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Human development and inequalities: The importance of social public spending

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Abstract

In this article, we empirically analyse the impact of social public spending on human development distribution in a sample of 82 developed and developing countries over the period 2010-2021. Specifically, we focus on the impact of the three components of social spending (health, education and social protection) on the distribution of human development as measured by the Human Development Index (HDI) and its dimensions (health, education, and income). Applying data panel analysis, our empirical evidence shows that the three components of social expenditure reduce the loss of HDI caused by inequality. Hence, public resources allocated towards social spending have an important redistributive impact with regards to human development outcomes related to life expectancy, years of schooling and income per capita.

Key words: Human development, social public expenditure, inequality.

JEL codes: O15, H5, H51, H52, I15, I25.

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1. Introduction

The role of public expenditure in achieving higher and more equitable levels of economic and human development has come to the fore, particularly in the aftermath of the COVID-pandemic. The pandemic led to an upsurge in public expenditure on health in all countries, accompanied by an increase in resources for social protection programmes to alleviate the impact on the most economically vulnerable members of society (WHO 2022).

In this paper, we use cross-country evidence to examine how government spending affects inequality-induced Human Development Index (HDI) losses. Specifically, we analyse the role of social public spending, which includes public resources devoted to health, education, and social protection (IMF 2017). Our empirical analysis, which covers a group of 82 developed and developing economies during the period 2010-2021, focuses on how social public expenditures have affected the level and distribution of human development outcomes across the country's population in a period ending with the profound impact of COVID-19 in 2020-2021.

We measure the impact of inequality on the distribution of human development across the population using two measures of economic and human development, the Human Development Index (HDI) and the Inequality-adjusted Human Development Index (IHDI) published annually since 2010 by the United Nations Development Programme (UNDP).[1] The HDI and IHDI are multidimensional and composite indices of human and economic development, that allow for the inclusion of outcomes related to health, education, and income, providing alternative indices to the GDP and income-based indicators for measuring human development.

The HDI is a measure of average performance of a country in three key dimensions of human development related to health (measured by life expectancy at birth); education (expected years of schooling for children of school entry, and the mean of years of schooling for adults aged 25 and over); and income (the gross national income per capita PPP USD). The HDI represents a national average in these three dimensions represented by HDI_health, HDI_education and HDI_income.[2] The IHDI is a metric that corrects a country's indicator on these three dimensions, by taking into account how these achievements are distributed across the population using Atkinson inequality indices. Thus, the IHDI_health considers the health expectancy at birth, incorporating the current inequality in mortality patterns; the IHDI_education accounts for the inequality in years of schooling of the adult population; and the IHDI_income captures the inequality in income distribution based on household survey data.[3] In our analysis, we use the percentage difference between HDI and IHDI to measure inequality-induced human development losses (Loss_HDI); namely "loss in HDI due to inequality". If the IHDI is equal to the HDI, we assume there is no inequality in the distribution of achievements

[1] Available at: http://hdr.undp.org/en/global-reports

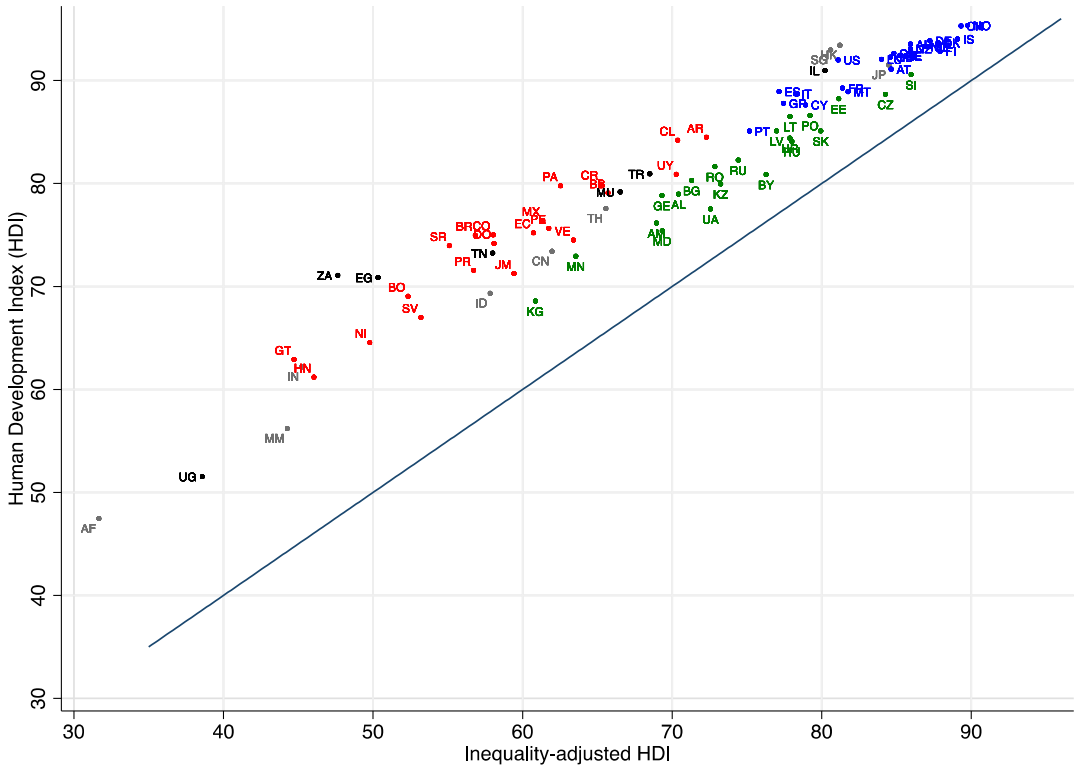
[2] The details on the calculation of the HDI and its three dimensions may be found in the United Nations Development Programme (2020), while Klugman et al. (2011) and Seth and Villar (2017) provide a discussion on their limitations.

[3] See Technical note 2 at http://hdr.undp.org/sites/default/files/hdr2022_technical_notes.pdf for details on how the IHDI is calculated.

across the country's population, while the bigger the Loss_HDI, the greater the impact of inequality on human development. In other words, the Loss_HDI could be understood as the percentage loss in the level of well-being due to existing inequality in the three dimensions.

The analysis about the impact of inequality on the distribution of the HDI across the population is completed by examining how inequality impacts on the distribution of each dimension of human development by looking at the difference (in percentage) between each component of the HDI and IHDI. Specifically, the Loss_Health is computed as the difference between HDI_health and IHDI_health, divided by HDI_health, which provides insights into how life expectancy is affected by inequality. Loss_Education is computed as the difference between HDI_education and IHDI_education divided by HDI_education, and captures the impact of inequality on the years of schooling; while the impact of inequality on income per capita (PPP) is reported by the Loss_Income, calculated as the difference between HDI_income and IHDI_income divided by HDI_income. Analysing the performance of these disaggregated indicators could help to better understand the different inequalities across populations and their contribution to the overall loss of human development.

Figure 1 – Human Development Index and Inequality adjusted Human Development Index (mean period 2010–2021)

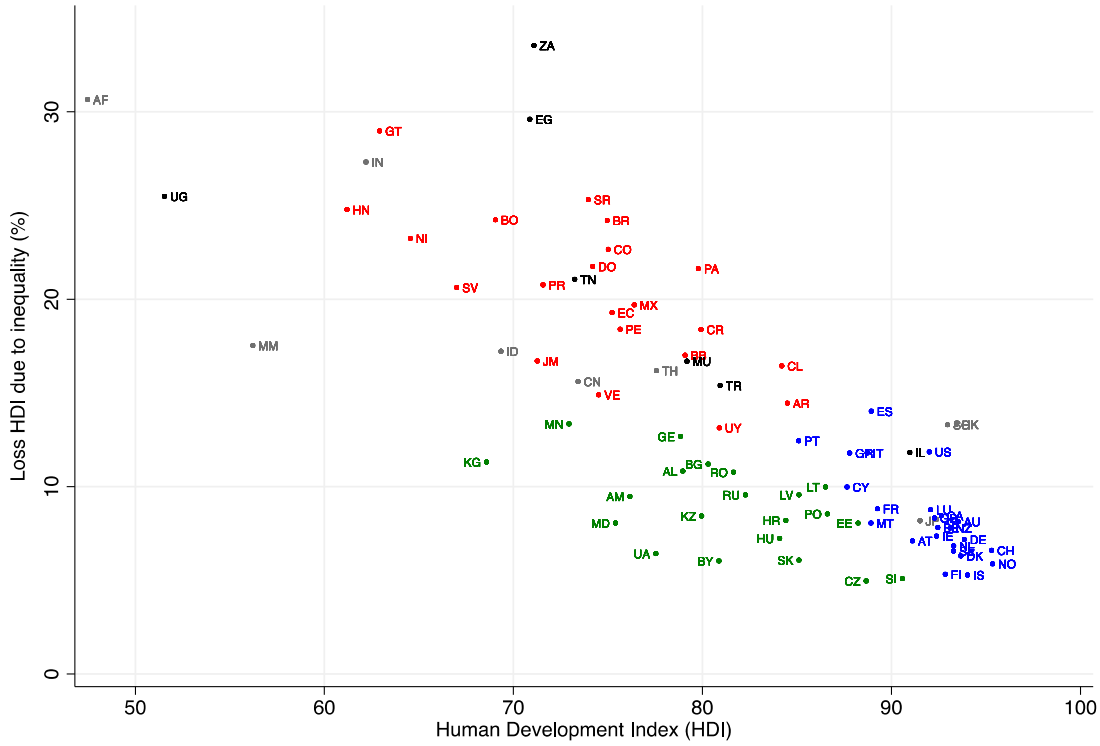


Note: Blue label: Western Europe and North America; green: Eastern Europe and Central Asia; grey: East and South Asia; red: Latin America and the Caribbean (LAC); black: Middle East and North Africa and Sub-Saharan Africa (MENA and S.S. Africa). For a complete description of countries and regions, see Table A.1 in the Appendix.
Source: Own elaboration based on data from Human Development Data Center (HDDC).

Figure 1 illustrates the levels of HDI and IHDI in our sample of countries over the period analyzed, and shows that inequality has reduced human development in all countries (all countries appear on the left-hand side of the graph). It should be noted, however, that two countries can have the same average level of HDI (for example, Panama –PA- and Kazakhstan -KZ- have similar values close to 80), but very different distributions of achievements (IHDI values of 62 and 73, respectively), which in this case shows that inequalities have a greater negative impact on human development in Panama than in Kazakhstan. In this sense, since IHDI takes into account the level achieved and the level of inequality in the various achievements (life expectancy, years of schooling, GNI per capita), the most unequal distribution across the Panama population in terms of health, education and income outcomes, translates into lower levels of development as measured by the IHDH, than in Kazakhstan.

Figure 1 also highlights an important heterogeneity across countries, where the Western European and North American countries (in blue) are the ones with higher levels of HDI and IDHI. In contrast, Latin America and the Caribbean (LAC) countries (in red) reveal a greater gap between the HDI and the IHDI, indicating that inequalities have a more substantial negative impact on human development in these countries. Hence, the data suggests that LAC countries face a more significant challenge in terms of reducing inequality to foster human development compared to their Western European and North American counterparts.

Figure 2 – Loss HDI due to inequality and Human Development Index (mean period 2010 - 2021)



Note: Blue label: Western Europe and North America; green: Eastern Europe and Central Asia; grey: East and South Asia; red: LAC; black: MENA and S.S. Africa.
Source: Own elaboration based on data from HDDC.

Figure 2 shows the impact of inequalities reducing human development, as measured by the level of the Loss_HDI in our sample of countries, showing firstly, that the overall loss of HDI due to inequality is inversely proportional to the level of human development, and secondly, that the countries across different regions perform differently. For example, countries in West Europe and North America (in blue) and Eastern Europe and Central Asia (in green) present significantly lower Loss_HDI values than the countries in Africa (in black), Latin America and the Caribbean (in red) and East and South Asia (in grey). The average loss of HDI due to inequality in our sample of countries is around 18%, ranging from 5% (Czech Republic) to 33.5% (South Africa).

In this context, our paper focuses on assessing the impact of different public social expenditure policies reducing inequality on development outcomes related to health (life expectancy), education (years of schooling) and income (PPP per capita income), as well as overall human development (HDI index). Thus, this research addresses at least the following Sustainable Development Goals (SDGs): improving health and well-being (SDG3), ensuring inclusive and equitable education (SDG4), and reducing inequality (SDG10).

Our contribution represents a significant step forward analysing how public expenditure on health, education, and social protection can contribute to a higher and less unequal level of economic and human development, as measured by the HDI and its three dimensions related to education, health, and income. To the best of our knowledge, such an analysis has not given adequate attention before, especially with regard to the impact of social public spending policies on the loss of human development provoked by inequalities. Our paper aims to fill this gap by analyzing a broad sample of developed and developing countries during the decade that finishes with the impact of the COVID-19 pandemic.

Based on a sample of 82 developed and developing countries over the period 2010-2021, and using panel data analysis, we find robust evidence that public social spending, in the form of health, education and social protection expenditure, reduces the loss of human development caused by inequality, although it has different effects on the level and distribution of the three different dimensions included in the HDI. In particular, public expenditure on health and education reduces inequity in the distribution of years of schooling, whereas spending on social protection diminishes inequality in both life expectancy and income distribution. These findings are robust to different lagged structures of the government spending variables, alternative estimation techniques, and the inclusion of several potential confounding variables.

The remainder of the paper is structured as follows. Section 2 provides a brief theoretical and empirical overview of the relationship between social public spending and human development indicators. Section 3 describes the key indicators used in the article to conduct the empirical analysis. Section 4 describes the empirical methodology. Section 5 presents the estimation results. Section 6 discusses the results of several robustness checks. Section 7 concludes the paper.

2. Human development and social public spending

In this section, we review the pertinent empirical literature and provide a comprehensive conceptual framework of the potential channels through which social public spending might affect the level and distribution of human development outcomes.

Fiscal policies could have a redistributive effect, reducing inequalities and influencing economic and human development through various channels (International Monetary Fund 2017): first, through cash transfers (social protection spending); second, through in-kind transfers (such as education and health spending); third, through progressive direct taxes; and fourth, through subsidies and indirect taxes. Our analysis focuses on the first and second channels, which have a direct impact on the level and distribution of the different human development outcomes, related to life expectancy, years of schooling and income per capita. In this context, we hypothesize that the impact of social public expenditures on human development losses due to inequality may depend on both the volume of resources and their distribution across the different public spending policies.

As we detail in the next paragraphs of this section, some recent papers have found that social public expenditures have a positive impact on human development outcomes, as measured by the HDI, the IHDI, and other health and education outcomes. Other contributions recognize the crucial role of governance in the relationship between social public spending and health and education outcomes. On the other hand, several contributions have estimated the impact of social public spending policies on income distribution, generally showing a reduction in income inequality. Thus, it is clearly established that social public expenditures affect development outcomes and income inequality, while governance may play a role in this relationship, but it remains to be explored how different social public expenditures could contribute to achieving a higher and less unequal level of human development in terms of health, education and income outcomes. This is particularly relevant in recent times strongly influenced by the shock of the COVID-19 pandemic.

Haile and Niño-Zarazúa (2018) find a statistically significant impact of social spending (government expenditure on education, health and social protection) on HDI for a sample of 55 low and middle-income countries from 1990 to 2009, and also show that health spending has a significantly positive impact on IHDI, while the coefficients of education and social protection expenditures appear insignificant. In a related study, Paliova et al. (2019) analyse the impact of social government expenditures on HDI dimensions using a sample of 68 countries over the period 1995-2016, and find a significant positive effect of education expenditure on education and income dimensions, and of health expenditure on life expectancy. In other related work, Castells-Quintana et al. (2019) analyse a panel of 117 countries for the period 1970-2010 and find no significant effect of government spending on HDI and its dimensions, while showing a negative long-run effect of inequality on HDI, but this effect changes for different HDI dimensions (being positive for income and negative for education). And based on a sample of 57 developed and developing countries over the period 2000-2018, Miranda et al. (2023) found that public health expenditure has a positive impact on the HDI, and in each of its dimensions, while the effects of education expenditure are unclear; they also highlight the important role played by governance.

Furthermore, some studies consistently found a clear significant positive impact of health and education spending on health and education outcomes in poor countries (Bidani and Ravallion 1997; Gupta et al. 2002; Baldacci et al. 2003; Anyanwu and Erhijakpor 2009; Ssozi and Amlani 2015) as well as on European Union (EU) countries (Nixon and Ulmann 2006). However, other studies have revealed that the relationship between social spending and outcomes depends on the quality of institutions. For instance, Rajkumar and Swaroop (2008) emphasize the crucial role of governance in examining the relationship between public spending and outcomes, finding that health and education expenditure have virtually no impact on health and education outcomes in poorly governed countries, whereas there is a positive impact in countries with good governance. Baldacci et al. (2008) conclude that while education and health spending have a significant impact on education and health capital, improving governance could help to achieve the same outcomes. Conversely, Filmer and Pritchett (1999) found no effect of public health spending on child mortality due to insufficient institutional capacity and market failures. Along the same lines, other authors (Mauro 1998; Gupta et al. 2001) have emphasized that bad governance (corruption) worsens the public provision of health and education services. Accordingly, a large body of empirical research suggests that good governance can promote economic and development outcomes.

Regarding the impact of social public expenditures on inequality, most studies have focused on their impact on income distribution, ignoring the effects on health and educational outcomes inequities. In general, these empirical studies have shown a strong redistributive impact of these policies in developed countries (Wang et al., 2012; Caminada et al., 2019; Sánchez and Pérez-Corral, 2018), while in developing countries the impact is extremely limited due to lower public resources available to influence income distribution (Goñi et al. 2011; Villela et al. 2007). Our analysis aims to fill this gap on the empirical literature studying the redistributive impact of social public expenditures on human well-being outcomes related to life expectancy, years of schooling and income per capita, in a sample of both developed and developing countries.

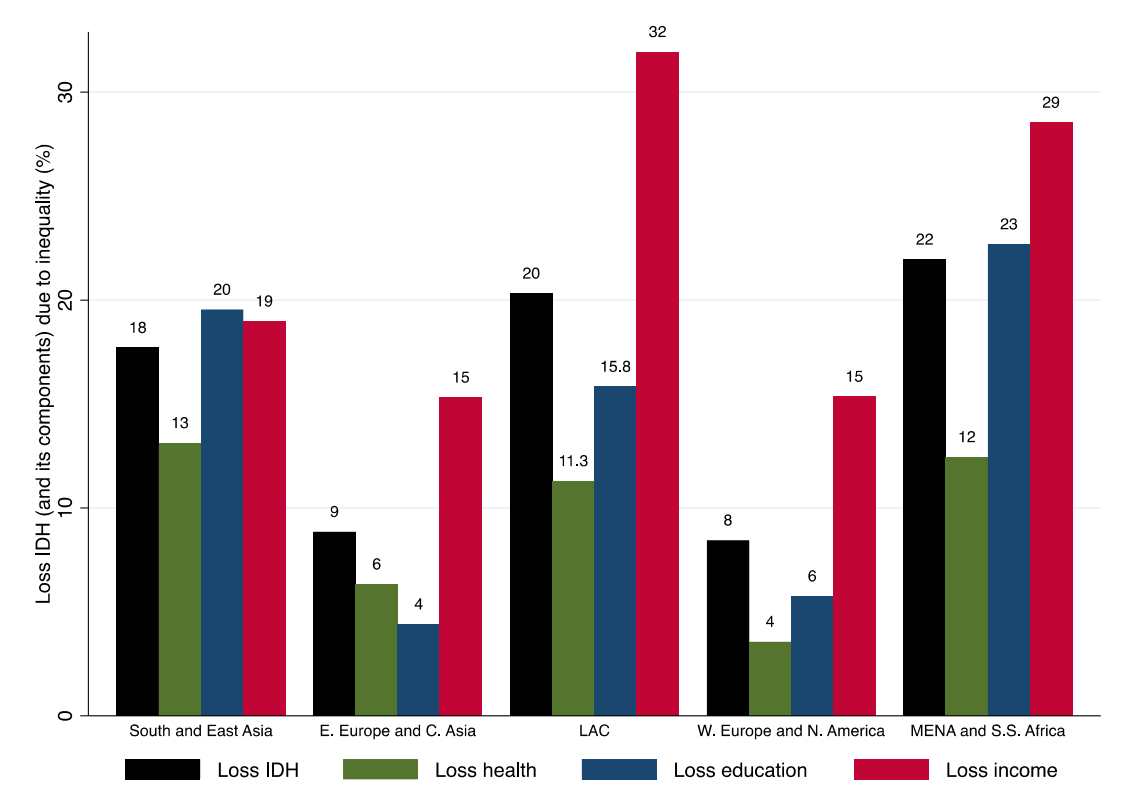
3. Data

In this section we provide information about the main variables of interest, the Loss of HDI due to inequality (at the aggregate level and on its three dimensions) and social public expenditures.

Figure 3 shows the loss of HDI and its dimensions due to inequality per politico-geographic region, indicating that the countries in the regions of Middle East and North African and Sub-Saharan Africa (MENA and S.S. Africa) and LAC, suffer the greatest losses of HDI due to inequality (22% and 20% respectively, in average). In both regions, these values are mainly explained by the income dimension of the HDI, which is the part that suffers the greatest losses due to the unequal distribution of income (29% and 32% respectively). Besides, the regions that include the European countries present the lowest losses provoked by inequality. On the other hand, at regional level, the health dimension is the least affected by inequality (values between 4% and 13%) while the losses on the education dimension show higher variability across regions (between 4% and 23%).

The fiscal data are taken from the Government Finance Statistics (GFS) database of the IMF, classified by economic functions (COFOG).[4] Specifically, we consider the three most important expenditure functions (health, education and social protection) which constitute the social public spending (IMF 2017) and are directly related to the three achievements included in the HDI (life expectancy, years of schooling and income per capita).[5] In our sample of countries, public social spending represents on average approximately 20% of the country GDP and around 55% of the total government expenditure. In order to account for the remaining public expenditure, we also consider a residual catch-all category that contains the rest of the functions including general public services, economic affairs, defense, and public order, and in total comprises (on average) the other 45% of the total public expenditure, and we labelled 'Other expenditure'.

Figure 3 – Inequality-induced Loss in Human Development by politico-geographic regions (mean period 2010–2021)



Note: Loss in HDI due to inequality is computed as the difference between HDI and the inequality-adjusted HDI divided by HDI (expressed as a percentage). *Source*: Own elaboration based on data from HDDC.

Since we include a large and heterogeneous sample of countries, the amount of resources that each country's government allocates to the different social expenditure functions varies considerably, as can be seen from Figure 4 and the data summary

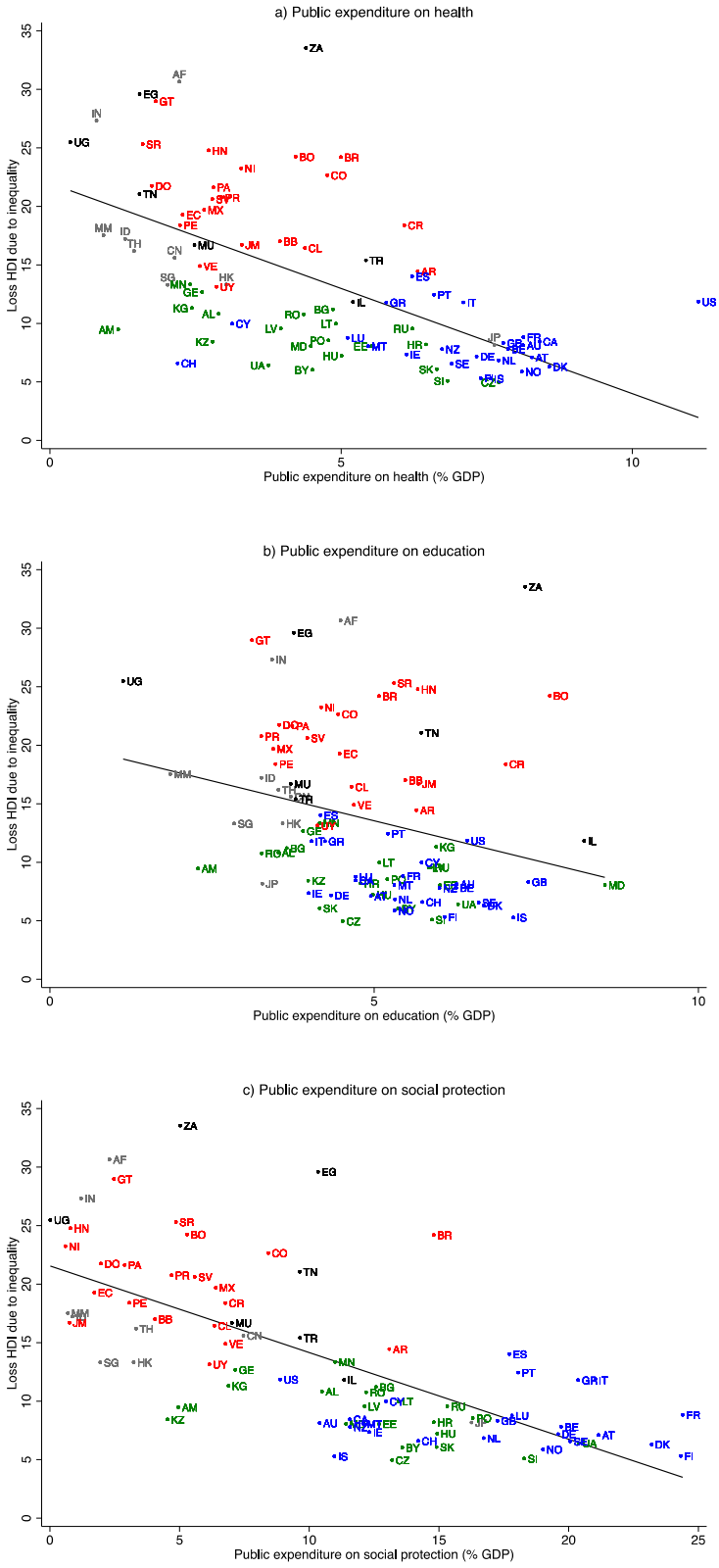
[4] The Classification of Functions of Government (COFOG) is the international framework for reporting general government expenditure at the functional level according to the purposes and objectives for which they are intended.

[5] World Bank (2018) provides the details of all elements included on the health, education and social protection expenditure, and Zouhar et al. (2021) provide a complete description of the evolution of these expenditures during the last decade.

statistics (see Table A.3 at the Appendix). Thus, public resources devoted to health in some developing economies are probably too small to have a significant impact on the level and distribution of any dimension of human development, even on life expectancy (this could be the case of Uganda, India and Myanmar with levels below 1% of their GDP), while other countries devote more than 10% of their GDP to this public policy. The variation between countries is certainly smaller in the case of the weight of public expenditure on education, while it is extremely high in the case of social protection expenditure, with some Western European countries allocating between 20-25% of their GDP to this purpose, while some developing economies allocate less than 1% of their GDP (again, see the cases of Uganda, India and Myanmar, and also of Nicaragua and Honduras).

Figure 4 plots the mean values of the Loss_HDI, that is the reduction in human development due to inequality, against public spending on health (a), education (b) and social protection (c), showing a negative relationship in all three cases. That is, economies with higher (lower) public spending on health, education, and social protection (as a percentage of GDP) are those with lower (higher) human development losses due to inequality. Therefore, the social spending policies seem to be an important way of influencing the unequal distribution of HDI (and its dimensions). Interestingly, the colours of countries in Figure 4 allow us to identify some common patterns according to their geographical location, which will be taken into account in the empirical analysis by including regional fixed effects.

Figure 4 – Loss HDI due to inequality and public expenditure on health, education and social protection (mean period 2010 – 2021)



Note: Blue label: Western Europe and North America; green: Eastern Europe and Central Asia; grey: East and South Asia; red: LAC; black: MENA and S.S. Africa.
Source: Own elaboration based on data from HDDC, CEPALSTAT and GFS-IMF.

4. Empirical model

Our sample consists on an unbalanced panel of 82 developed and developing countries over the 2010-2021 period. We have considered annual data and three-year means for the periods 2010-2012, 2013-2015, 2016-2018 and 2019-2021. Since our dependent variables move very slowly over time, the three-year means approach facilitates the identification of long-term trends and structural relationships between the key variables of interest, i.e., we neutralize the business cycle effect. In this section, we explain the modeling strategy used to address the objective of this paper. We estimate the following empirical model:

$$Loss_HDI_{it} = \beta_0 + \beta_1 GEduc_{it} + \beta_2 GHealth_{it+}\, \beta_3 GSocProt_{it+}\, \beta_4 X_{it} + \mu_t + \varepsilon_{it} \qquad (1)$$

where $i = 1, 2, \ldots I$ represents the countries in the sample and $t = 1,2, \ldots T$ denotes the time period, and β are the parameters to be estimated. *LossHDI* is the dependent variable, and we focus on the role of the public spending on health (GHealth), education (GEduc) and social protection (GSocProt). X is a vector of control variables, μ_t represents the period fixed effects (to control for global shocks) and ε is the error term.

We also consider the following three empirical models, since we estimate the same specification for each HDI dimension:

$$Loss_Health_{it} = \beta_0 + \beta_1 GEduc_{it} + \beta_2 GHealth_{it+}\, \beta_3 GSocProt_{it+}\, \beta_4 X_{it} + \mu_t + \varepsilon_{it} \qquad (2)$$

$$Loss_Education_{it} = \beta_0 + \beta_1 GEduc_{it} + \beta_2 GHealth_{it+}\, \beta_3 GSocProt_{it+}\, \beta_4 X_{it} + \mu_t + \varepsilon_{it} \qquad (3)$$

$$Loss_Income_{it} = \beta_0 + \beta_1 GEduc_{it} + \beta_2 GHealth_{it+}\, \beta_3 GSocProt_{it+}\, \beta_4 X_{it} + \mu_t + \varepsilon_{it} \qquad (4)$$

We estimate equations (1) to (4) using OLS based on panel-corrected standard errors (PCSE) which are robust to heteroscedasticity and serial correlation between the residuals of a given cross-section (Period SUR). In this type of macroeconomic panel data analysis it is common to include cross-section fixed effects because it allows to control for unobserved country specific characteristics and omitted time-invariant factors, related for instance to cultural and geographical aspects. However, if most of the variation in the key variables is between-countries rather than within-country, that limits the potential to identify causal effects using panel estimations with country fixed effects (Fallah and Partridge 2007; Castells-Quintana et al. 2019). In our analysis, this effect may be relevant since our key variables vary more between countries than within countries (see Table A.3 of Appendix).[6] Accordingly, we do not consider the inclusion of cross-section fixed effects. Nevertheless, following the arguments that more geographically diverse countries have more heterogeneous populations with different preferences and needs for the provision of public goods and services (Canavire-Bacarreza et al. 2016), and that geographical proximity leads countries to adopt policies similar to those of neighboring countries (Ligthart and Oudheusden 2017), we have considered the inclusion of regional dummy variables, which allow us to partially account for country-specific effects

[6] For instance, the Loss_HDI variable has a mean value of 13.475 and an overall standard deviation of 6.913; and while the between standard deviation is 7.069, the within standard deviation is only 0.962 (see Table A.3 in the Appendix).

(Sepúlveda and Martínez-Vázquez 2011). The five regional dummies correspond to the classification of geographical regions provided by the V-Dem Institute (2023).[7]

As we justify in the following paragraphs, we have controlled for the variables that might influence the relationship between the variables of social public expenditure and the level and distribution of human development (and its dimensions).

We control for governance because many studies have shown that the quality of institutions has an impact on economic and human development indicators, including health and education outcomes (Rajkumar and Swaroop 2008), as well as on inequality (Kyriacou 2021). To account for this factor, we construct the 'Governance Quality' variable considering the average of the following dimensions from the Worldwide Governance Indicators (WGI, Kaufmann et al. 2011): government effectiveness, rule of law, regulatory quality, and control of corruption.[8] Note that we do not consider the inclusion of GDP per capita as a control because, first, one of the dimensions of the HDI is the GNI per capita, and, second, the variable governance is highly correlated with GDP per capita and including both variables could cause multicollinearity, and consequently limit the validity of the estimates.

We include a variable to control for income inequality given the potential implications of high levels of inequality for economic and human development (Manuelyan Atinc et al. 2006), and in particular, on economic growth and health and education outcomes, although there is no consensus on its effects.[9] And since we are analyzing the impact of the social public expenditures on the loss of HDI provoked by inequalities, we have included income inequality measured by the Gini market index (i.e., income inequality before transfers and direct taxes) from The Standardized World Income Inequality Database (SWIID) developed by Solt (2020).[10] We have not considered the level of disposable income inequality (through a Gini net index) because this indicator would be already capturing how the social public expenditures impact on the distribution of different human development outcomes.

We control for the degree to which the country is ethnically fractionalized since ethnic heterogeneity weakens potential agreement regarding public goods provision (Alesina et al. 1999), and that concerns health and educational resources. In addition, we include the urban population variable because the increasing share of urban population, driven by rural immigration in developing economies over the last decade, has been associated with higher HDI (Tripathi 2021) and affects inequality (Kanbur and Zhuang 2013). Finally, we include population as a proxy of the size of the country. To sum up, and in line with previous studies, our control variables are governance, market income inequality, the degree of ethnic fractionalization, the level of urbanization and the size of a country's population.[11]

[7] Table A.1 of the Appendix provides the list of included countries and their geographic regions.

[8] This aggregated indicator of 'Governance Quality' contructed from the four mentioned WGI variables have been widely used in previous work (e.g., Olson et al. 2000; Kyriacou and Roca-Sagalés 2020).

[9] Ferreira et al. (2022) provide a complete survey of the papers dealing with the growth effects of income inequality and describe different channels linking both variables; also summarise the empirical evidence on the effects of income inequality on education and health outcomes.

[10] See Solt (2020) for a complete description of the SWIID; we employ version 9.4 (updated in November 2022).

[11] Definitions and sources of all variables are presented in Table A.2, and descriptive statistics in Table A.3.

5. Results

Table 1 presents the main findings resulting from the estimation of equations (1) to (4) using panel regression analysis, where we estimate the impact of social public expenditures on the loss of HDI and its three dimensions. The estimates are based on annual and three-year means data and include a range of explanatory factors.

(Insert Table 1 about here)

Columns 1 and 2 of Table 1 present the estimates using the Loss_HDI as the dependent variable, which show a negative and significant impact of the three variables of social expenditure (health, education, and social protection) and a positive and robust impact of other public expenditure. Accordingly, social public expenditures reduce the losses on human development provoked by inequalities, while other public expenditure increases them. In columns 3 to 8, we disaggregate the Loss_HDI into its components and consider as dependent variables the Loss_Health, Loss_Education and Loss_Income (again using annual and three-year means). The estimated results allow us to disentangle some interesting features of the impact of the public expenditure variables on the distribution of human development outcomes. Thus, public spending on health and education have a statistically significant negative impact on the education dimension (columns 3 and 4), meaning that both reduce the losses in educational attainment caused by inequality, but does not present a significant impact on the health (columns 5 and 6) and income (7 and 8) dimensions; accordingly, their impact on the aggregated human development variable (Loss_HDI) is driven by the education dimension.

With regard to the social protection expenditure, the estimated negative and significant impact on Loss_HDI is clearly a result of its negative impact on Loss_Health and on Loss_Income, that is to say, these public resources reduce the inequities in life expectancy and also on income across the country's population. This is an expected result, as social protection spending includes cash transfers (such as old-age pensions and unemployment benefits) which have a direct impact on income distribution, and consequently, on personal health status. In addition, social protection expenditure has a positive impact on Loss_Education, increasing the inequality on the education achievement (years of schooling). This impact could be explained by a social dominance effect where the increasing ageing population raises social protection expenditure, crowding-out other public expenditures like education (Schuknecht and Zemanek 2021).

Conversely, the impact of the 'other expenditure' increasing the losses on HDI provoked by inequality is explained by the income dimension, since the health and education dimensions are not affected. In this case, the heterogeneity of the public resources that fall under this residual category (devoted to the rest of functions, such as defense, public order, economic affairs, and others) makes it difficult to go further in explaining the possible channels involved.

Insofar as the control variables are concerned, these exhibit the expected signs, with governance and urbanization having a negative sign, while market income inequality and ethnic fractionalization have a positive impact. In particular, the empirical estimates in

Table 1 reveal a robust and negative impact of governance, confirming that the quality of institutions affects the distribution of human development, regardless of the dimension considered. Thus, higher levels of governance reduce the losses caused by inequalities, in terms of life expectancy, years of schooling, income per capita, and at the aggregated level of human development. Moreover, we obtain a robust and negative impact of urban population, possibly indicating that higher levels of urbanization are associated with high income per-capita and demand for health and education services, suggesting that the urban context enhances socioeconomic conditions (Mehmood et al. 2010). This result is consistent with previous studies, such as Castells-Quintana et al. (2019), that find a significant positive impact on the level of HDI.

The obtained results also show a significant positive impact of market income inequality on the loss of HDI and its three components. Therefore, increases in household income inequality due to changes in the distribution of labor and capital rents (market income inequality), are translated into an increase in the losses of the human development indicators provoked by inequalities. Additionally, ethnic fractionalization has the expected positive and significant effect in all cases.

Finally, the dummy variables corresponding to the geographical regions are significant, most of them being significant at the 1% level, suggesting that there is a regional fixed effect. In particular, the three regions that do not include European countries exhibit a positive difference with respect to the omitted region (Western Europe and North America), while the other regions (East Europe and Central Asia) shows a negative coefficient. Accordingly, non-European regions present a greater inequality-induced loss in HDI above the predicted by the explanatory variables. Nevertheless, the time-invariant characteristics of these regions (such as geography, climate and cultural background) influence the distribution of the human development achievements.

6. Robustness analysis

In this section, we examine the robustness of our results following different strategies. Firstly, we propose to account for the possibility that the effects generated by the public expenditure variables are not contemporaneous by introducing a different lagged structure of the government expenditure variables. Secondly, we address the potential endogeneity that may affect the results of our baseline models by using a Two-Stage Least Square (TSLS) estimation strategy. Finally, we examine the role of other potential confounding variables, namely inflation, openness, democracy and decentralization.

(Insert Table 2 about here)

We first examine the possibility that the expenditure variables do not impact on the HDI variables contemporaneously. To do this, we estimate our baseline models employing one and two period lagged values of the public expenditure variables. As can be seen in columns 1-8 of Table 2, considering a different timing of effects does not modify our results.

We now turn to address endogeneity concerns related to the fact that our dependent variables may affect policymakers' spending decisions. For example, social protection

expenditure should affect health status, such as improving the level of life expectancy or reducing the disparity on its distribution, but there is also a potential feedback effect from life expectancy, as it leads to an increase in social protection spending because older people may imply more old-age pensions payments. To tackle these potential endogeneity issues, we estimate our baseline model using a TSLS method, instrumenting the potentially endogenous variables with their lagged values. Columns 9 to 12 of Table 2 present the results for the TSLS estimations, which show that the overall implications of the estimates are unchanged from the OLS estimates, thus confirming the impact of social public expenditures on human development outcomes distribution. Both strategies provide further reassurance that endogeneity issues and non-contemporaneous impacts do not affect the estimated results.

(Insert Table 3 about here)

In Table 3, we provide the results (both annual and in three-year means) of our main case (equation 1) to examine the sensitivity of our main findings when controlling for other potential confounding variables. We first consider the 'inflation' variable to capture the fact that an economy with a high level of inflation worsens the purchasing power of the population and access to health and education services (Yolanda 2017), which may negatively affect human development outcomes (Castells-Quintana et al. 2019; Paliova et al. 2019) and their distribution. The results we obtain when including this additional control (see columns 1 and 2) are maintained, and we do not find clear and robust evidence of its impact on the loss of HDI due to inequality.

We also consider the sum of exports and imports to GDP as a proxy for trade openness, in order to control for the potential effect of the volume of trade on income and, consequently, on HDI, with the idea that an economy with a high degree of trade openness has favourable conditions to raise income (Paliova et al. 2019) and may have distributional and welfare implications increasing inequality (Antràs et al. 2017). Our results (see columns 3 and 4) show the expected positive sign of trade openness, indicating that it increases the losses on human development outcomes caused by inequality.

Besides, we introduce a variable controlling for the level of democracy, since this variable can influence human development and its distribution affecting population well-being (Gerring et al. 2012; Bellinger 2019; Gerring et al. 2021). The channels through which it can affect human development distribution could be related to higher electoral competition and accountability. Thus, we include the variable 'democracy', which is obtained by combining the variables 'political rights' and 'civil liberties' from V-Dem Institute (2023) and Freedom House (2023). We obtain the expected results in the sense that democracy reduces the losses of human development provoked by inequality, but the results are not fully robust (see columns 5 and 6).

Finally, we consider the potential effect of decentralization, following the arguments that it may reduce available resources to national authorities (central governments) and that redistribution is essentially a national policy (Oates 1999, 2005). We control for decentralization by introducing the variable 'federalism' from Gerring and Thacker (2004) and, as expected, we obtain a positive sign indicating that more decentralized countries reduce redistribution, increasing the inequality on human development outcomes (see columns 7 and 8).

It is important to note that the inclusion of these additional control variables does not modify our main results and confirms the sign, magnitude, and significance of the expenditure variables; accordingly, the results of Table 3 allow us to ratify the impact of public social expenditures in reducing the losses in human development outcomes provoked by inequality.

7. Conclusions

This paper investigates how social public expenditures affect the distribution of the human development outcomes by using data from a sample of 82 developed and developing countries over the 2010-2021 period. Specifically, we study how public social expenditure on health, education and social protection, impact on the loss of human development due to inequality. Our approach emphasizes that it is not only the average level of human development achieved by a country that is relevant, but also the distribution of these achievements across the population. Our contribution focuses on how this distribution could be modified by social public spending. In this sense, it is important to insist that our analysis does not examine the impact of social public spending on human development as measured by the HDI indicators but rather focuses on the impact of these expenditure policies on the distribution of human development outcomes. Our analysis complements the existing literature by highlighting the role of social public spending in improving the level of human development outcomes as measured by the HDI and its dimensions.

Our findings are quite conclusive, pointing to the relevance of social public spending in relation to the reduction of HDI losses, albeit with diverse impacts on the different HDI dimensions. In particular, the results obtained indicate that social protection expenditure (which includes cash transfers for old-age pensions and unemployment benefits) reduces the inequities in life expectancy and income per capita across the country's population, while health and education public expenditures reduce the losses on the educational achievement (years of schooling) provoked by inequality. In the recent period, characterized by the strong impact of the COVID pandemic, it is noteworthy to emphasize that, according to our results, the social public expenditure that could have a more immediate impact in reducing life expectancy inequality is social public protection, while health expenditure could have an important impact in improving the average level of life expectancy of the country's population, as has been shown in the literature.

Nevertheless, the impact of social public policies on the equitable human development across the country's population is not just a matter of the amount of public resources devoted to these specific expenditure functions. Governments can pursue social objectives without affecting social spending; for example, through minimum wage regulations, by requiring individuals and companies to contribute to public or private pension schemes, or even through other public spending programs related to infrastructure (such as water and sanitation). In addition, other forms of spending on health, education, and social protection also matter for human development outcomes, such as private resources provided by households, charitable activities, or foreign-aid-funded projects, all of them not included in the public budget. The lack of homogenous

data on these items for our sample of countries did not allow their inclusion in our empirical analysis. It is obvious that ignoring these factors may limit the validity of our results on the impact of social spending and points to the need for further research to address these policy concerns more exhaustively.

References

Adedokun, A. J. (2017) 'Foreign Aid, Governance and Economic Growth in Sub-Saharan Africa: Does One Cap Fit All?', *African Development Review*, **29**, 184–196.

Alesina, A., Baqir, R. and Easterly, W. (1999) 'Public Goods and Ethnic Divisions', *Quarterly Journal of Economics*, **114**, 1243–1284.

Alesina, A., Devleeschauwer, A., Easterly, W., Kurlat, S. and Wacziarg, R. (2003) 'Fractionalization', *Journal of Economic Growth*, **8**, 155–194.

Antràs, P., de Gortari, A. and Itskhoki, O. (2017) 'Globalization, Inequality and Welfare', *Journal of International Economics*, **108**, 387–412.

Anyanwu, J. C. and Erhijakpor, A. E. O. (2009) 'Health Expenditures and Health Outcomes in Africa', *African Development Review*, **21**, 400–433.

Baldacci, E., Clements, B., Gupta, S. and Cui, Q. (2008) 'Social Spending, Human Capital, and Growth in Developing Countries', *World Development*, **36**, 1317–1341.

Bellinger, N. M. (2019) 'Why Democracy Matters: Democratic Attributes and Human Well-Being', *Journal of International Relations and Development*, **22**, 413–440.

Bidani, B. and Ravallion, M. (1997) 'Decomposing Social Indicators Using Distributional Data', *Journal of Econometrics*, **77**, 125–139.

Caminada, K., Goudswaard, K., Wang, C. and Wang, J. (2019) 'Income Inequality and Fiscal Redistribution in 31 Countries after the Crisis', *Comparative Economic Studies*, **61**, 119–148.

Canavire-Bacarreza, G., Martinez-Vazquez, J. and Yedgenov, B. (2016) 'Reexamining the Determinants of Fiscal Decentralization: What Is the Role of Geography?', *Journal of Economic Geography*, **17**, 1209–1249.

Castelló-Climent, A. and Doménech, R. (2014) *Human Capital and Income Inequality: Some Facts and Some Puzzles*, Madrid, Spain, BBVA.

Castells-Quintana, D., Royuela, V. and Thiel, F. (2019) 'Inequality and Sustainable Development: Insights from an Analysis of the Human Development Index', *Sustainable Development*, **27**, 448–460.

Fallah, B. N. and Partridge, M. (2007) 'The Elusive Inequality-Economic Growth Relationship: Are There Differences between Cities and the Countryside?', *The Annals of Regional Science*, **41**, 375–400.

Ferreira, I. A., Gisselquist, R. M. and Tarp, F. (2022) 'On the Impact of Inequality on Growth, Human Development, and Governance', *International Studies Review*, **24**, viab058.

Filmer, D. and Pritchett, L. (1999) 'The Impact of Public Spending on Health: Does Money Matter?', *Social Science & Medicine*, **49**, 1309–1323.

Freedom House (2023) 'Freedom in the World 2023. Washington, D.C.'

Gerring, J., Knutsen, C. H., Maguire, M., Skaaning, S.-E., Teorell, J. and Coppedge, M. (2021) 'Democracy and Human Development: Issues of Conceptualization and Measurement', *Democratization*, **28**, 308–332.

Gerring, J. and Thacker, S. C. (2004) 'Political Institutions and Corruption: The Role of Unitarism and Parliamentarism', *British Journal of Political Science*, **34**, 295–330.

Gerring, J., Thacker, S. C. and Alfaro, R. (2012) 'Democracy and Human Development', *The Journal of Politics*, **74**, 1–17.

Goñi, E., Humberto López, J. and Servén, L. (2011) 'Fiscal Redistribution and Income Inequality in Latin America', *World Development*, **39**, 1558–1569.

Gupta, S., Davoodi, H. and Tiongson, E. (2001) 'Corruption and the Provision of Health Care and Education Services'. In *The Political Economy of Corruption*, London,

Routledge, p. 31.
Haile, F. and Niño-Zarazúa, M. (2018) 'Does Social Spending Improve Welfare in Low-Income and Middle-Income Countries?', *Journal of International Development*, **30**, 367–398.
International Monetary Fund (2017) *IMF Fiscal Monitor: Tackling Inequality*, Washington, October, International Monetary Fund, IMF.
Kanbur, R. and Zhuang, J. (2013) 'Urbanization and Inequality in Asia', *Asian Development Review*, **30**, 131–147.
Kaufmann, D., Kraay, A. and Mastruzzi, M. (2011) 'The Worldwide Governance Indicators: Methodology and Analytical Issues', *Hague Journal on the Rule of Law*, **3**, 220–246.
Klugman, J., Rodríguez, F. and Choi, H.-J. (2011) 'The HDI 2010: New Controversies, Old Critiques', *The Journal of Economic Inequality*, **9**, 249–288.
Kyriacou, A. P. (2021) *Inequality and Governance*, New York, NY, Routledge.
Kyriacou, A. P. and Roca-Sagalés, O. (2020) 'Does Decentralising Public Procurement Affect the Quality of Governance? Evidence from Local Government in Europe', *Local Government Studies*, **0**, 1–26.
Ligthart, J. E. and Oudheusden, P. van (2017) 'The Fiscal Decentralisation and Economic Growth Nexus Revisited', *Fiscal Studies*, **38**, 141–171.
Manuelyan Atinc, T., Banerjee, A., Ferreira, F. H. G., Lanjouw, P. F., Menendez, M., Ozler, B., Prennushi, G., Rao, V., Robinson, J., Walton, M. and Woolcock, M. (2006) *World Development Report 2006 : Equity and Development*, Washington, D.C., World Bank Group.
Mauro, P. (1998) 'Corruption and the Composition of Government Expenditure', *Journal of Public Economics*, **69**, 263–279.
Mehmood, R., Sadiq, S. and Khalid, M. (2010) 'Impact of Fiscal Decentralisation on Human Development: A Case Study of Pakistan', *The Pakistan Development Review*, **49**, 513–530.
Miranda-Lescano, R., Muinelo-Gallo, L. and Roca-Sagalés, O. (2023) 'Human Development and Decentralization: The Importance of Public Health Expenditure', *Annals of Public and Cooperative Economics*, **94**, 191–219.
Nixon, J. and Ulmann, P. (2006) 'The Relationship between Health Care Expenditure and Health Outcomes: Evidence and Caveats for a Causal Link', *The European Journal of Health Economics*, **7**, 7–18.
Oates, W. E. (1999) 'An Essay on Fiscal Federalism', *Journal of Economic Literature*, **37**, 1120–1149.
Oates, W. E. (2005) 'Toward a Second-Generation Theory of Fiscal Federalism', *International Tax and Public Finance*, **12**, 349–373.
Olson, M., Sarna, N. and Swamy, A. V. (2000) 'Governance and Growth: A Simple Hypothesis Explaining Cross-Country Differences in Productivity Growth', *Public Choice*, **102**, 341–364.
Paliova, I., Mcnown, R. and Nülle, G. (2019) *Multiple Dimensions of Human Development Index and Public Social Spending for Sustainable Development*, IMF Working Paper No. 19/204, Washington D.C., International Monetary Fund (IMF).
Rajkumar, A. S. and Swaroop, V. (2002) *Public Spending and Outcomes: Does Government Matter?*, World Bank Policy Research Working Paper 2840, Washington, D.C., The World Bank.
Rajkumar, A. S. and Swaroop, V. (2008) 'Public Spending and Outcomes: Does Governance Matter?', *Journal of Development Economics*, **86**, 96–111.
Sánchez, Á. and Pérez-Corral, A. L. (2018) 'Government Social Expenditure and Income

Inequalities in the European Union', *Revista Hacienda Pública Española*, **227**, 133–156.
Schuknecht, L. and Zemanek, H. (2021) 'Public Expenditures and the Risk of Social Dominance', *Public Choice*, **188**, 95–120.
Sepúlveda, C. F. and Martínez-Vázquez, J. (2011) 'The Consequences of Fiscal Decentralization on Poverty and Income Equality', *Environment and Planning C: Government and Policy*, **29**, 321–343.
Seth, S. and Villar, A. (2017) *Human Development, Inequality, and Poverty: Empirical Findings*, Oxford, UK., Oxford Poverty & Human Development Initiative (OPHI), University of Oxford.
Solt, F. (2020) 'Measuring Income Inequality across Countries and over Time: The Standardized World Income Inequality Database', *Social Science Quarterly. SWIID Version 9.4*, **101**, 1183–1199.
Tripathi, S. (2021) 'How Does Urbanization Affect the Human Development Index? A Cross-Country Analysis', *Asia-Pacific Journal of Regional Science*, **5**, 1053–1080.
UNDP (2020) *Human Development Report Technical Notes*, Technical notes, New York, United Nations Development Programme.
V-Dem Institute (2023) 'V-Dem Codebook V13 Varieties of Democracy (V-Dem) Project.'
Villela, L. A., Roca, J. and Barreix, A. D. (2007) *Fiscal Policy and Equity: Estimation of the Progressivity and Redistributive Capacity of Taxes and Social Public Expenditure in the Andean Countries*, Technical Notes, Inter-American Development Bank.
Wang, C., Caminada, K. and Goudswaard, K. (2012) 'The Redistributive Effect of Social Transfer Programmes and Taxes: A Decomposition across Countries', *International Social Security Review*, **65**, 27–48.
WHO (2022) *Global Spending on Health: Rising to the Pandemic's Challenges*, Geneva, Switzerland, World Health Organization.
World Bank (2018) *The State of Social Safety Nets 2018*, Washington, DC., World Bank.
Yolanda, Y. (2017) 'Analysis of Factors Affecting Inflation and Its Impact on Human Development Index and Poverty in Indonesia', *European Research Studies Journal*, **20**, 38–56.
Zouhar, Y., Jellema, J., Lustig, N. and Mohamed, T. (2021) *Public Expenditure and Inclusive Growth - A Survey*, Washington, D.C., International Minetary Fund, IMF.

Appendix:

List of countries, definition of variables and sources, and descriptive statistics

Table A.1 – List of countries (per regions) and codes

Eastern Europe and Central Asia		*Latin America and the Caribbean*		*Western Europe and North America*	
Albania	AL	Argentina	AR	Australia	AU
Armenia	AM	Barbados	BB	Austria	AT
Belarus	BY	Bolivia	BO	Belgium	BE
Bulgaria	BG	Brazil	BR	Canada	CA
Croatia	HR	Chile	CL	Cyprus	CY
Czechia	CZ	Colombia	CO	Denmark	DK
Estonia	EE	Costa Rica	CR	Finland	FI
Georgia	GE	Republic	DO	France	FR
Hungary	HU	Dominican		Germany	DE
Kazakhstan	KZ	Ecuador	EC	Greece	GR
Kyrgyzstan	KG	El Salvador	SV	Iceland	IS
Latvia	LV	Guatemala	GT	Ireland	IE
Lithuania	LT	Honduras	HN	Italy	IT
Moldova	MD	Jamaica	JM	Luxembourg	LU
Mongolia	MN	Mexico	MX	Malta	MT
Poland	PO	Nicaragua	NI	Netherlands	NL
Romania	RO	Panama	PA	New Zealand	NZ
Russia	RU	Paraguay	PR	Norway	NO
Federation		Peru	PE	Portugal	PT
Slovakia	SK	Suriname	SR	Spain	ES
Slovenia	SI	Uruguay	UY	Sweden	SE
Ukraine	UA	Venezuela	VE	Switzerland	CH
				United Kingdom	GB
				United States	US

Eastern and South Asia		*Middle East and North Africa and Sub-Saharan Africa*	
Afghanistan	AF	Egypt	EG
China	CN	Israel	IL
Hong Kong	HK	Mauritius	MU
India	IN	South Africa	ZA
Indonesia	ID	Tunisia	TN
Japan	JP	Turkey	TR
Myanmar	MM	Uganda	UG
Singapore	SG		
Thailand	TH		

Note: Country classification in five regions based on geographical regions from V-Dem Institute (2023).

Table A.2 – Definition of variables and sources

Variable	Definition	Sources
Human Development Index (HDI)	A summary measure of average achievement in the health, education and income dimensions of human development in the country. The HDI is the geometric mean of normalised indices for each of the three dimensions.	United Nations Development Programme (UNDP). Human Development Reports 2020 (HDR).
Health index	Number of years a newborn infant could expect to live if prevailing patterns of age-specific mortality rates at the time of birth stay the same throughout the infant's life.	UNDP-HDR.
Education index	Combination of the average of the number of years of schooling that a child of school entrance age can expect to receive if prevailing patterns of age-specific enrolment rates persist throughout the child's life, and the average number of years of education received by people ages 25 and older, converted from educational attainment levels using official durations of each level.	UNDP-HDR.
Income index	Gross National Income (GNI) per capita adjusted for the price level of the country (2017 PPP USD) in logs.	UNDP-HDR.
Inequality-adjusted Human Development Index (IHDI)	Measures the level of human development when inequality is accounted for. The IHDI accounts for inequalities in HDI dimensions by "discounting" each dimension's average value according to its level of inequality.	UNDP-HDR.
Inequality-adjusted education index	The index accounts for inequalities in the education index of the HDI by "discounting" the value according to its level of inequality.	UNDP-HDR.
Inequality-adjusted health index	The index accounts for inequalities in the health index of the HDI by "discounting" the value according to its level of inequality.	UNDP-HDR.
Inequality-adjusted income index	The index accounts for inequalities in the income index of the HDI by "discounting" the value according to its level of inequality.	UNDP-HDR.
Loss HDI	The difference between HDI and IHDI in terms of HDI, expressed as a percentage.	UNDP-HDR.
Loss Education	The difference between education index and inequality-adjusted education index, expressed as a percentage.	UNDP-HDR.
Loss Health	The difference between health index and inequality-adjusted health index, expressed as a percentage.	UNDP-HDR.
Loss Income	The difference between income index and inequality-adjusted income index, expressed as a percentage.	UNDP-HDR.
Public education expenditure	Comprises pre-primary and primary education, secondary education, post-secondary non-tertiary education, tertiary education, education not definable by level, subsidiary services to education, R&D education, education n.e.c. (% of GDP)	Government Finance Statistics of the International Monetary Fund (GFS-IMF) database.
Public health expenditure	Includes medical products, appliances and equip, outpatient services, hospital services, public health services, R&H health, health n.e.c. (% of GDP)	GFS-IMF database.
Public social protection expenditure	Comprises nine sub-functions: sickness and disability; old age (i.e. pensions); survivors; family and children; unemployment; housing; social exclusion n.e.c.; R&D social protection; and social protection n.e.c. (% of GDP)	GFS-IMF database.
Other public expenditure	Variable obtained subtracting education, health and social protection public expenditure from the total general government expenditure, as a share of GDP. It comprises: general public service, defense, public order and safety, economic affairs, environmental protection, housing and community services, recreation, culture and religion.	GFS-IMF database.
Governance Quality	Average of the following dimensions: government effectiveness, rule of law, regulatory quality, and control of corruption. Total range = 0-100, with higher values indicating more quality of governance.	World Governance Indicators (WGI) (Kaufmann et al. 2011).
Urban population	Urban population, as a share of total population.	World Development Indicators (WDI).
Population	Population, total. (in logs)	WDI.

Variable	Definition	Sources
Ethnic fractionalisation	The probability that two randomly selected individuals belongs to different ethnical groups, and so increases with the number of groups. Complete ethnic homogeneity (an index of 0) to complete heterogeneity (an index of 1).	Alesina et al. (2003).
Market Income inequality	Gini coefficient based on market income inequality (Gini market). It measures household pre-tax and pre-transfer income inequality, i.e. excluding any government cash or near-cash benefits.	The Standardized World Income Inequality Database (SWIID), Solt (2020).
Federalism	Federalism involves 5 categories: 1, non-federal; 2, semi-federal (elective regional legislatures/ constitutional sovereignty at national level); 3, federal (elective regional legislatures and constitutional recognition of subnational authority); add 1 if weak bicameral; add 2 if strong bicameral. Total range = 1-5, with higher values indicating more federal. Data from 1997.	Gerring and Thacker (2004)
Inflation	Consumer prices (annual % of variation).	WDI.
Democracy	Countries whose combined average ratings for Political Rights (1-7) and Civil Liberties (1-7) (using an inverse scale, i.e., 1 is not free and 7 is free) fell between 1.0 and 2.5 are considered Not Free (scale 1); between 3.0 and 5.0 are considered Partly Free (scale: 2); and between 5.5 and 7.0 are considered Free (scale 3).	V-Dem Institute (2023) and Freedom House (2023)
Trade openness	Sum of exports and imports (% of GDP)	WDI.

Table A.3 – Summary statistics

Variable		*Mean*	*Std. Dev.*	*Minimum*	*Maximum*	*No. Obs.*	
Human Development Index (HDI)	Overall	81.100	10.726	44.800	96.200	N =	984
	Between		10.698	47.467	95.350	n =	82
	Within		1.366	75.058	84.891	T =	12
Health index	Overall	86.586	8.285	57.007	100	N =	984
	Between		8.227	62.836	99.049	n =	82
	Within		1.312	79.655	90.849	T =	12
Education index	Overall	77.174	13.319	32.025	100	N =	984
	Between		13.188	35.900	99.901	n =	82
	Within		2.327	65.753	83.89	T =	12
Income index	Overall	80.676	12.428	43.862	100	N =	984
	Between		12.396	45.436	100	n =	82
	Within		1.583	66.238	87.755	T =	12
Inequality-adjusted HDI (IHDI)	Overall	71.246	13.212	31.200	91.500	N =	923
	Between		13.809	31.667	89.742	n =	82
	Within		1.598	64.786	75.505	T =	11.3
Inequality-adjusted health index	Overall	80.670	11.056	41.579	98.658	N =	923
	Between		11.862	42.724	96.983	n =	82
	Within		1.520	73.650	85.088	T =	11.3
Inequality-adjusted education index	Overall	70.782	16.688	18.189	100	N =	923
	Between		17.422	18.416	99.653	n =	82
	Within		2.395	59.164	76.992	T =	11.3
Inequality-adjusted income index	Overall	64.484	14.060	31.339	88.583	N =	923
	Between		14.153	32.454	87.004	n =	82
	Within		2.038	53.020	71.645	T =	11.3
Loss_HDI	Overall	13.475	6.913	4.357	34.103	N =	923
	Between		7.069	4.966	33.544	n =	82
	Within		0.962	9.898	18.126	T =	11.2
Loss_Health	Overall	10.408	9.108	0.000	44.823	N =	923
	Between		9.682	0.252	44.152	n =	82
	Within		1.024	7.501	16.501	T =	11.2
Loss_Education	Overall	7.686	5.314	1.954	33.842	N =	923
	Between		5.951	2.279	32.925	n =	82
	Within		0.883	3.644	12.350	T =	11.2
Loss_Income	Overall	21.219	9.383	5.845	56.996	N =	923
	Between		9.394	5.845	56.134	n =	82
	Within		1.744	15.719	31.367	T =	11.2
Public Expenditure on Education (% GDP)	Overall	4.883	1.495	0.718	10.917	N =	874
	Between		1.408	1.129	8.558	n =	82
	Within		0.526	1.622	7.487	T =	10.7
Public Expenditure on Health (% GDP)	Overall	4.710	2.428	0.005	13.061	N =	874
	Between		2.389	0.353	11.134	n =	82
	Within		0.585	2.258	7.487	T =	10.7
Public Expenditure on Social Protection (% GDP)	Overall	10.834	6.705	0.008	30.096	N =	871
	Between		6.556	0.019	24.397	n =	82
	Within		1.452	0.000	20.543	T =	10.6
Other Public Expenditure (% GDP)	Overall	16.744	6.640	0.909	85.569	N =	871
	Between		6.494	0.994	56.352	n =	82
	Within		2.713	0.000	45.961	T =	10.6

Variable		*Mean*	*Std. Dev.*	*Minimum*	*Maximum*	*No. Obs.*	*Variable*
Urban population (% total population)	Overall	69.134	17.951	19.383	100	N =	984
	Between		18.010	22.391	100	n =	82
	Within		1.235	62.329	75.615	T =	12
Market Income inequality	Overall	46.505	5.606	32.600	72.100	N =	864
	Between		5.760	32.800	71.513	n =	82
	Within		0.846	43.463	50.263	T =	10.5
Ethnic fractionalisation	Overall	0.350	0.224	0.012	0.930	N =	82
	Between		0.226	0.012	0.930	n =	82
Governance Quality (0 – 100 index)	Overall	59.042	19.397	9.967	92.789	N =	984
	Between		19.385	16.603	90.979	n =	82
	Within		2.159	47.136	65.727	T =	12
Population (in logarithm)	Overall	16.336	1.700	12.523	21.069	N =	984
	Between		1.709	12.536	21.046	n =	82
	Within		0.040	16.150	16.515	T =	12
Federalism	Overall	1.927	1.387	1	5	N =	82
	Between		1.395	1	5	n =	82
Democracy	Overall	5.573	1.665	1	7	N =	972
	Between		1.645	1.5	7	n =	81
	Within		0.311	2.490	6.906	T =	12
Inflation	Overall	3.613	5.088	-2.097	59.220	N =	951
	Between		3.554	0.009	21.327	n =	80
	Within		3.738	-15.791	47.041	T =	11.9
Trade openness (% GDP)	Overall	97.658	69.783	11.855	442.620	N =	953
	Between		69.321	27.328	395.606	n =	80
	Within		10.066	48.404	148.306	T =	11.9

Note: Democracy data are not available for Hong Kong. Inflation data are not available for Argentina and Venezuela. Trade data are not available for Afghanistan and Surinam.
Source: Own estimations.

Table 1. Public Expenditure and Loss of HDI

Dependent variable:	Loss_HDI Annual	Loss_HDI 3 year mean	Loss_Educ Annual	Loss_Educ 3 year mean	Loss_Health Annual	Loss_Health 3 year mean	Loss_Income Annual	Loss_Income 3 year mean
Expenditure on Education	-0.208**	-0.235	-0.701***	-0.713***	0.032	-0.020	-0.016	-0.004
	(0.093)	(0.152)	(0.144)	(0.256)	(0.085)	(0.138)	(0.148)	(0.242)
Expenditure on Health	-0.167***	-0.206**	-0.551***	-0.597***	-0.017	0.014	0.012	-0.067
	(0.063)	(0.104)	(0.136)	(0.228)	(0.064)	(0.103)	(0.101)	(0.172)
Expenditure on Social Protection	-0.110***	-0.097***	0.164***	0.150***	-0.144***	-0.144***	-0.287***	-0.266***
	(0.019)	(0.029)	(0.033)	(0.052)	(0.018)	(0.028)	(0.031)	(0.053)
Other Expenditure	0.083***	0.106**	0.024	0.009	0.063	0.047	0.097**	0.183**
	(0.029)	(0.044)	(0.073)	(0.135)	(0.039)	(0.064)	(0.044)	(0.089)
Governance Quality	-0.105***	-0.096***	-0.171***	-0.166***	-0.116***	-0.118***	-0.035**	-0.010
	(0.009)	(0.014)	(0.019)	(0.031)	(0.009)	(0.015)	(0.017)	(0.028)
Urban population	-0.045***	-0.045***	-0.083***	-0.082***	-0.078***	-0.080***	0.028**	0.029
	(0.008)	(0.013)	(0.019)	(0.029)	(0.008)	(0.012)	(0.012)	(0.019)
Population (in logs)	0.050	0.065	-0.173	-0.039	0.021	0.018	0.259**	0.249
	(0.076)	(0.127)	(0.167)	(0.266)	(0.074)	(0.116)	(0.110)	(0.198)
Ethnic fractionalization	3.691***	3.809***	1.881*	0.749	5.277***	5.570***	3.708***	4.370***
	(0.524)	(0.860)	(1.026)	(1.715)	(0.520)	(0.803)	(0.792)	(1.399)
Market income inequality	0.336***	0.349***	0.091**	0.069	0.043*	0.063*	0.778***	0.799***
	(0.020)	(0.028)	(0.035)	(0.059)	(0.023)	(0.034)	(0.034)	(0.049)
Eastern and South Asia	3.219***	3.190***	4.542***	3.774**	0.220	0.223	4.296***	4.493***
	(0.513)	(0.812)	(0.941)	(1.514)	(0.529)	(0.850)	(0.813)	(1.357)
E. Europe and C. Asia	-3.197***	-3.215***	-8.379***	-8.497***	-3.158***	-3.356***	1.611***	1.800**
	(0.240)	(0.374)	(0.472)	(0.767)	(0.296)	(0.472)	(0.461)	(0.773)
Latin America and the Caribbean	6.101***	6.179***	2.912***	2.460*	0.632*	0.241	13.430***	14.199***
	(0.366)	(0.562)	(0.834)	(1.314)	(0.367)	(0.566)	(0.613)	(0.991)
MENA and S.S. Africa	5.484***	6.180***	5.942***	6.607***	0.663	1.055	8.862***	9.600***
	(0.570)	(0.938)	(0.937)	(1.569)	(0.503)	(0.781)	(0.711)	(1.126)
Constant	5.814***	3.690*	29.490***	28.572***	17.971***	17.376***	-23.857***	-28.545***
	(1.476)	(2.163)	(2.827)	(4.514)	(1.938)	(3.014)	(2.705)	(4.115)
Adjusted R^2	0.869	0.877	0.695	0.704	0.779	0.791	0.835	0.837
Chi2	4544	2149	1868	821	1844	760	3717	1635
Countries	82	82	82	82	82	82	82	82
Observations	754	288	754	288	754	288	754	288

Notes: All regressions report PCSE in parentheses and include period Fixed Effects. Level of significance: 10% (*), 5% (**), and 1% (***). *Source:* Own estimations.

Table 2 – Lagged structure of government expenditure variables and Two-Stage Least Square (2SLS). Annual data

	Lagged structure of government expenditure variables								*TSLS*			
Dependent variable:	*Loss_HDI (h=1 lag)*	*Loss_HDI (h=2 lags)*	*Loss_Educ (h=1 lag)*	*Loss_Educ (h=2 lags)*	*Loss_Health (h=1 lag)*	*Loss_Health (h=2 lags)*	*Loss_Income (h=1 lag)*	*Loss_Income (h=2 lags)*	*Loss_HDI*	*Loss_Educ*	*Loss_Health*	*Loss_Income*
Expenditure on Education	-0.198** (0.095)	-0.127 (0.101)	-0.659*** (0.153)	-0.544*** (0.164)	0.044 (0.088)	0.115 (0.094)	-0.046 (0.151)	-0.034 (0.154)	-0.277 (0.193)	-0.784** (0.361)	0.006 (0.201)	-0.103 (0.308)
Expenditure on Health	-0.189*** (0.066)	-0.237*** (0.070)	-0.626*** (0.144)	-0.760*** (0.149)	-0.036 (0.066)	-0.072 (0.066)	0.043 (0.105)	0.075 (0.107)	-0.185 (0.182)	-0.599* (0.343)	-0.027 (0.191)	0.018*** (0.289)
Expenditure on Social Protection	-0.096*** (0.019)	-0.095*** (0.020)	0.181*** (0.034)	0.190*** (0.037)	-0.140*** (0.018)	-0.139*** (0.018)	-0.271*** (0.032)	-0.276*** (0.034)	-0.112* (0.064)	0.192 (0.121)	-0.149** (0.067)	-0.309*** (0.102)
Other Expenditure	0.080*** (0.031)	0.064*** (0.036)	0.004 (0.084)	-0.071 (0.093)	0.051 (0.043)	0.008 (0.051)	0.123** (0.052)	0.190*** (0.058)	0.099*** (0.042)	0.009 (0.080)	0.071* (0.043)	0.142** (0.066)
Governance Quality	-0.101*** (0.009)	-0.099*** (0.010)	-0.169*** (0.019)	-0.169*** (0.020)	-0.109*** (0.009)	-0.108*** (0.009)	-0.034* (0.017)	-0.028 (0.018)	-0.102*** (0.026)	-0.177*** (0.049)	-0.109*** (0.027)	-0.030 (0.041)
Urban population	-0.046*** (0.008)	-0.047*** (0.009)	-0.083*** (0.019)	-0.081*** (0.020)	-0.076*** (0.009)	-0.071*** (0.009)	0.023* (0.012)	0.014* (0.013)	-0.039** (0.018)	-0.073** (0.034)	-0.072*** (0.019)	0.028 (0.028)
Population (in logs)	0.084 (0.080)	0.138* (0.084)	-0.103 (0.176)	0.009 (0.180)	0.057 (0.076)	0.093 (0.079)	0.252** (0.115)	0.259** (0.119)	0.051 (0.199)	-0.0210 (0.374)	0.042 (0.208)	0.272 (0.315)
Ethnic fractionalization	3.411*** (0.539)	3.008*** (0.565)	1.276 (1.084)	0.143 (1.164)	5.187*** (0.541)	5.028*** (0.594)	3.621*** (0.826)	3.732*** (0.879)	3.577*** (1.274)	1.736 (2.390)	5.173*** (1.337)	3.582* (2.030)
Market income inequality	0.341*** (0.020)	0.339*** (0.021)	0.090** (0.038)	0.085** (0.040)	0.051** (0.024)	0.061** (0.027)	0.783*** (0.033)	0.769*** (0.033)	0.348*** (0.049)	0.104*** (0.092)	0.057 (0.051)	0.784*** (0.077)
Eastern and South Asia	3.294*** (0.526)	3.121*** (0.548)	4.434*** (0.984)	3.811*** (1.049)	0.115 (0.538)	-0.114 (0.583)	4.724*** (0.849)	5.060*** (0.885)	2.982** (1.260)	4.345* (2.364)	0.012 (1.323)	4.119** (2.007)
E. Europe and C. Asia	-3.162*** (0.249)	-3.137*** (0.265)	-8.374*** (0.490)	-8.355*** (0.528)	-3.027*** (0.306)	-2.875*** (0.327)	1.548*** (0.477)	1.415*** (0.499)	-3.120*** (0.781)	-8.280*** (1.464)	-2.960*** (0.825)	1.519 (1.251)
Latin America and the Caribbean	6.157*** (0.365)	5.997*** (0.384)	2.685*** (0.839)	2.012** (0.860)	0.807** (0.369)	0.677* (0.381)	13.615*** (0.627)	13.893*** (0.635)	6.054*** (1.075)	2.736 (2.019)	0.778 (1.125)	13.318*** (1.707)
MENA and S.S. Africa	6.055*** (0.615)	6.455*** (0.658)	6.678*** (1.022)	7.255*** (1.090)	0.951* (0.519)	1.127** (0.539)	9.405*** (0.739)	9.730*** (0.766)	5.600*** (1.163)	6.123*** (2.185)	0.716 (1.209)	8.943*** (1.835)
Constant	3.312*** (1.418)	2.668*** (1.479)	26.998*** (2.860)	26.872*** (2.918)	14.663*** (1.942)	13.686*** (2.026)	-25.405*** (2.634)	-25.900*** (2.574)	4.135*** (4.160)	28.640*** (7.823)	15.042*** (4.341)	-24.789*** (6.572)
Adjusted R^2	0.869	0.866	0.695	0.699	0.774	0.769	0.837	0.840	0.869	0.682	0.767	0.833
Chi2	4664	4387	1816	1730	1718	1611	3808	4089	---	---	---	---
Countries	82	82	82	82	82	82	82	82	82	82	82	82
F-statistic	---	---	---	---	---	---	---	---	194.646	65.405	99.736	149.610
Prob(F-statistic)	---	---	---	---	---	---	---	---	0.000	0.000	0.000	0.000
Observations	711	653	711	653	711	653	711	653	688	688	754	688

Notes: All regressions report PCSE in parentheses and include period Fixed Effects. TSLS: The potential endogenous variables (government expenditure variables) are instrumented by their lag (annual data). Level of significance: 10% (*), 5% (**), and 1% (***). *Source:* Own estimations.

Table 3 – Robustness. Additional control variables.

Dependent variable:	Loss_HDI Annual	Loss_HDI 3 year mean	Loss_HDI Annual	Loss_HDI 3 year mean	Loss_HDI Annual	Loss_HDI 3 year mean	Loss_HDI Annual	Loss_HDI 3 year mean
Expenditure on Education	-0.194**	-0.235	-0.113	-0.134	-0.188**	-0.226	-0.225**	-0.252*
	(0.092)	(0.151)	(0.093)	(0.149)	(0.094)	(0.153)	(0.091)	(0.148)
Expenditure on Health	-0.144**	-0.180*	-0.191***	-0.216**	-0.208***	-0.235**	-0.188***	-0.221**
	(0.064)	(0.104)	(0.059)	(0.097)	(0.066)	(0.106)	(0.067)	(0.109)
Expenditure on Social Protection	-0.102***	-0.088***	-0.117***	-0.112***	-0.119***	-0.100***	-0.093***	-0.083***
	(0.018)	(0.028)	(0.018)	(0.028)	(0.020)	(0.033)	(0.019)	(0.030)
Other Expenditure	0.078***	0.103**	0.026	0.058	0.087***	0.113***	0.078***	0.099**
	(0.029)	(0.044)	(0.027)	(0.040)	(0.028)	(0.043)	(0.029)	(0.045)
Governance Quality	-0.119***	-0.105***	-0.106***	-0.097***	-0.118***	-0.106***	-0.108***	-0.100***
	(0.008)	(0.014)	(0.009)	(0.013)	(0.011)	(0.017)	(0.010)	(0.015)
Urban population	-0.035***	-0.038***	-0.050***	-0.053***	-0.046***	-0.048***	-0.048***	-0.047***
	(0.008)	(0.013)	(0.008)	(0.013)	(0.008)	(0.013)	(0.008)	(0.013)
Population (in logs)	0.055	0.059	0.353***	0.410***	0.122	0.129	-0.145*	-0.111
	(0.077)	(0.126)	(0.091)	(0.150)	(0.082)	(0.135)	(0.088)	(0.146)
Ethnic fractionalization	3.632***	3.776***	2.968***	2.962***	3.725***	3.927***	3.435***	3.571***
	(0.515)	(0.845)	(0.504)	(0.817)	(0.523)	(0.856)	(0.506)	(0.840)
Market income inequality	0.316***	0.337***	0.339***	0.347***	0.321***	0.336***	0.332***	0.344***
	(0.022)	(0.030)	(0.020)	(0.030)	(0.020)	(0.029)	(0.020)	(0.028)
Inflation	-0.027	0.016	---	---	---	---	---	---
	(0.021)	(0.042)						
Trade openness	---	---	0.009***	0.009***	---	---	---	---
			(0.002)	(0.003)				
Democracy	---	---	---	---	0.265**	0.183	---	---
					(0.127)	(0.192)		
Federalism	---	---	---	---	---	---	0.354***	0.317*
							(0.107)	(0.167)
Eastern and South Asia	3.258***	3.277***	1.919***	1.794**	2.958***	2.703***	3.846***	3.756***
	(0.522)	(0.814)	(0.482)	(0.779)	(0.552)	(0.883)	(0.575)	(0.909)
E. Europe and C. Asia	-3.287***	-3.312***	-3.120***	-3.143***	-3.304***	-3.352***	-3.111***	-3.146***
	(0.240)	(0.372)	(0.233)	(0.366)	(0.246)	(0.384)	(0.242)	(0.376)
L. America and the Caribbean	6.199***	6.304***	6.168***	6.227***	5.772***	5.935***	6.034***	6.090***
	(0.361)	(0.565)	(0.358)	(0.540)	(0.420)	(0.654)	(0.368)	(0.571)
MENA and S.S. Africa	5.569***	6.200***	5.631***	6.294***	5.439***	6.080***	5.862***	6.472***
	(0.592)	(0.959)	(0.564)	(0.911)	(0.566)	(0.926)	(0.550)	(0.901)
Constant	6.852***	4.250*	1.194	-1.352	4.929***	3.075	9.055***	6.719***
	(1.507)	(2.226)	(1.656)	(2.420)	(1.509)	(2.218)	(1.655)	(2.579)
Adjusted R^2	0.874	0.882	0.873	0.882	0.871	0.880	0.871	0.880
Chi2	4595	2175	4581	2175	4609	2212	5184	2598
Countries	80	80	80	80	81	81	82	82
Observations	740	283	748	285	748	285	754	288

Notes: All regressions report PCSE in parentheses and include period Fixed Effects. Level of significance: 10% (*), 5% (**), and 1% (***). *Source:* Own estimations.