Domestic Government Spending on Human Capital

A Cross-Country Analysis of Recent Trends

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Abstract

Using a new data set comprised of publicly available information, this paper provides cross-country evidence on domestic government spending for human capital in recent years. Creating a measure of social spending that covers the three sectors of health, education, and social protection has proven to be a challenging task. Only for health spending is there high data coverage over time and across countries. Education and, especially, social protection display large gaps. Increases in social sector spending have generally been slow and unsteady. Although education spending in low-income countries has seen a stable and steady increase, spending on health has been remarkably flat. Human capital outcomes are only weakly correlated with spending in the three sectors. Finally, this paper discusses future research required to provide guidance on how much and what type of investment is needed to achieve high levels of human capital.

This paper is a product of the Human Development Global Practice. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://www.worldbank.org/prwp. The authors may be contacted at rgatti@worldbank.org.
Domestic Government Spending on Human Capital: 
A Cross-Country Analysis of Recent Trends

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Updated October 2020

JEL Classification: I00, O15

Keywords: human capital, domestic government financing, social sector spending

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I. Introduction

There is a long-standing debate among policy makers and scholars on whether increasing financial resources can improve health and education outcomes. The question has been and remains equally relevant both in developed and developing countries. While a recent strand of literature (Laforetine, Rothstein, and Schanzenbach 2018; Jackson, Johnson, and Persico 2015) provides very rigorous evidence of a strong positive causal relationship between school spending and student outcomes for the United States, there is no clear sense of whether this relationship can be generalized to other countries and to other important dimensions of human capital beyond learning.

The Human Capital Index (HCI), as a cross-country metric that benchmarks human capital outcomes for the next generation, one of the key pillars of the Human Capital Project (HCP) (World Bank Group 2018a), has highlighted how differences in human capital, as proxied by a combination of education and health indicators, are associated with large productivity differences across countries. Countries in the bottom 10 percent of the HCI ranking are losing at least 60 percent of the productivity that they could have achieved if they had full health and full education. For countries in the top 10 percent, the lost potential is equivalent to 20 percent of what they could have obtained by achieving their full human capital potential. Such large differences in outcomes naturally raise the question of whether countries at the bottom of the HCI ranking are investing enough resources to close the human capital gap. Answering this question is complex for a variety of reasons.

First, the human capital outcomes that we observe today are the result of investments that countries made in the past and there is no clear evidence on how long it takes for these investments to materialize into better outcomes. Second, since the HCI puts emphasis on the quality as well as on the quantity of human capital (Kraay 2018), the nature of spending might be as relevant as the amount of spending. For instance, there is well-established evidence that high-quality pre-school programs that target the most disadvantaged children are an effective tool to increase learning outcomes (Almond, Currie, and Duque 2017). That is not the case for other types of investments, such as school construction (Ganimian and Murnane 2014). The entire field of research of cost-effectiveness in health and health care is based on the assumption that finite resources can be used strategically to achieve better outcomes for less money (World Health Organization 2019). Third, the return of an additional dollar spent in terms of human capital outcomes is dramatically different across countries because institutional, economic, demographic, and cultural differences contribute to spending being more or less efficient. For instance, Al-Samarrai et al. find that on average a 10 percent increase in resources led to a 0.6 percent increase in Learning Adjusted Years of Schooling (LAYS) (Al-Samarrai, Cerdan-Infantes, and Lehe 2018). However, for countries in the top 25th percentile of the efficiency distribution, a 10 percent increase in resources led to a 2.7 percent increase in LAYS. Finally, spending on human capital is usually quantified in a sector-specific manner, which does not reflect the multisectoral nature of the interventions needed to improve outcomes. Interactions between different types of investments are not confined to the social sector. There is growing evidence showing that investments in water and sanitation (Alsan and Goldin 2015) and infrastructure (Barham, Lipscomb, and Mobarak 2011) as just two examples are crucial for improving human capital outcomes. Therefore, it is unclear to what extent the effect of social sector spending depends on investments in other sectors.

Besides the economic motivations discussed above, there are many data limitations that can potentially constrain our understanding of the relationship between spending and human capital. While the resources
transferred by the government might be as important as those invested by households in determining human capital outcomes, information on private spending is very limited and difficult to compare across countries.\(^2\) For this reason, we primarily focus on domestic government spending on education, health and social protection. However, data limitations extend to public spending as well, since these three sectors often adopt different definitions when classifying their spending and this makes it almost impossible to achieve a common definition of social spending that holds across countries.

The objective of this note is to describe the trends in government spending in health, education and social protection across countries and over time, starting from 2000 onwards, and the association between spending and human capital outcomes, as proxied by the HCI and by its sector-specific components. Far from providing a full answer to the question raised above, the analysis will help to identify those countries for which increasing the amount of social sector spending represents a first order concern when thinking of strategies to improve their outcomes. It is important to stress that also for those countries, increasing the amount of social sector spending represents a necessary, but not sufficient, condition to improve human capital outcomes.

The note is organized as follows. In section II, we will define the main variables of interest and present the main data sources for spending and human capital outcomes. We will devote great attention to highlighting the gaps in spending data. In section III, we discuss how government spending in the social sectors has evolved over time, by region and income group. In section IV, we will analyze how aggregate and sector-specific spending correlate with the HCI, and its key ingredients. In section V, we provide a discussion about the main messages and a possible research agenda moving forward.

II. Data

A. Sources and definitions

The data on social spending come from a variety of sources and adopt different definitions that are discussed below. Information on the variables and the sources used for our analysis is summarized in Table 1, and the countries included in the analysis are listed in Table A.1. We combine 3 sources of data to make the first compiled data set of social sector spending for human capital:

1) **Health:** Government health expenditures are aggregated and refined by the World Health Organization (WHO), resulting in the Global Health Expenditure Database (GHED) (World Health Organization 2018), commonly considered the most reliable source. The data set used for this analysis is curated by the World Bank’s Health Financing Global Solutions Group (Tandon et al. 2018). The data include total government spending on all aspects of health, not distinguishing by age group or malady. WHO provides ample warning against combining estimates of current and capital health expenditures due to the deemed extremely low quality of the capital expenditure

\(^2\) Moreover, private spending might fulfill different functions – an indispensable substitute when public services fall short of minimum quality (which is often the case in low income countries) or simply allow users who can afford it to buy the preferred bundle of services.
information (OECD, Eurostat, and WHO 2011). In line with convention, the analysis discussed in this work only considers current spending estimates.

2) **Education:** The database of education expenditures used for this analysis was curated by members of the World Bank’s Education Global Practice (Al-Samarrai, Cerdan-Infantes, and Lehe 2018). The data set combines estimates from the Unesco Institute of Statistics (UIS) (Unesco 2019) and the International Monetary Fund (IMF), with the latter being used when UIS information was missing.\(^3\) The data include total government spending on all aspects of education, not distinguishing by level of educational attainment or per-student costs. Unlike for health, information for education spending is not disaggregated into capital and current spending. Even when available, the disaggregation is considered not reliable. For this reason, in the rest of the paper we will consider the sum of capital and current spending estimates.

3) **Social protection:** Social protection spending includes conditional/unconditional cash transfers, fee waivers, in-kind, public works, school feeding, social pension (non-contributory), and other social assistance. Notably, it excludes pensions and other contributory programs.\(^4\) This data source is the most limited; it only has 124 observations (1 observation for each of the 124 countries), making it impossible to examine changes over time. The information has been curated by the Social Protection Global Practice at the World Bank and made available through the Atlas of Social Protection – Indicators of Resilience and Equity (ASPIRE) data set (World Bank Group 2019). ASPIRE only provides data on spending as a percent of GDP, not as a percent of total government expenditure, so this is also what we present here. Both current and capital spending are included in these values. While ASPIRE data have limitations, they are the most comprehensive set of social protection spending data for low-income countries. In line with IMF’s recent work on social sector spending (IMF 2019), we choose ASPIRE over EURSTAT, which has data only for a limited number of countries.

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\(^3\) See “Mobilizing Resources for Education and Improving Spending Effectiveness: Establishing Realistic Targets Based on Past Trends” (Al-Samarrai, Cerdan-Infantes, and Lehe 2018) for further details.

\(^4\) Our main interest is to examine the relationship between social protection spending and the HCI. We exclude pensions because spending directed toward those of pension age is unlikely to have a strong impact on the human capital of a child born today. While some evidence documents that pensions received by older women may impact the human development of the recipients’ granddaughters (Duflo 2000), the context of this study may not be globally applicable. We exclude contributory programs because our interest is in examining government expenditure on human capital, rather than the contributions of its citizens, which are likely highly correlated with income.
Table 1: Government domestic spending data sources

| Sector                | Source          | Variables                                                                 |
|-----------------------|-----------------|---------------------------------------------------------------------------|
| Health                | WHO GHED        | • Domestic government health expenditure as % of GDP *(current only)*        |
|                       |                 | • Domestic government health expenditure as % of total government          |
|                       |                 |   expenditure *(current only)*                                             |
| Education             | UIS, IMF        | • Domestic government education expenditure as % of GDP *(current +     |
|                       |                 |   capital)*                                                                |
|                       |                 | • Domestic government education expenditure as % of total government       |
|                       |                 |   expenditure *(current + capital)*                                        |
| Social protection     | ASPIRE          | • Domestic government spending on social protection (defined above) as     |
|                       |                 |   a % of GDP *(current + capital)*                                         |

The main source of information on country-specific human capital outcomes is represented by the HCI, which measures the human capital that a child born today can expect to attain by age 18, given the risks of poor health and poor education that prevail in the country where she lives (Kraay 2018). The index has three components:

1) **Survival**: measured as the complement of the under-5 mortality rate.
2) **School**: measured both through the *quantity* and *quality* of education. The quantity of education is measured by the number of Expected Years of School. The Quality of education is measured by the Harmonized Learning Outcomes (HLOs), that harmonize test scores from major international student achievement testing programs. A recent paper provides an in-depth discussion on the HLOs (Altinok, Angrist, and Patrinos 2018). The two measures are aggregated into the Learning Adjusted Years of School that vary between 0 and 14.
3) **Health**: measured by Adult Survival Rate (ASR), the share of 15-year-olds who survive until age 60, and the complement of the share of children under 5 who are below normal height for age.

A recent paper discusses in detail the aggregation methodology of the three components (Kraay 2018). The index, defined between 0 and 1, is measured in terms of productivity of the next generation of workers relative to the benchmark of complete education and full health. The index is currently available for 157 countries. Kraay (2018) describes the data used for each of the five ingredients.

Comparing or aggregating spending estimates across countries and over time requires assumptions that are not free of implications. When constructing regional- or income-level average spending for the three sectors, we give each observation equal weight so as not over-represent countries with the largest populations. However, changes in some of these averages might reflect the fact that the number of countries changes over time as result of increased data availability. Comparisons over time are particularly problematic for education since in some of the years the data coverage accounts for less than 50% of the potential universe (the universe being all possible country-years). It is different for health, where we have
data for about 90% of the potential universe throughout the period we consider. No comparison over time is possible for social protection spending, since we have only one data point for each country. When contrasting the HCI or its components with spending values, we use the most recent data point available from each country. Health data are most dense. Specifically, 98% of countries have data from 2016, meaning that the vast majority of countries have data from the most recent possible year. For education, however, the most recent observation of spending data ranges in years from 2000 to 2016 (with 52% from 2016 and 86% from 2010 and more recent). Social protection spending data are from 2009-2016. In short, only in very selected cases do measures of the outcomes and the spending refer to the same year. The government domestic expenditure on health, education, and social protection in the most recent year is available for 124 countries and is used in our estimates of “social sector spending”.

B. Data density

High-quality data are the prerequisite to understand the relationship between social sector spending and human capital outcomes. In this section we discuss how spending data availability has evolved over time and across regions. For this purpose, we divide the time period under consideration into four sub-periods (2000-2003, 2004-2007, 2008-2011, 2012-2016), with the different length of the last one explaining the difference in the number of potential observations.

Data density for domestic current health spending has been consistently high, with a coverage of at least 96% of all potential observations throughout the entire time period (Table 2). Remarkably, low-income countries (LICs) have seen a significant increase from 88% in 2000-2003 to 93% in 2011-2016. The picture is completely different when we look at the density of spending data for education, with coverage peaking at 67% in the time period between 2008 and 2011 (Table 2). Perhaps even more worryingly, we do not observe a stable upward trend in data availability: in 2012-2016 the coverage went down to 61%. Also for education, LICs display a positive trend (from 50% in 2000-2003 to 71% in 2012-2016), while high-income countries display an opposite trend (from 88% in 2000-2003 to 71% in 2012-2016). Information on spending in social protection is low across the spectrum, with an average density of 11%. In 2008-2011 there were only 21 observations, while there were 102 observations in 2012-2016.
Table 2: Data density by sector and country-income groups

|                      | 2000-2003 | 2004-2007 | 2008-2011 | 2012-2016 |
|----------------------|-----------|-----------|-----------|-----------|
|                      | # observations | % coverage | # observations | % coverage | # observations | % coverage | # observations | % coverage |
| **Government spending on health** |           |           |           |           |
| Overall              | 729       | 96%       | 737       | 97%       | 742       | 98%       | 920       | 97%       |
| High income          | 212       | 100%      | 212       | 100%      | 212       | 100%      | 265       | 100%      |
| Upper middle income  | 209       | 97%       | 213       | 99%       | 216       | 100%      | 265       | 98%       |
| Lower middle income  | 202       | 95%       | 204       | 96%       | 204       | 96%       | 250       | 94%       |
| Low income           | 106       | 88%       | 108       | 90%       | 110       | 92%       | 140       | 93%       |
| **Government spending on education** |           |           |           |           |
| Overall              | 492       | 65%       | 464       | 61%       | 506       | 67%       | 583       | 61%       |
| High income          | 186       | 88%       | 172       | 81%       | 168       | 79%       | 189       | 71%       |
| Upper middle income  | 129       | 60%       | 113       | 52%       | 129       | 60%       | 139       | 51%       |
| Lower middle income  | 117       | 55%       | 121       | 57%       | 132       | 62%       | 148       | 56%       |
| Low income           | 60        | 50%       | 58        | 48%       | 77        | 64%       | 107       | 71%       |
| **Government spending on social protection** |           |           |           |           |
| Overall              | 21        | 3%        | 102       | 11%       |
| High income          | 1         | 0%        | 11        | 4%        |
| Upper middle income  | 5         | 2%        | 33        | 12%       |
| Lower middle income  | 10        | 5%        | 37        | 14%       |
| Low income           | 5         | 4%        | 21        | 14%       |

When we look at the disaggregation by region, for health we do find coverage that is close to universal for all the regions (Table 3). This may be related to decades-long international efforts to collect health expenditure data (Bui et al. 2015). That is not the case for education, where the trend in data availability is particularly worrying for Latin America (LAC) and Middle East and North Africa (MENA). It is encouraging, however, to observe a significant positive trend in data availability for South Asia and Sub-Saharan Africa. Importantly, for education, the shifts in data availability are so large that comparisons of mean spending values are not particularly informative since data availability might be systematically related to the amount of spending.
### Table 3: Data density by sector, region

|                      | 2000-2003 |          | 2004-2007 |          | 2008-2011 |          | 2012-2016 |          |
|----------------------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|
|                      | # observations | % coverage | # observations | % coverage | # observations | % coverage | # observations | % coverage |
| **Government spending on health** |           |          |           |          |           |          |           |          |
| Overall              | 729       | 96%      | 737       | 97%      | 742       | 98%      | 920       | 97%      |
| East Asia & Pacific  | 114       | 98%      | 116       | 100%     | 116       | 100%     | 145       | 100%     |
| Europe & Central Asia| 192       | 96%      | 193       | 97%      | 196       | 98%      | 245       | 98%      |
| Latin America & Caribbean | 128     | 100%     | 128       | 100%     | 128       | 100%     | 160       | 100%     |
| Middle East & North Africa | 77     | 96%      | 80        | 100%     | 80        | 100%     | 90        | 90%      |
| North America        | 8         | 100%     | 8         | 100%     | 8         | 100%     | 10        | 100%     |
| South Asia           | 30        | 94%      | 32        | 100%     | 32        | 100%     | 40        | 100%     |
| Sub-Saharan Africa   | 180       | 92%      | 180       | 92%      | 182       | 93%      | 230       | 94%      |
| **Government spending on education** |           |          |           |          |           |          |           |          |
| Overall              | 492       | 65%      | 464       | 61%      | 506       | 67%      | 583       | 61%      |
| East Asia & Pacific  | 65        | 56%      | 52        | 45%      | 69        | 59%      | 77        | 53%      |
| Europe & Central Asia| 167       | 84%      | 165       | 83%      | 174       | 87%      | 197       | 79%      |
| Latin America & Caribbean | 84     | 66%      | 65        | 51%      | 69        | 54%      | 82        | 51%      |
| Middle East & North Africa | 46     | 58%      | 47        | 59%      | 38        | 48%      | 38        | 38%      |
| North America        | 7         | 88%      | 6         | 75%      | 8         | 100%     | 5         | 50%      |
| South Asia           | 19        | 59%      | 24        | 75%      | 29        | 91%      | 35        | 88%      |
| Sub-Saharan Africa   | 104       | 53%      | 105       | 54%      | 119       | 61%      | 149       | 61%      |
| **Government spending on social protection** |           |          |           |          |           |          |           |          |
| Overall              | 21        | 3%       | 102       | 11%      |           |          |           |          |
| East Asia & Pacific  | 5         | 4%       | 12        | 8%       |           |          |           |          |
| Europe & Central Asia| 1         | 1%       | 26        | 10%      |           |          |           |          |
| Latin America & Caribbean | 1     | 1%       | 17        | 11%      |           |          |           |          |
| Middle East & North Africa | 3     | 4%       | 6         | 6%       |           |          |           |          |
| North America        | 0         |          |           |          |           |          |           |          |
| South Asia           | 4         | 13%      | 3         | 8%       |           |          |           |          |
| Sub-Saharan Africa   | 7         | 4%       | 38        | 16%      |           |          |           |          |

Overall, the evidence presented in this section suggests that data availability is increasing over time, although modestly and with a drop in the period 2012-2016. Average trends hide heterogeneity across sectors and regions, with some worrying time trends in coverage for some regions. For education and social protection, increasing data availability represents an essential step for meaningful comparisons.
III. Trends in government spending over time, by region, by income group

In Table 4 we display the evolution over time in spending as a share of GDP for the three sectors and across different income groups. In our discussion, we will refrain from comparing the size of spending in the different sectors, since the definition of spending (including capital or not) changes across the three sectors.

|                          | Government spending on health | Government spending on education | Government spending on social protection |
|--------------------------|------------------------------|--------------------------------|----------------------------------------|
|                          | Mean | Min  | Max  | Mean | Min  | Max  | Mean | Min  | Max  | Mean | Min  | Max  |
| Overall                  | 3.1  | 0.1  | 16.7 | 3.2  | 0.2  | 12.7 | 3.3  | 0.2  | 12.3 | 3.5  | 0.5  | 13.5 |
| High income              | 4.5  | 1.1  | 7.8  | 4.7  | 1.0  | 8.0  | 5.2  | 1.3  | 8.8  | 5.5  | 1.9  | 11.4 |
| Upper middle income      | 3.4  | 0.4  | 16.7 | 3.4  | 0.4  | 12.7 | 3.6  | 0.4  | 12.3 | 3.8  | 0.5  | 13.5 |
| Lower middle income      | 2.2  | 0.2  | 10.5 | 2.2  | 0.2  | 10.5 | 2.3  | 0.2  | 8.9  | 2.4  | 0.5  | 7.6  |
| Low income               | 1.4  | 0.1  | 3.2  | 1.5  | 0.2  | 3.0  | 1.3  | 0.4  | 2.6  | 1.3  | 0.5  | 3.1  |

The average share of domestic current spending in health has seen a moderate increase over time. Specifically, it increased from 3.1% of GDP in the period 2000-2003 to 3.5% of GDP in the period between 2012 and 2016. Not surprisingly, regions with higher levels of income spend more. The time trend is steeper in high-income countries, while it is flat in lower-middle income (LMICs) and low-income countries, with the latter displaying a dismayingly low level of current spending in health (1.5% of GDP). Unlike other income groups, LICs have experienced a sharp decline in domestic government health expenditure as a percent of total government expenditure (Figure A.1). The acceleration in high-income countries (HICs) and the consequent increase in the gap between them and other income groups took place after 2008 (Figure 1). The reason for this increase is potentially linked to the economic consequences of the financial crisis, since total expenditure in absolute terms for HICs did not experience a dip similar to that seen in GDP (in other words, a decrease in the denominator that is larger than the decrease in the numerator would mechanically generate an uptick, such as that seen in Figure 1). For instance, EUROSTAT reports that for the 28 EU countries, total government expenditure notably increased in 2009 (to 50.0%, from 46.2% in
2008), before reversing its trend by easing back to 48% in subsequent years (Eurostat 2019). A more granular analysis by region shows that among HICs, North America experienced the largest increase in domestic government spending on health (Figure 2) between 2000-2003 and 2012-2016, possibly as a result of the spike in spending induced by the Affordable Care Act. In the same time period, the Sub-Saharan Africa and South Asia regions have seen either no or very modest increase in their health spending (Table 5).

**Figure 1:** Domestic government health expenditure as a percent of GDP, by income group
Table 5: Government spending (as a percent of GDP) by sector and region

| Sector                        | 2000-2003 |           | 2004-2007 |           | 2008-2011 |           | 2012-2016 |           |
|-------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                               | Mean      | Min       | Max       | Mean      | Min       | Max       | Mean      | Min       | Max       |
| Government spending on health |           |           |           |           |           |           |           |           |           |
| Overall                       | 3.1       | 0.1       | 16.7      | 3.2       | 0.2       | 12.7      | 3.3       | 0.2       | 12.3      | 3.5       | 0.5       | 13.5      |
| East Asia & Pacific           | 3.9       | 0.2       | 16.7      | 3.7       | 0.2       | 12.7      | 3.6       | 0.2       | 12.3      | 3.8       | 0.7       | 13.5      |
| Europe & Central Asia         | 4.4       | 0.8       | 7.8       | 4.7       | 0.9       | 8.0       | 5.1       | 1.1       | 8.8       | 5.2       | 1.3       | 9.2       |
| Latin America & Caribbean    | 2.7       | 1.1       | 4.9       | 2.8       | 0.9       | 4.5       | 3.1       | 1.2       | 5.6       | 3.4       | 0.8       | 6.2       |
| Middle East & North Africa   | 2.6       | 1.1       | 5.1       | 2.5       | 1.4       | 5.8       | 2.8       | 1.3       | 5.7       | 3.0       | 0.9       | 5.8       |
| North America                | 6.2       | 6.1       | 6.3       | 6.7       | 6.7       | 6.7       | 7.6       | 7.5       | 7.8       | 9.5       | 7.5       | 11.4      |
| South Asia                   | 1.4       | 0.4       | 3.2       | 1.4       | 0.5       | 3.0       | 1.6       | 0.5       | 5.1       | 1.7       | 0.5       | 5.5       |
| Sub-Saharan Africa           | 1.8       | 0.1       | 6.5       | 1.9       | 0.2       | 5.9       | 1.7       | 0.4       | 5.0       | 1.8       | 0.5       | 5.4       |
| Government spending on education |         |           |           |           |           |           |           |           |           |           |           |           |
| Overall                       | 4.5       | 1.2       | 11.6      | 4.5       | 1.2       | 11.5      | 4.6       | 0.8       | 13.0      | 4.6       | 1.4       | 12.5      |
| East Asia & Pacific           | 5.4       | 1.7       | 11.6      | 4.2       | 1.7       | 9.9       | 4.4       | 0.8       | 13.0      | 4.7       | 1.8       | 12.5      |
| Europe & Central Asia         | 4.6       | 2.2       | 8.2       | 4.7       | 2.5       | 7.9       | 5.1       | 2.3       | 8.9       | 5.0       | 2.6       | 7.6       |
| Latin America & Caribbean    | 4.2       | 1.2       | 8.1       | 4.4       | 2.0       | 9.9       | 4.7       | 2.5       | 7.4       | 5.0       | 2.8       | 10.3      |
| Middle East & North Africa   | 5.5       | 2.7       | 8.7       | 4.9       | 2.7       | 8.6       | 4.3       | 1.6       | 6.4       | 4.2       | 1.6       | 6.7       |
| North America                | 5.7       | 5.1       | 6.3       | 5.5       | 4.8       | 6.3       | 5.5       | 5.0       | 6.0       | 5.5       | 5.5       | 5.5       |
| South Asia                   | 3.7       | 1.8       | 5.6       | 3.8       | 2.1       | 6.6       | 3.4       | 1.9       | 4.5       | 3.5       | 1.9       | 6.7       |
| Sub-Saharan Africa           | 3.8       | 1.2       | 10.7      | 4.2       | 1.2       | 11.5      | 4.2       | 0.8       | 11.4      | 4.2       | 1.4       | 7.4       |
| Government spending on social protection |     |           |           |           |           |           |           |           |           |           |           |           |
| Overall                       |           |           |           | 1.6       | 0.0       | 10.1      |           |           |           |           |           |           |
| East Asia & Pacific           |           |           |           | 0.8       | 0.2       | 2.0       |           |           |           |           | 1.2       | 0.0       | 6.5       |
| Europe & Central Asia         |           |           |           | 3.9       | 3.9       | 3.9       |           |           |           | 2.1       | 0.5       | 7.0       |
| Latin America & Caribbean    |           |           |           | 1.5       | 1.5       | 1.5       |           |           |           | 1.5       | 0.2       | 3.5       |
| Middle East & North Africa   |           |           |           | 0.6       | 0.2       | 0.8       |           |           |           | 1.1       | 0.2       | 2.6       |
| North America                |           |           |           |           |           |           |           |           |           |           |           |           |
| South Asia                   |           |           |           | 0.9       | 0.3       | 1.3       |           |           |           | 1.0       | 0.7       | 1.5       |
| Sub-Saharan Africa           |           |           |           | 2.3       | 0.2       | 7.1       |           |           |           | 1.4       | 0.0       | 10.1      |
The overall trend in total spending in education is remarkably flat over time. On average, domestic spending on education as a share of GDP is equal to 4.6% of GDP in the period between 2012 and 2016, up from 4.5% in the period between 2000 and 2003. Trends in HICs, high middle and LMICs are in line with the overall trend. The only exception is among LICs, where education spending rose from 3.2% of GDP in the period between 2000-2003 to 3.9% in 2012-2016 (Table 4). However, among LICs, it is worth highlighting that South Asian and Sub-Saharan African countries followed completely opposite trends: while in the former, education spending dropped from 3.7% of GDP in 2000-2003 to 3.5% of GDP in 2012-2016, in the latter it rose from 3.8 to 4.2% of GDP (Table 5). When looking at trends in education spending across regions over time, the most worrying ones are observed for East Asia Pacific (EAP) and MENA. In 2000-2003, both regions were spending well above 5% of GDP in education (5.4 and 5.5 respectively), as opposed to 2012-2016 where spending represented 4.7 and 4.2% of GDP, respectively. Importantly, further analysis will be needed to understand to what extent this decline can be explained by differences over time in data availability. When looking at health and education spending, LAC stands out as being the region with steep increases in both sectors (Table 5).

The average spending for Social Protection programs, as defined in section II, is equal to 1.6% of GDP in the period 2012-2016, with Europe and Central Asia displaying the highest share (2%) and South Asia the lowest (1%). Conclusions about changes over time cannot be drawn given that each country only appears once in the ASPIRE data set.
IV. Relationship between government spending and the Human Capital Index

There is a large body of analytical work studying the relationship between spending and human capital outcomes adopting a sector-specific view. For instance, the 2018 World Development Report (WDR) finds that the relationship between changes in public education spending and student learning is often weak. In health, flagship work in the United States using Medicare data has highlighted that higher spending is often associated with poorer outcomes (“Dartmouth Atlas Project” 2019). Given the multidimensional nature of human capital and the possible interactions between different types of spending, in this note we will try to account for the multisectoral nature of both outcomes and spending. In terms of outcomes, our preferred measure is the newly designed HCI. For spending, we create a measure of spending that includes health, education and social protection as defined above. Since the definition of spending varies across the three sectors, the sum of the three might be plagued by substantial measurement error issues.

Using a cross-section of the most recent data, we observe a weak correlation between HCI scores and social spending in Figure 3 (Pearson correlation coefficient $\rho = 0.38$). Measurement error might partly explain it. Moreover, countries differ along many different dimensions that can be potentially correlated with both spending and human capital outcomes. For example, higher-income countries might have better institutions that could make social spending more effective. In order to partly control for some of these differences, we plot the relationship between spending and HCI for different country income levels (Figure 4). When stratified by income levels, none of the correlation coefficients capturing the relationship between HCI and spending is statistically significantly different from zero. While the correlation between HCI and spending is clearly positive for HICs, there is no evidence that the correlation monotonically declines when we consider less affluent countries. A closer look at both Figures 3 and 4 suggests the presence of extreme outliers that make the interpretation of any correlation particularly problematic. Teasing out the potential role of GDP in this relationship, we examine the association between the variation in HCI unexplained by GDP and the variation in spending unexplained by GDP and find a similarly weak relationship ($\rho = 0.37$; Figure A.2).
**Figure 3:** Relationship between HCI and expenditure on human capital (as a percent of GDP, most recent data)

**Figure 4:** Relationship between HCI and expenditure on human capital (as a percent of GDP), stratified by income level
In order to better understand what may be driving these relatively weak relationships, we also examine the relationship between HCI levels and domestic government health, education, and SP expenditure separately.

When we contrast the HCI with government expenditure on health as a percentage of GDP (Figure 5) we do find evidence of a non-linear relationship. There is a strong positive relationship between health spending and HCI up to around 5% of GDP, but the relationship becomes basically flat at higher rates of spending (little increase in HCI regardless of additional spending). In the appendix, we plot the HCI against government per capita spending on health (Figure A.3) in order to assess whether the potential non-linearity documented in Figure 5 is driven by any particular relationship between HCI and absolute values of GDP per capita. For instance, since Preston’s work in the 1970s, it is a well-known fact that among the poorest countries, increases in average income are strongly associated with increases in life expectancy, but as income per head rises, the relationship plateaus (Preston 1975). The relationship between HCI and domestic government health expenditure per capita (USD) is even more non-linear (Figure A.3) than the one plotted in Figure 5. When we look at how the slope between HCI and spending varies by the country’s income level, we do not find evidence suggesting that the slope decreases with income, providing little support to the hypothesis that higher income countries are better at translating resources into outcomes (Figure 6). Not considered here are the contributions of donor financing to health spending in LICs. While overall external financing for health is extremely small compared to overall domestic financing, donor support can constitute a non-negligible fraction of spending in some LICs (Ke et al. 2018), which may further complicate the relationships visualized in Figure 4.

**Figure 5: Relationship between HCI and health expenditure (as a percent of GDP)**
Figure 6: Relationship between HCI and health expenditure (as a percent of GDP), stratified by income level

It is reasonable to expect that the demographic structure of the population might drive spending patterns to some extent, in particular that countries with a high share of elderly members of the population might have higher volumes of health spending associated with end-of-life care. This high spending would not necessarily be associated with high HCI (which measures the human capital in the 0-18 age range), except in the presence of a spurious association. This could potentially explain the lack of a systematic relationship between spending and HCI scores. To explore this possibility, we plotted the relationship between HCI and spending for countries with different demographic characteristics. Specifically, we split all countries into quartiles of the fraction of the population above age 65 years and examine the relationship between HCI and spending within these subgroups. Again, we do not see any illuminating differences in the relationship between the HCI and spending given stratification by share of elderly (Figure 7).
One potential explanation for the non-linear relationship between HCI and spending is that, above a certain amount, government spending is crowding out private spending. When we look at the relationship between HCI and private spending per capita (from WHO-GHED), we find a pattern that is remarkably similar to the one observed for public spending (Figure 8). We also see no evidence for government spending crowding out private spending (or vice-versa) (Figure A.4).
The relationship between HCI and domestic government expenditures on education is possibly weaker than the one observed for health (Figure 9). The results may be driven by a few countries that spend a large percent of GDP on education (>9%) but have very low HCI. Similar to what we had observed for health expenditure, Kiribati (KIR) and Lesotho (LSO) stand out as countries with high levels of spending and low human capital outcomes. Even less informative is the analysis of the relationship between the HCI and education spending by different income levels. While there is a clearly positive slope for HICs and LICs, the relationship is negative for upper middle-income countries and almost flat for LMICs (Figure 10). The WDR 2018 discusses five possible reasons for why spending does not always translate into better learning (including that spending may not be used equitably, efficiently, or with learning outcomes in mind; resources may not always reach schools themselves, and public spending may crowd out private spending). The same explanations can potentially contribute to make sense of the weak relationship between spending and HCI observed here.
Figure 9: Relationship between HCI and education expenditure (as a percent of GDP)

Figure 10: Relationship between HCI and education expenditure (as a percent of GDP), stratified by income level
The relationship between HCI and social protection spending is equally weak (Figure 11), possibly due to the non-negligible number of outliers that spend more than 6% of GDP on social welfare programs but have extremely low outcomes. When we look at the relationship between social protection spending and HCI by income levels, we do find evidence that the relationship is positive for HICs and LMICs, while it is negative for upper middle income and LICs (Figure 12). However, for the last group, the relationship seems to be strongly affected the very high spending and very low outcomes of South Sudan.

**Figure 11:** Relationship between HCI and SP expenditure (as a percent of GDP)
The weak relationship between sector-specific government spending and the overall HCI score might be in principle driven by specific components of the index. Potentially, combining both health and education inputs and outcomes can disguise possible large differences in the performance between the two sectors. In order to assess whether that is the case, we looked at the relationship between HCI components and sector-specific spending. In the main text, we include the figure showing the relationship between childhood stunting and health expenditure (Figure 13), and the relationship between quality-adjusted years of school and education expenditure (Figure 14). The latter provides some evidence that education spending is correlated with the education specific component of the index. In the Appendix (Figures A.5, A.6) we display the relationship between the other main ingredients of the index and the relevant spending items, but the conclusions remain in line with the ones discussed above.
Figure 13: Relationship between childhood stunting and health expenditure (as a percent of GDP)

Figure 14: Relationship between quality-adjusted years of school and education expenditure (as a percent of GDP)
V. Discussion and conclusion

In this note we have analyzed the evolution of domestic government spending in health, education and social protection over the last 15 years. Creating a measure of social spending that covers the three sectors has proven to be a challenging task. While for the health sector only current spending is deemed reliable, in education there is no rigorous way to separate current from capital spending. Only for health spending is there high data coverage both over time and across regions. Education and especially social protection display large gaps. It is particularly worrying that in education there is not a consolidated upward trend in data availability. Low data density does not only plague LICs: in many middle-income countries (such as those in LAC), there are large gaps in data availability. Addressing data sparsity represents a clear area of opportunity for the Human Capital Project to leverage its data collection efforts in a manner that encourages more comprehensive data gathering for spending.

Increases in social sector spending have generally been slow and not steady. In fact, while education spending in LICs has seen a stable and steady increase, spending in health has been remarkably flat. Given the strong complementarities between health and education interventions, especially in the first years of life, coordinated investments might help maximize the returns. Some regional trends are also worrying: both EAP and South Asia have seen a reduction in education spending as a share of GDP.

Taking advantage of the newly-designed Human Capital Index (HCI), we go beyond existing analyses that look at the relationship between a single outcome sector-specific spending, and we assess whether a multidimensional measure of human capital is correlated with a multidimensional measure of spending. While this data curation effort was unique, the relationships identified here are challenging to interpret. The (unstratified) relationship between spending and the HCI often plateaus above a certain level of spending and is noisy throughout. While the relationship between spending and HCI appears stronger for HICs than for countries at other income levels, these relationships are not statistically significant.

Our conclusions do not change when we examine the relationship between specific inputs into the HCI and their associated sector’s spending. Among the three sectors, health spending seems to display a slightly clearer relationship with HCI than other sectors considered, but this might be partly explained by the higher density of the health data. The clearer relationship between health spending and HCI might also be related to a few factors that could contribute to less noisy data: the health data do not include capital spending (which can be lumpy), and also the WHO-GHED is the result of a long-standing international effort to collect and validate health spending data, possibly resulting in higher quality.

Our findings are in line with other studies that look at the relationship between spending and human capital outcomes, which find that increased spending does not necessarily translate to improved outcomes (Al-Samarrai, Cerdan-Infantes, and Lehe 2018; World Bank Group 2018b). There are many possible reasons behind the weak correlation that we observe at the country level. As shown in Al-Samarrai (2018), countries display dramatic differences in the ability to transform resources into outcomes, so poor outcomes may be reflective of spending inefficiencies (Al-Samarrai, Cerdan-Infantes, and Lehe 2018). The inefficiencies might either be the result of inability to prioritize resources towards the interventions that are most effective at improving outcomes, or to scale them up in a cost-effective way.

At the heart of our interest in assessing the relationship between social sector spending and outcomes is an interest in providing guidance on how much and what type of investment is needed to achieve high levels
of human capital. The results of our analysis suggest that the answer to this question is not straightforward and more efforts are required along different dimensions. First, it is necessary to improve data availability. As stressed by the recent IMF report on engagement on social spending (IMF 2019), there is a need for a concerted strategy to improve coverage and availability of data. The report points to the improved availability of expenditure data by Function of Government (COFOG) as one of the possible useful avenues for moving forward. Advantages of COFOG data include: (i) they are based on already consolidated statistical concepts, so there would be no need for establishing new statistical standards or placing new reporting requirements on statistical authorities; and (ii) they would also be fully consistent with Government Finance Statistics and National Accounts concepts, and therefore would ensure consistency of the analysis with the broader understanding of countries’ economic developments (IMF 2019).

Second, in order to further tease out the relationships between spending and human capital outcomes, additional research is required. Until data quality are improved, analysis similar to the one conducted in this paper will continue to have weaknesses. As suggested throughout, cross-country analyses may mask key confounding factors and complicate the associations observed here. One way of strengthening the analysis would be through examination of spending and HCI data sub-nationally, and even more so by quasi-experimental work that could test the impact of exogenous variation in social sector spending on HCI outcomes. Another way would be through strengthening and harmonization of sector-specific or program-specific studies (e.g. Public Expenditure Reviews), which are likely to deliver much more robust evidence for examining the relationship between monetary inputs (government spending) and outcomes. Progress in these alternative research avenues may begin to help develop strategic guidance on the magnitude and nature of financing required to further human capital outcomes.
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### Table A.1: Countries included in at least one part of analysis

| Country                  | Country                  | Country                  | Country                  | Country                  |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Afghanistan              | Congo, Rep.              | Iraq                     | Mozambique               | South Sudan              |
| Albania                  | Costa Rica               | Ireland                  | Myanmar                  | Spain                    |
| Algeria                  | Croatia                  | Israel                   | Namibia                  | Sri Lanka                |
| Angola                   | Cyprus                   | Italy                    | Nauru                    | St. Kitts and Nevis      |
| Antigua and Barbuda      | Côte d'Ivoire            | Jamaica                  | Nepal                    | St. Lucia                |
| Argentina                | Denmark                  | Jordan                   | New Zealand              | Sudan                    |
| Australia                | Djibouti                 | Kazakhstan               | Nicaragua                | Suriname                 |
| Austria                  | Dominica                 | Kenya                    | Niger                    | Sweden                   |
| Azerbaijan               | Dominican Republic       | Kiribati                 | Nigeria                  | Switzerland              |
| Bahamas, The             | Ecuador                  | Korea, Rep.              | Norway                   | Syrian Arab Republic     |
| Bahrain                  | Egypt, Arab Rep.         | Kosovo                   | Oman                     | São Tomé and Príncipe    |
| Bangladesh               | El Salvador              | Kyrgyz Republic         | Palau                    | Tanzania                 |
| Barbados                 | Equatorial Guinea        | Lao PDR                  | Panama                   | Thailand                 |
| Belarus                  | Eritrea                  | Latvia                   | Papua New Guinea         | Timor-Leste              |
| Belgium                  | Estonia                  | Lebanon                  | Paraguay                 | Togo                     |
| Belize                   | Ethiopia                 | Lesotho                  | Peru                     | Tonga                    |
| Benin                    | Fiji                     | Liberia                  | Philippines              | Trinidad and Tobago      |
| Bhutan                   | Finland                  | Libya                    | Poland                   | Tunisia                  |
| Bolivia                  | France                   | Lithuania                | Portugal                 | Turkey                   |
| Bosnia and Herzegovina   | Gabon                    | Madagascar              | Russian Federation       | Uganda                   |
| Botswana                 | Gambia, The              | Marshall Islands        | Romania                  | Tuvalu                   |
| Brazil                   | Georgia                  | Malawi                   | Rwanda                   | Ukraine                  |
| Brunei Darussalam        | Germany                  | Malaysia                 | Samoa                    | United Arab Emirates     |
| Bulgaria                 | Ghana                    | Micronesia, Fed. Sts.    | Senegal                  | Uruguay                  |
| Burkina Faso             | Greece                   | Marshall Islands        | Senegal                  | Uruguay                  |
| Burundi                  | Grenada                  | Mauritania               | Seychelles               | Vanuatu                  |
| Cabo Verde               | Guatemala                | Mauritius                | Sierra Leone             | Venezuela, RB            |
| Cambodia                 | Guinea                   | Mexico                   | Singapore                | Vietnam                  |
| Cameroon                 | Guinea-Bissau            | Micronesia, Fed. Sts.    | Slovak Republic          | Yemen, Rep.              |
| Canada                   | Guyana                   | Mongolia                 | Solomon Islands          | Zimbabwe                 |
| Central African Republic | Haiti                    | Montenegro               | Somalia                  | Eswatini                 |
| Chad                     | Honduras                 | Iran, Islamic Rep.       | Morocco                  | South Africa             |
| Chile                    | Hungary                  | Iceland                  | Moldova                  | Slovenia                 |
| China                    | India                    | Indonesia                | Montenegro               | Somalia                  |
| Colombia                 | Indonesia                | Iran, Islamic Republic   | Morocco                  | South Africa             |
Figure A.1: Domestic government health expenditure as a percent of total government expenditure, by income group

Figure A.2: Comparison of residuals from regression of HCI on GDP per capita (y-axis) and residuals from regression of social spending as a share of GDP on GDP per capita ($\rho = 0.37$)
Figure A.3: Relationship between HCI and domestic government health expenditure per capita (USD)

Figure A.4: Relationship between domestic government health expenditure per capita and private health expenditure per capita (USD), showing a linear positive relationship in log space
Figure A.5: Relationship between child mortality and health expenditure (as a percent of GDP)

Figure A.6: Relationship between adult survival rate and health expenditure (as a percent of GDP)