-0.88	-1.01	-2.05	-0.87	-1.00
North America and Western Europe	0.16	0.16	0.16	0.08	-1.75	-0.79	-0.89	-1.74	-0.78	-0.89
South and West Asia	0.46	0.48	0.45	0.01	-1.17	-0.52	-0.50	-1.16	-0.52	-0.50
Sub-Saharan Africa	0.70	0.72	0.68	0.01	-2.44	-1.04	-0.99	-2.43	-1.03	-0.98
World	0.42	0.41	0.43	0.03	-1.57	-0.65	-0.75	-1.56	-0.65	-0.74

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. "Public health exp - baseline value" is the ratio between public health expenditures and GDP in 2021. Global and regional costs, in terms of lower public health expenditures, are obtained by aggregating country costs. For each country, the values of public health expenditure are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. ESL: share of early school leavers; bln: billion.

Table 41. The global costs of LBS - lower government health expenditures (bln US dollars)

World Region	Share of LBS	Share of female LBS	Share of male LBS	public health exp - baseline value	Lifetime cost of LBS bln$	Lifetime cost of female LBS bln$	Lifetime cost of male LBS bln$	Annual cost of LBS bln$	Annual cost of female LBS bln$	Annual cost of male LBS bln$
Arab States	0.74	0.72	0.77	0.02	-1930.16	-778.37	-860.82	-91.13	-36.76	-40.65
Central Asia	0.62	0.62	0.63	0.02	-306.91	-120.15	-132.34	-14.49	-5.67	-6.25
Central and Eastern Europe	0.30	0.32	0.35	0.04	-2086.44	-612.61	-792.21	-98.48	-28.92	-37.40
East Asia and the Pacific	0.24	0.23	0.25	0.03	-6388.64	-2647.16	-3381.56	-301.56	-124.97	-159.63
Latin America and the Caribbean	0.64	0.64	0.65	0.04	-5380.72	-2231.24	-2471.21	-254.00	-105.35	-116.68
North America and Western Europe	0.23	0.23	0.24	0.08	-22354.58	-9866.91	-11440.72	-1055.46	-465.90	-540.21
South and West Asia	0.88	0.86	0.89	0.01	-2174.87	-844.87	-960.48	-102.65	-39.89	-45.35
Sub-Saharan Africa	0.94	0.94	0.93	0.01	-1615.46	-668.91	-645.84	-76.25	-31.58	-30.49
World	0.57	0.57	0.58	0.03	-42237.78	-17770.21	-20685.18	-1994.04	-839.05	-976.66

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. "Public health exp - baseline value" is the ratio between public health expenditures and GDP in 2021. Global and regional costs, in terms of lower public health expenditures, are obtained by aggregating country costs. For each country, the values of public health expenditure are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. All costs are expressed in 2015 US dollars. LBS: share of children with less than basic skills; bln: billion.

Table 42. The global costs of LBS - lower government health expenditures (as percentage of GDP)

World Region	Share of LBS	Share of female LBS	Share of male LBS	public health exp - baseline value	Lifetime cost of LBS %	Lifetime cost of female LBS %	Lifetime cost of male LBS %	Annual cost of LBS %	Annual cost of female LBS %	Annual cost of male LBS %
Arab States	0.74	0.72	0.77	0.02	-3.29	-1.35	-1.45	-3.26	-1.34	-1.44
Central Asia	0.62	0.62	0.63	0.02	-1.86	-0.79	-0.87	-1.85	-0.79	-0.87
Central and Eastern Europe	0.30	0.32	0.35	0.04	-2.06	-0.89	-1.17	-2.04	-0.88	-1.16
East Asia and the Pacific	0.24	0.23	0.25	0.03	-1.05	-0.42	-0.53	-1.05	-0.42	-0.52
Latin America and the Caribbean	0.64	0.64	0.65	0.04	-3.91	-1.63	-1.78	-3.89	-1.62	-1.77
North America and Western Europe	0.23	0.23	0.24	0.08	-2.65	-1.16	-1.37	-2.63	-1.15	-1.36
South and West Asia	0.88	0.86	0.89	0.01	-1.75	-0.69	-0.75	-1.74	-0.68	-0.74
Sub-Saharan Africa	0.94	0.94	0.93	0.01	-3.31	-1.36	-1.34	-3.28	-1.35	-1.33
World	0.57	0.57	0.58	0.03	-2.13	-0.87	-0.97	-2.12	-0.87	-0.97

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. "Public health exp - baseline value" is the ratio between public health expenditures and GDP in 2021. Global and regional costs, in terms of lower public health expenditures, are obtained by aggregating country costs. For each country, the values of public health expenditure are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. LBS: share of children with less than basic skills; bln: billion.

Table 43. The global costs of ESL - lower government education expenditures (bln US dollars)

World Region	Share of ESL	Share of female ESL	Share of male ESL	public edu exp - baseline value	Lifetime cost of ESL bln$	Lifetime cost of female ESL bln$	Lifetime cost of male ESL bln$	Annual cost of ESL bln$	Annual cost of female ESL bln$	Annual cost of male ESL bln$
Arab States	0.51	0.49	0.53	0.01	-339.79	-159.10	-171.71	-16.01	-7.50	-8.09
Central Asia	0.12	0.12	0.11	0.01	-30.00	-13.46	-16.36	-1.41	-0.63	-0.77
Central and Eastern Europe	0.14	0.14	0.15	0.02	-230.55	-101.66	-126.21	-10.86	-4.79	-5.95
East Asia and the Pacific	0.40	0.35	0.45	0.01	-2764.06	-1090.15	-1618.08	-130.28	-51.38	-76.27
Latin America and the Caribbean	0.36	0.35	0.38	0.02	-685.76	-311.84	-359.06	-32.31	-14.69	-16.92
North America and Western Europe	0.16	0.16	0.16	0.02	-3249.72	-1527.26	-1690.51	-153.12	-71.96	-79.65
South and West Asia	0.46	0.48	0.45	0.02	-872.46	-429.92	-420.37	-41.09	-20.25	-19.80
Sub-Saharan Africa	0.70	0.72	0.68	0.01	-454.72	-230.18	-207.28	-21.42	-10.84	-9.76
World	0.42	0.41	0.43	0.02	-8627.05	-3863.56	-4609.58	-406.50	-182.04	-217.21

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. "Public edu exp - baseline value" is the ratio between public education expenditures and GDP in 2021. Global and regional costs, in terms of lower public education expenditures, are obtained by aggregating country costs. For each country, the values of public education expenditure are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. All costs are expressed in 2015 US dollars. ESL: share of early school leavers; bln: billion.

Table 44. The global costs of ESL - lower government education expenditures (as percentage of GDP)

World Region	Share of ESL	Share of female ESL	Share of male ESL	public edu exp - baseline value	Lifetime cost of ESL %	Lifetime cost of female ESL %	Lifetime cost of male ESL %	Annual cost of ESL %	Annual cost of female ESL %	Annual cost of male ESL %
Arab States	0.51	0.49	0.53	0.01	-0.73	-0.34	-0.36	-0.72	-0.33	-0.36
Central Asia	0.12	0.12	0.11	0.01	-0.21	-0.10	-0.11	-0.21	-0.10	-0.11
Central and Eastern Europe	0.14	0.14	0.15	0.02	-0.22	-0.09	-0.12	-0.21	-0.09	-0.12
East Asia and the Pacific	0.40	0.35	0.45	0.01	-0.40	-0.16	-0.23	-0.40	-0.16	-0.23
Latin America and the Caribbean	0.36	0.35	0.38	0.02	-0.52	-0.24	-0.27	-0.51	-0.23	-0.27
North America and Western Europe	0.16	0.16	0.16	0.02	-0.37	-0.17	-0.19	-0.37	-0.17	-0.19
South and West Asia	0.46	0.48	0.45	0.02	-0.74	-0.37	-0.35	-0.73	-0.37	-0.35
Sub-Saharan Africa	0.70	0.72	0.68	0.01	-1.06	-0.52	-0.49	-1.05	-0.52	-0.49
World	0.42	0.41	0.43	0.02	-0.59	-0.28	-0.30	-0.59	-0.27	-0.30

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. "Public edu exp - baseline value" is the ratio between public education expenditures and GDP in 2021. Global and regional costs, in terms of lower public education expenditures, are obtained by aggregating country costs. For each country, the values of public education expenditure are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. ESL: share of early school leavers; bln: billion.

Table 45. The global costs of LBS - lower government education expenditures (bln US dollars)

World Region	Share of LBS	Share of female LBS	Share of male LBS	public edu exp - baseline value	Lifetime cost of LBS bln$	Lifetime cost of female LBS bln$	Lifetime cost of male LBS bln$	Annual cost of LBS bln$	Annual cost of female LBS bln$	Annual cost of male LBS bln$
Arab States	0.74	0.72	0.77	0.01	-1001.26	-401.57	-452.33	-47.27	-18.96	-21.36
Central Asia	0.62	0.62	0.63	0.01	-136.20	-53.22	-58.07	-6.43	-2.51	-2.74
Central and Eastern Europe	0.30	0.32	0.35	0.02	-694.77	-206.70	-262.53	-32.79	-9.76	-12.39
East Asia and the Pacific	0.24	0.23	0.25	0.01	-2314.83	-951.90	-1234.88	-109.25	-44.93	-58.28
Latin America and the Caribbean	0.64	0.64	0.65	0.02	-2258.02	-941.07	-1040.92	-106.58	-44.43	-49.14
North America and Western Europe	0.23	0.23	0.24	0.02	-7437.89	-3293.82	-3798.62	-351.15	-155.52	-179.35
South and West Asia	0.88	0.86	0.89	0.02	-2597.45	-1025.16	-1152.56	-122.58	-48.39	-54.40
Sub-Saharan Africa	0.94	0.94	0.93	0.01	-1117.41	-465.68	-452.47	-52.73	-21.98	-21.36
World	0.57	0.57	0.58	0.02	-17557.84	-7339.11	-8452.38	-828.78	-346.48	-399.03

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. "Public edu exp - baseline value" is the ratio between public education expenditures and GDP in 2021. Global and regional costs, in terms of lower public education expenditures, are obtained by aggregating country costs. For each country, the values of public education expenditure are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. All costs are expressed in 2015 US dollars. LBS: share of children with less than basic skills; bln: billion.

Table 46. The global costs of LBS - lower government education expenditures (as percentage of GDP)

World Region	Share of LBS	Share of female LBS	Share of male LBS	public edu exp - baseline value	Lifetime cost of LBS %	Lifetime cost of female LBS %	Lifetime cost of male LBS %	Annual cost of LBS %	Annual cost of female LBS %	Annual cost of male LBS %
Arab States	0.74	0.72	0.77	0.01	-2.00	-0.83	-0.89	-1.98	-0.82	-0.88
Central Asia	0.62	0.62	0.63	0.01	-0.89	-0.38	-0.42	-0.88	-0.38	-0.41
Central and Eastern Europe	0.30	0.32	0.35	0.02	-0.76	-0.34	-0.45	-0.75	-0.34	-0.45
East Asia and the Pacific	0.24	0.23	0.25	0.01	-0.45	-0.18	-0.23	-0.45	-0.18	-0.23
Latin America and the Caribbean	0.64	0.64	0.65	0.02	-1.71	-0.71	-0.78	-1.70	-0.71	-0.77
North America and Western Europe	0.23	0.23	0.24	0.02	-0.84	-0.37	-0.43	-0.84	-0.37	-0.43
South and West Asia	0.88	0.86	0.89	0.02	-2.14	-0.85	-0.94	-2.13	-0.85	-0.93
Sub-Saharan Africa	0.94	0.94	0.93	0.01	-2.54	-1.05	-1.05	-2.52	-1.05	-1.04
World	0.57	0.57	0.58	0.02	-1.43	-0.59	-0.65	-1.42	-0.59	-0.64

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. "Public edu exp - baseline value" is the ratio between public education expenditures and GDP in 2021. Global and regional costs, in terms of lower public education expenditures, are obtained by aggregating country costs. For each country, the values of public education expenditure are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. LBS: share of children with less than basic skills; bln: billion.

Table 47. The global costs of ESL - lower government expenditures on law and order (bln US dollars)

World Region	Share of ESL	Share of female ESL	Share of male ESL	law order exp - baseline value	Lifetime cost of ESL bln$	Lifetime cost of female ESL bln$	Lifetime cost of male ESL bln$	Annual cost of ESL bln$	Annual cost of female ESL bln$	Annual cost of male ESL bln$
Arab States	0.51	0.49	0.53	0.02	-257.96	-139.73	-143.71	-12.04	-6.53	-6.71
Central Asia	0.12	0.12	0.11	0.02	-40.48	-18.52	-22.66	-1.90	-0.87	-1.06
Central and Eastern Europe	0.14	0.14	0.15	0.02	-133.31	-62.58	-76.82	-6.22	-2.92	-3.59
East Asia and the Pacific	0.40	0.35	0.45	0.01	-670.66	-325.66	-420.45	-30.99	-15.08	-19.43
Latin America and the Caribbean	0.36	0.35	0.38	0.01	-269.48	-137.61	-155.87	-12.57	-6.42	-7.27
North America and Western Europe	0.16	0.16	0.16	0.02	-1062.79	-521.95	-578.33	-49.64	-24.38	-27.02
South and West Asia	0.46	0.48	0.45	0.02	-332.63	-182.02	-186.95	-15.54	-8.51	-8.74
Sub-Saharan Africa	0.70	0.72	0.68	0.03	-295.17	-176.95	-161.54	-13.80	-8.28	-7.55
World	0.42	0.41	0.43	0.02	-3062.47	-1565.02	-1746.33	-142.69	-72.99	-81.37

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. "law order edu exp - baseline value" is the ratio between public expenditures on law and order (including the costs for police, justice, prisons) and GDP in 2021. Global and regional costs, in terms of lower public expenditures on law and order, are obtained by aggregating country costs. For each country, the values of public expenditures on law and order are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. All costs are expressed in 2015 US dollars. ESL: share of early school leavers; bln: billion.

Table 48. The global costs of ESL - lower government expenditures on law and order (as percentage of GDP)

World Region	Share of ESL	Share of female ESL	Share of male ESL	law order exp - baseline value	Lifetime cost of ESL %	Lifetime cost of female ESL %	Lifetime cost of male ESL %	Annual cost of ESL %	Annual cost of female ESL %	Annual cost of male ESL %
Arab States	0.51	0.49	0.53	0.02	-0.60	-0.33	-0.34	-0.59	-0.33	-0.33
Central Asia	0.12	0.12	0.11	0.02	-0.28	-0.13	-0.15	-0.28	-0.13	-0.15
Central and Eastern Europe	0.14	0.14	0.15	0.02	-0.15	-0.07	-0.09	-0.15	-0.06	-0.09
East Asia and the Pacific	0.40	0.35	0.45	0.01	-0.11	-0.06	-0.07	-0.11	-0.05	-0.07
Latin America and the Caribbean	0.36	0.35	0.38	0.01	-0.21	-0.11	-0.12	-0.20	-0.10	-0.12
North America and Western Europe	0.16	0.16	0.16	0.02	-0.12	-0.06	-0.07	-0.12	-0.06	-0.07
South and West Asia	0.46	0.48	0.45	0.02	-0.29	-0.16	-0.16	-0.29	-0.16	-0.16
Sub-Saharan Africa	0.70	0.72	0.68	0.03	-0.68	-0.41	-0.39	-0.66	-0.40	-0.38
World	0.42	0.41	0.43	0.02	-0.28	-0.16	-0.16	-0.27	-0.15	-0.16

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. "law order edu exp - baseline value" is the ratio between public expenditures on law and order (including the costs for police, justice, prisons) and GDP in 2021. Global and regional costs, in terms of lower public expenditures on law and order, are obtained by aggregating country costs. For each country, the values of public expenditures on law and order are forecasted between 2021 and 2041, under a status quo scenario (ESL is set at the level recorded in 2021) and an intervention scenario (ELS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) ESL are obtained by comparing status quo and intervention scenarios where the female (male) ESL is set at zero while the male (female) ESL is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. ESL: share of early school leavers; bln: billion.

Table 49. The global costs of LBS - lower government expenditures on law and order (bln US dollars)

World Region	Share of LBS	Share of female LBS	Share of male LBS	law order exp - baseline value	Lifetime cost of LBS bln$	Lifetime cost of female LBS bln$	Lifetime cost of male LBS bln$	Annual cost of LBS bln$	Annual cost of female LBS bln$	Annual cost of male LBS bln$
Arab States	0.74	0.72	0.77	0.02	-743.66	-387.02	-417.70	-34.86	-18.14	-19.58
Central Asia	0.62	0.62	0.63	0.02	-106.77	-52.22	-56.00	-5.00	-2.45	-2.62
Central and Eastern Europe	0.30	0.32	0.35	0.02	-365.39	-125.40	-154.28	-17.12	-5.88	-7.23
East Asia and the Pacific	0.24	0.23	0.25	0.01	-1062.36	-506.56	-620.50	-49.78	-23.74	-29.08
Latin America and the Caribbean	0.64	0.64	0.65	0.01	-858.49	-453.12	-490.86	-40.23	-21.24	-23.01
North America and Western Europe	0.23	0.23	0.24	0.02	-2435.68	-1176.47	-1345.26	-114.17	-55.15	-63.06
South and West Asia	0.88	0.86	0.89	0.02	-868.03	-468.31	-517.83	-40.67	-21.95	-24.27
Sub-Saharan Africa	0.94	0.94	0.93	0.03	-551.14	-317.14	-310.99	-25.82	-14.86	-14.58
World	0.57	0.57	0.58	0.02	-6991.53	-3486.24	-3913.42	-327.66	-163.41	-183.43

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. "law order edu exp - baseline value" is the ratio between public expenditures on law and order (including the costs for police, justice, prisons) and GDP in 2021. Global and regional costs, in terms of lower public expenditures on law and order, are obtained by aggregating country costs. For each country, the values of public expenditures on law and order are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. All costs are expressed in 2015 US dollars. LBS: share of children with less than basic skills; bln: billion.

Table 50. The global costs of LBS - lower government expenditures on law and order (as percentage of GDP)

World Region	Share of LBS	Share of female LBS	Share of male LBS	law order exp - baseline value	Lifetime cost of LBS %	Lifetime cost of female LBS %	Lifetime cost of male LBS %	Annual cost of LBS %	Annual cost of female LBS %	Annual cost of male LBS %
Arab States	0.74	0.72	0.77	0.02	-1.45	-0.79	-0.83	-1.43	-0.78	-0.82
Central Asia	0.62	0.62	0.63	0.02	-0.69	-0.38	-0.40	-0.68	-0.37	-0.40
Central and Eastern Europe	0.30	0.32	0.35	0.02	-0.40	-0.21	-0.27	-0.40	-0.21	-0.27
East Asia and the Pacific	0.24	0.23	0.25	0.01	-0.26	-0.13	-0.15	-0.26	-0.13	-0.15
Latin America and the Caribbean	0.64	0.64	0.65	0.01	-0.66	-0.35	-0.38	-0.65	-0.35	-0.37
North America and Western Europe	0.23	0.23	0.24	0.02	-0.28	-0.13	-0.16	-0.28	-0.13	-0.15
South and West Asia	0.88	0.86	0.89	0.02	-0.72	-0.40	-0.43	-0.71	-0.39	-0.42
Sub-Saharan Africa	0.94	0.94	0.93	0.03	-1.29	-0.74	-0.74	-1.27	-0.73	-0.73
World	0.57	0.57	0.58	0.02	-0.64	-0.35	-0.37	-0.63	-0.35	-0.37

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. "law order edu exp - baseline value" is the ratio between public expenditures on law and order (including the costs for police, justice, prisons) and GDP in 2021. Global and regional costs, in terms of lower public expenditures on law and order, are obtained by aggregating country costs. For each country, the values of public expenditures on law and order are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at zero). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. The lifetime and annual costs of female (male) LBS are obtained by comparing status quo and intervention scenarios where the female (male) LBS is set at zero while the male (female) LBS is kept at its 2021 value. Lifetime costs are expressed as percent of the discounted sum of GDP between 2021 and 2041, as forecasted by the IMF World Economic Outlook 2023. Annual costs are expressed as percent of discounted GDP in 2030, as forecasted by IMF. LBS: share of children with less than basic skills; bln: billion.

Table 51. The global non-monetary costs of ESL - crime

World Region	Share of ESL	Variation in homicides due to ESL %	Variation in robberies due to ESL %	Variation in assaults due to ESL %	Variation in sexual violence due to ESL %
Arab States	0.51	10.58	5.74	5.38	3.50
Central Asia	0.12	2.56	1.36	1.27	0.82
Central and Eastern Europe	0.14	3.16	1.68	1.57	1.02
East Asia and the Pacific	0.40	8.63	4.64	4.36	2.83
Latin America and the Caribbean	0.36	6.83	3.66	3.43	2.22
North America and Western Europe	0.16	3.63	1.93	1.81	1.17
South and West Asia	0.46	9.53	5.15	4.83	3.14
Sub-Saharan Africa	0.70	14.18	7.75	7.28	4.75
World	0.42	8.73	4.72	4.43	2.88

Notes: The share of ESL is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. The last four columns report the predicted percent change in homicides, robberies, physical assaults and sexual assaults associated with ESL. Global and regional changes are obtained by aggregating country changes. For each country these changes are computed by comparing the estimated crime prevalence in the status quo scenario (ELS set at the level recorded in 2021) and in the intervention scenario (ESL set at zero). ESL: share of early school leavers.

Table 52. The global non-monetary costs of LBS - crime

World Region	Share of LBS	Variation in homicides due to LBS %	Variation in robberies due to LBS %	Variation in assaults due to LBS %	Variation in sexual violence due to LBS %
Arab States	0.74	74.40	51.05	49.23	35.19
Central Asia	0.62	68.29	45.19	43.48	30.57
Central and Eastern Europe	0.30	42.22	25.16	24.05	16.19
East Asia and the Pacific	0.24	28.88	18.14	17.41	12.03
Latin America and the Caribbean	0.64	65.93	43.16	41.50	29.04
North America and Western Europe	0.23	35.47	20.45	19.51	12.95
South and West Asia	0.88	79.41	56.22	54.33	39.39
Sub-Saharan Africa	0.94	82.06	59.24	57.32	41.96
World	0.57	56.74	38.50	37.12	26.48

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. The last four columns report the predicted percent changes in homicides, robberies, physical assaults and sexual assaults associated with LBS. Global and regional changes are obtained by aggregating country changes. For each country these changes are computed by comparing the estimated crime prevalence in the status quo scenario (LBS set at the level recorded in 2021) and in the intervention scenario (LBS set at zero). LBS: share of children with less than basic skills.

Table 53. The global non-monetary costs of ESL - corruption

World Region	Share of ESL	Share of female ESL	Share of male ESL	corruption - Baseline value	Variation in corruption % - due to ESL	Variation in corruption % - due to female ESL	Variation in corruption % - due to male ESL
Arab States	0.51	0.49	0.53	68.46	7.52	3.57	3.95
Central Asia	0.12	0.12	0.11	72.68	1.81	0.91	0.90
Central and Eastern Europe	0.14	0.14	0.15	61.76	2.71	1.21	1.51
East Asia and the Pacific	0.40	0.35	0.45	58.29	6.70	2.73	3.96
Latin America and the Caribbean	0.36	0.35	0.38	63.26	6.46	3.03	3.44
North America and Western Europe	0.16	0.16	0.16	28.71	4.04	1.89	2.15
South and West Asia	0.46	0.48	0.45	64.26	7.47	3.81	3.67
Sub-Saharan Africa	0.70	0.72	0.68	69.57	9.93	5.08	4.85
World	0.42	0.41	0.43	59.66	6.84	3.22	3.62

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. "Corruption - baseline value" is the average regional or global corruption index produced by Transparency International. Global and regional changes are obtained by aggregating country changes. For each country these changes are computed by comparing the estimated corruption index in the status quo scenario (ESL set at the value recorded in 2021) and in the intervention scenario (ESL set at zero). Changes due to female (male) ESL are obtained by comparing the status quo scenario with an intervention scenario where the female (male) ESL is brought to zero while the male (female) rate remains at its 2021 level. ESL: share of early school leavers.

Table 54. The global non-monetary costs of LBS - corruption

World Region	Share of LBS	Share of female LBS	Share of male LBS	corruption - Baseline value	Variation in corruption % - due to LBS	Variation in corruption % - due to female LBS	Variation in corruption % - due to male LBS
Arab States	0.74	0.72	0.77	68.46	11.23	5.42	5.81
Central Asia	0.62	0.62	0.63	72.08	9.43	4.55	4.88
Central and Eastern Europe	0.33	0.32	0.34	56.27	6.49	2.86	3.63
East Asia and the Pacific	0.24	0.23	0.25	58.29	4.44	2.02	2.42
Latin America and the Caribbean	0.64	0.64	0.65	63.26	11.65	5.59	6.06
North America and Western Europe	0.23	0.23	0.24	28.71	19.92	9.27	10.65
South and West Asia	0.88	0.86	0.89	64.26	14.18	6.84	7.33
Sub-Saharan Africa	0.94	0.94	0.93	69.57	13.62	6.83	6.79
World	0.58	0.57	0.58	59.42	11.05	5.29	5.77

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. "Corruption - baseline value" is the average regional or global corruption index produced by Transparency International. Global and regional changes are obtained by aggregating country changes. For each country these changes are computed by comparing the estimated corruption index in the status quo scenario (LBS set at the value recorded in 2021) and in the intervention scenario (LBS set at zero). Changes due to female (male) LBS are obtained by comparing the status quo scenario with an intervention scenario where the female (male) LBS is brought to zero while the male (female) rate remains at its 2021 level. LBS: share of children with less than basic skills.

Table 55. The global non-monetary costs of ESL - tax morale

World Region	Share of ESL	Share of female ESL	Share of male ESL	tax morale - Baseline value	Variation in tax morale % - due to ESL	Variation in tax morale % - due to female ESL	Variation in tax morale % - due to male ESL
Arab States	0.51	0.49	0.53	8.84	-0.43	-0.20	-0.22
Central Asia	0.12	0.12	0.11	8.72	-0.10	-0.05	-0.05
Central and Eastern Europe	0.14	0.14	0.15	8.40	-0.12	-0.05	-0.07
East Asia and the Pacific	0.40	0.35	0.45	9.07	-0.33	-0.13	-0.20
Latin America and the Caribbean	0.36	0.35	0.38	8.41	-0.30	-0.14	-0.16
North America and Western Europe	0.16	0.16	0.16	8.87	-0.13	-0.06	-0.07
South and West Asia	0.46	0.48	0.45	8.90	-0.38	-0.19	-0.19
Sub-Saharan Africa	0.70	0.72	0.68	8.73	-0.59	-0.30	-0.29
World	0.42	0.41	0.43	8.86	-0.35	-0.16	-0.18

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. "Tax morale - baseline value" is the average regional or global index of tax morale derived from the World Values Survey. Global and regional changes are obtained by aggregating country changes. For each country these changes are computed by comparing the estimated tax morale index in the status quo scenario (ESL set at the value recorded in 2021) and in the intervention scenario (ESL set at zero). Changes due to female (male) ESL are obtained by comparing the status quo scenario with an intervention scenario where the female (male) ESL is brought to zero while the male (female) rate remains at its 2021 level. ESL: share of early school leavers.

Table 56. The global non-monetary costs of LBS - tax morale

World Region	Share of LBS	Share of female LBS	Share of male LBS	tax morale - Baseline value	Variation in tax morale % - due to LBS	Variation in tax morale % - due to female LBS	Variation in tax morale % - due to male LBS
Arab States	0.74	0.72	0.77	8.84	-0.66	-0.32	-0.34
Central Asia	0.62	0.62	0.63	8.72	-0.56	-0.27	-0.29
Central and Eastern Europe	0.33	0.32	0.34	8.78	-0.30	-0.13	-0.17
East Asia and the Pacific	0.24	0.23	0.25	9.07	-0.21	-0.10	-0.11
Latin America and the Caribbean	0.64	0.64	0.65	8.41	-0.57	-0.28	-0.30
North America and Western Europe	0.23	0.23	0.24	8.87	-0.20	-0.09	-0.11
South and West Asia	0.88	0.86	0.89	8.90	-0.77	-0.37	-0.40
Sub-Saharan Africa	0.94	0.94	0.93	8.73	-0.84	-0.42	-0.42
World	0.58	0.57	0.58	8.89	-0.51	-0.24	-0.26

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. "Tax morale - baseline value" is the average regional or global index of tax morale derived from the World Values Survey. Global and regional changes are obtained by aggregating country changes. For each country these changes are computed by comparing the estimated tax morale index in the status quo scenario (LBS set at the value recorded in 2021) and in the intervention scenario (LBS set at zero). Changes due to female (male) LBS are obtained by comparing the status quo scenario with an intervention scenario where the female (male) LBS is brought to zero while the male (female) rate remains at its 2021 level. LBS: share of children with less than basic skills.

Table 57. The global non-monetary costs of ESL - early pregnancies

World Region	Share of female ESL	early pregnancies - baseline value	Variation in early pregnancies % - due to female ESL
Arab States	0.49	42.51	67.38
Central Asia	0.12	27.03	23.85
Central and Eastern Europe	0.14	16.11	27.06
East Asia and the Pacific	0.35	13.67	56.28
Latin America and the Caribbean	0.35	55.19	56.23
North America and Western Europe	0.16	10.73	32.81
South and West Asia	0.48	24.87	67.19
Sub-Saharan Africa	0.72	107.54	81.20
World	0.41	34.75	58.87

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. "Early pregnancies - baseline value" is the regional or global mean incidence of early pregnancies among girls younger than 19 years (out of 1000 teen girls) (source UNICEF). Global and regional changes are obtained by aggregating country changes. For each country these changes are computed by comparing the estimated incidence of early pregnancies in the status quo scenario (ESL set at the value recorded in 2021) and in the intervention scenario (female ESL is set at zero, while male ESL is set at the status quo). ESL: share of early school leavers.

Table 58. The global non-monetary costs of LBS - early pregnancies

World Region	Share of female LBS	early pregnancies - baseline value	Variation in early pregnancies % - due to female LBS
Arab States	0.72	42.02	87.70
Central Asia	0.62	27.03	83.68
Central and Eastern Europe	0.32	16.11	59.82
East Asia and the Pacific	0.23	13.67	36.26
Latin America and the Caribbean	0.64	55.19	84.23
North America and Western Europe	0.23	10.73	49.55
South and West Asia	0.86	24.87	92.17
Sub-Saharan Africa	0.94	107.54	93.86
World	0.57	34.73	68.78

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. "Early pregnancies - baseline value" is the regional or global mean incidence of early pregnancies among girls younger than 19 years (out of 1000 teen girls) (source UNICEF). Global and regional changes are obtained by aggregating country changes. For each country these changes are computed by comparing the estimated incidence of early pregnancies in the status quo scenario (LBS set at the value recorded in 2021) and in the intervention scenario (female LBS is set at zero, while male LBS is set at the status quo). LBS: share of children with less than basic skills.

Table 59. The global non-monetary costs of ESL – NEET

World Region	Share of ESL	Share of female ESL	Share of male ESL	Share of NEET	Share of female NEET	Share of male NEET	Variation in NEET % due to ESL	Variation in female NEET % due to female ESL	Variation in male NEET % due to male ESL %
Arab States	0.51	0.49	0.53	0.30	0.36	0.24	30.97	33.15	28.29
Central Asia	0.12	0.12	0.11	0.20	0.21	0.20	8.24	9.50	7.01
Central and Eastern Europe	0.14	0.14	0.15	0.18	0.21	0.15	9.96	10.76	9.00
East Asia and the Pacific	0.40	0.35	0.45	0.19	0.20	0.18	25.69	25.21	25.04
Latin America and the Caribbean	0.36	0.35	0.38	0.23	0.29	0.18	23.50	25.34	21.43
North America and Western Europe	0.16	0.16	0.16	0.13	0.13	0.13	11.33	12.83	9.84
South and West Asia	0.46	0.48	0.45	0.25	0.28	0.22	28.76	32.76	24.75
Sub-Saharan Africa	0.70	0.72	0.68	0.24	0.26	0.21	40.09	45.03	35.03
World	0.42	0.41	0.43	0.22	0.24	0.19	26.11	28.18	23.64

Notes: The share of ESL (either overall or gender-specific) is defined as (1 - completion rate). Completion rates are provided by UNESCO (http://data.uis.unesco.org/) and are computed as the percentage of a cohort of individuals aged 3-5 years above the intended age for the last grade of high school who have completed that grade. The overall and gender-specific share of NEET (Not in Employment, Education or Training) are from ILOSTAT. Global and regional changes are obtained by aggregating country changes. For each country these changes are computed by comparing the estimated prevalence of NEET in the status quo scenario (ESL set the at value recorded in 2021) and in the intervention scenario (ESL is set at zero). Changes in female (male) NEET due to female (male) ESL are obtained by comparing the status quo scenario with an intervention scenario where the female (male) ESL is brought to zero while the male (female) rate remains at its 2021 level. ESL: share of early school leavers.

Table 60. The global non-monetary costs of LBS - NEET

World Region	Share of LBS	Share of female LBS	Share of male LBS	Share of NEET	Share of female NEET	Share of male NEET	Variation in NEET % due to LBS	Variation in female NEET % due to female LBS	Variation in male NEET % due to male LBS %
Arab States	0.74	0.72	0.77	0.30	0.36	0.24	49.63	54.49	44.71
Central Asia	0.62	0.62	0.63	0.20	0.21	0.20	43.71	49.30	38.60
Central and Eastern Europe	0.30	0.32	0.35	0.18	0.21	0.15	24.02	29.44	23.26
East Asia and the Pacific	0.24	0.23	0.25	0.19	0.20	0.18	17.59	19.01	15.98
Latin America and the Caribbean	0.64	0.64	0.65	0.23	0.29	0.18	44.87	50.17	39.59
North America and Western Europe	0.23	0.23	0.24	0.13	0.13	0.13	19.50	22.46	16.73
South and West Asia	0.88	0.86	0.89	0.25	0.28	0.22	55.70	61.39	49.80
Sub-Saharan Africa	0.94	0.94	0.93	0.24	0.26	0.21	58.21	64.62	51.65
World	0.57	0.57	0.58	0.22	0.24	0.19	37.95	42.30	34.11

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. Gender specific LBS are imputed, by using Gust et al. (2022) data, the gender-specific harmonized test scores produced by Angrist (2021), gender specific ESL and gender-specific share of adolescents aged 15-18 who are not in education. The overall and gender-specific share of NEET (Not in Employment, Education or Training) are from ILOSTAT. Global and regional changes are obtained by aggregating country changes. For each country these changes are computed by comparing the estimated prevalence of NEET in the status quo scenario (LBS set the at value recorded in 2021) and in the intervention scenario (LBS is set at zero). Changes in female (male) NEET due to female (male) LBS are obtained by comparing the status quo scenario with an intervention scenario where the female (male) LBS is brought to zero while the male (female) rate remains at its 2021 level. LBS: share of children with less than basic skills.

Table 61. Lifetime and annual costs of lack of SES (mediator: LBS)

Country	Big 5 Index	Share of LBS	Change in LBS (status quo - intervention)	Lifetime cost of LBS (in terms of GDP) bln$	Lifetime cost of LBS (in terms of GDP) %	Annual cost of LBS (in terms of GDP) bln$	Annual cost of LBS (in terms of GDP) %
Albania	1.30	0.48	0.09	-30.22	-8.66	-1.42	-8.57
Argentina	-0.37	0.63	0.18	-2496.32	-18.06	-117.44	-17.87
Australia	-0.16	0.23	0.17	-6268.55	-21.35	-294.89	-21.07
Austria	0.16	0.25	0.15	-1500.63	-17.90	-70.59	-17.68
Azerbaijan	-1.75	0.60	0.26	-335.32	-21.41	-15.77	-21.23
Belarus	0.63	0.28	0.13	-185.57	-13.43	-8.73	-13.28
Bosnia and Herzegovina	0.35	0.60	0.14	-67.19	-14.16	-3.16	-14.02
Brazil	-0.86	0.66	0.21	-9299.17	-17.59	-437.47	-17.44
Bulgaria	-1.11	0.48	0.22	-318.29	-18.66	-14.97	-18.50
Canada	0.39	0.15	0.14	-5755.02	-16.74	-270.74	-16.54
Chile	-0.48	0.47	0.19	-1244.70	-19.64	-58.56	-19.43
Colombia	-0.41	0.63	0.18	-1471.24	-20.36	-69.21	-20.13
Costa Rica	0.29	0.58	0.15	-234.23	-13.33	-11.02	-13.21
Croatia	0.59	0.30	0.13	-187.72	-12.15	-8.83	-12.03
Dominican Republic	-3.21	0.91	0.33	-756.73	-25.60	-35.60	-25.39
Estonia	0.48	0.10	0.10	-73.44	-8.68	-3.45	-8.61
France	0.09	0.22	0.16	-9763.89	-19.78	-459.33	-19.52
Germany	-1.53	0.24	0.24	-20480.24	-28.42	-963.46	-28.07
Greece	0.41	0.36	0.14	-679.90	-14.40	-31.98	-14.25
Hong Kong SAR, China	0.37	0.11	0.11	-878.94	-11.43	-41.35	-11.30
Hungary	0.06	0.28	0.16	-577.22	-17.12	-27.15	-16.93
Indonesia	1.08	0.70	0.10	-2661.53	-8.37	-125.21	-8.30
Ireland	0.94	0.17	0.11	-1203.84	-10.83	-56.63	-10.72
Italy	-0.31	0.26	0.18	-8047.74	-21.57	-378.59	-21.30
Jordan	0.72	0.59	0.12	-124.87	-11.46	-5.87	-11.35
Kazakhstan	-0.05	0.55	0.16	-853.76	-14.74	-40.16	-14.60
Korea, Rep.	1.39	0.15	0.09	-3543.58	-10.25	-166.70	-10.13
Kosovo	0.84	0.80	0.12	-22.26	-12.45	-1.05	-12.31
Latvia	0.01	0.19	0.16	-122.08	-13.49	-5.74	-13.37
Lithuania	-0.09	0.24	0.17	-205.50	-13.39	-9.67	-13.28
Malaysia	0.93	0.46	0.11	-956.37	-9.37	-44.99	-9.29
Malta	0.47	0.34	0.14	-48.67	-13.85	-2.29	-13.71
Mexico	-1.23	0.56	0.23	-6647.91	-20.40	-312.74	-20.21
Moldova	1.19	0.52	0.10	-22.55	-6.99	-1.06	-6.94
Montenegro	0.11	0.50	0.16	-17.21	-13.18	-0.81	-13.06
Morocco	-1.93	0.79	0.27	-783.33	-31.05	-36.85	-30.67
New Zealand	0.67	0.21	0.13	-642.47	-15.34	-30.22	-15.15
Panama	-2.82	0.82	0.31	-464.15	-27.87	-21.84	-27.60
Peru	-1.70	0.60	0.25	-1331.83	-24.63	-62.65	-24.38
Philippines	1.00	0.84	0.11	-989.34	-9.56	-46.54	-9.47

Poland	0.72	0.15	0.12	-1781.67	-10.94	-83.82	-10.84
Portugal	0.70	0.23	0.12	-644.30	-13.48	-30.31	-13.33
Romania	1.04	0.50	0.11	-568.76	-7.87	-26.76	-7.81
Russian Federation	-0.01	0.24	0.16	-5801.69	-17.62	-272.93	-17.42
Saudi Arabia	0.49	0.68	0.13	-2303.97	-14.80	-108.39	-14.63
Serbia	-0.42	0.41	0.18	-216.65	-13.24	-10.19	-13.14
Singapore	1.38	0.08	0.08	-718.35	-7.64	-33.79	-7.57
Slovak Republic	-0.32	0.31	0.18	-436.88	-17.54	-20.55	-17.36
Slovenia	0.67	0.16	0.13	-158.45	-11.94	-7.45	-11.82
Spain	0.52	0.24	0.13	-4010.78	-15.62	-188.68	-15.43
Switzerland	-0.42	0.22	0.18	-3387.86	-19.21	-159.38	-19.00
Thailand	0.37	0.54	0.14	-1503.37	-12.50	-70.72	-12.39
Turkiye	0.99	0.34	0.11	-2966.55	-9.48	-139.56	-9.39
Ukraine	0.63	0.41	0.13	-331.82	-23.83	-15.61	-23.37
United Arab Emirates	0.43	0.46	0.14	-1336.21	-13.91	-62.86	-13.77
United Kingdom	-1.98	0.19	0.19	-13975.99	-19.74	-657.48	-19.53
Uruguay	-1.07	0.51	0.22	-315.54	-18.52	-14.84	-18.36
Vietnam	0.69	0.21	0.12	-999.03	-8.62	-47.00	-8.56
Average/Total	0.00	0.47	0.16	-132751.44	-15.70	-6245.09	-15.53

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. The Big 5 Index is the first principal component derived from five indices of Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. The Big 5 index has zero mean and unit standard deviation. In the column titled "Change in LBS" we report how much LBS changes in percentage points if the Big 5 Index was increased to 3 (the level corresponding to its 99th percentile). For each country, the values of GDP per capita are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at at the level that it would attain if the Big 5 Index is set to 3). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. Lifetime (annual) costs are expressed in 2015 US dollars and as percent of the discounted sum of GDP between 2021 and 2041 (as percent of discounted GDP in 2030), as forecasted by IMF World Economic Outlook 2023. LBS: share of children with less than basic skills.

Table 62. Lifetime and annual costs of lack of motivation (mediator: LBS)

Country	Motivation Index	Share of LBS	Change in LBS (status quo - intervention)	Lifetime cost of LBS (in terms of GDP) bln$	Lifetime cost of LBS (in terms of GDP) %	Annual cost of LBS (in terms of GDP) bln$	Annual cost of LBS (in terms of GDP) %
Argentina	0.72	0.63	0.37	-5069.31	-36.67	-238.48	-36.29
Australia	0.92	0.23	0.11	-4026.27	-13.72	-189.41	-13.53
Austria	0.95	0.25	0.07	-704.72	-8.41	-33.15	-8.30
Azerbaijan	0.92	0.60	0.11	-148.37	-9.48	-6.98	-9.39
Belgium	0.92	0.21	0.11	-1299.77	-13.11	-61.15	-12.94
Brazil	0.78	0.66	0.29	-12856.88	-24.32	-604.83	-24.11
Bulgaria	0.83	0.48	0.22	-315.90	-18.52	-14.86	-18.36
Canada	0.92	0.15	0.11	-4575.28	-13.31	-215.24	-13.15
Chile	0.79	0.47	0.28	-1832.12	-28.91	-86.19	-28.59
Colombia	0.65	0.63	0.46	-3699.00	-51.20	-174.01	-50.60
Croatia	0.90	0.30	0.13	-190.45	-12.32	-8.96	-12.20
Czechia	0.92	0.22	0.10	-530.17	-9.06	-24.94	-8.98
Denmark	0.92	0.19	0.11	-869.77	-12.09	-40.92	-11.94
Estonia	0.93	0.10	0.10	-67.00	-7.92	-3.15	-7.85
Finland	0.96	0.15	0.06	-346.78	-6.82	-16.31	-6.73
France	0.89	0.22	0.15	-9465.24	-19.17	-445.28	-18.92
Germany	0.93	0.24	0.10	-8358.63	-11.60	-393.22	-11.46
Greece	0.82	0.36	0.24	-1147.15	-24.30	-53.97	-24.04
Hong Kong SAR, China	0.93	0.11	0.09	-744.25	-9.68	-35.01	-9.57
Hungary	0.90	0.28	0.13	-461.55	-13.69	-21.71	-13.54
Indonesia	0.84	0.70	0.22	-5595.50	-17.59	-263.23	-17.44
Ireland	0.92	0.17	0.11	-1197.18	-10.77	-56.32	-10.66
Israel	0.82	0.34	0.24	-2215.45	-26.90	-104.22	-26.58
Italy	0.85	0.26	0.20	-9205.74	-24.67	-433.07	-24.36
Japan	0.91	0.13	0.11	-12362.41	-14.81	-581.57	-14.61
Jordan	0.83	0.59	0.23	-231.71	-21.27	-10.90	-21.06
Korea, Rep.	0.93	0.15	0.09	-3655.18	-10.58	-171.95	-10.44
Kyrgyz Republic	0.79	0.86	0.28	-51.61	-22.69	-2.43	-22.49
Latvia	0.88	0.19	0.16	-124.01	-13.71	-5.83	-13.59
Lithuania	0.90	0.24	0.13	-159.57	-10.40	-7.51	-10.31
Luxembourg	0.90	0.31	0.13	-215.57	-17.08	-10.14	-16.84
Mexico	0.79	0.56	0.28	-8047.50	-24.69	-378.58	-24.46
Montenegro	0.88	0.50	0.16	-17.25	-13.20	-0.81	-13.08
Netherlands	0.93	0.19	0.09	-1909.54	-10.49	-89.83	-10.37
New Zealand	0.92	0.21	0.10	-525.90	-12.56	-24.74	-12.40
Norway	0.89	0.21	0.15	-1477.43	-17.74	-69.50	-17.51
Poland	0.90	0.15	0.13	-1869.41	-11.48	-87.94	-11.37
Portugal	0.88	0.23	0.16	-838.47	-17.55	-39.44	-17.35

Qatar	0.81	0.57	0.25	-993.06	-21.10	-46.72	-20.91
Romania	0.83	0.50	0.22	-1202.09	-16.63	-56.55	-16.50
Russian Federation	0.82	0.24	0.24	-8425.41	-25.58	-396.36	-25.29
Serbia	0.87	0.41	0.17	-205.15	-12.54	-9.65	-12.44
Slovak Republic	0.91	0.31	0.12	-295.60	-11.87	-13.91	-11.74
Slovenia	0.92	0.16	0.10	-129.38	-9.75	-6.09	-9.66
Spain	0.88	0.24	0.16	-4828.26	-18.81	-227.14	-18.58
Sweden	0.91	0.19	0.12	-1643.35	-17.14	-77.31	-16.88
Switzerland	0.94	0.22	0.08	-1493.63	-8.47	-70.27	-8.37
Thailand	0.83	0.54	0.22	-2331.88	-19.39	-109.70	-19.21
Tunisia	0.77	0.74	0.30	-340.43	-35.08	-16.02	-34.65
Turkiye	0.85	0.34	0.20	-5428.43	-17.34	-255.37	-17.18
United Kingdom	0.89	0.19	0.15	-10766.52	-15.21	-506.49	-15.04
United States	0.90	0.25	0.13	-64144.76	-13.26	-3017.59	-13.12
Uruguay	0.70	0.51	0.40	-572.30	-33.59	-26.92	-33.29
Average/Total	0.85	0.39	0.19	-209208.30	-19.08	-9841.89	-18.88

Notes: The share of LBS is from Gust et al. (2022) and is defined as the percentage of children under 15 years of age, both at school and out of school, who have not attained basic skills, i.e. a score of 420 in the international PISA test in mathematics. The Motivation Index ranges between 0 and 1 and is taken from Balart et al, 2018. In the column titled "Change in LBS" we report how much LBS changes in percentage points if the Motivation Index was increased to 1. For each country, the values of GDP per capita are forecasted between 2021 and 2041, under a status quo scenario (LBS is set at the level recorded in 2021) and an intervention scenario (LBS is set at the level that it would attain if the Motivation Index is set to 1). Lifetime costs are computed as the discounted sum (in 2021) of the gaps between the status quo and the intervention values between 2021 and 2041. Annual costs are computed as the discounted gap between status quo and intervention values predicted for 2030. The discount rate is set at 3 percent. Lifetime (annual) costs are expressed in 2015 US dollars and as percent of the discounted sum of GDP between 2021 and 2041 (as percent of discounted GDP in 2030), as forecasted by IMF World Economic Outlook 2023.