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ORIGINAL ARTICLE

Human development and decentralization: The importance of public health expenditure

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Abstract

In this article, we empirically analyze the impact of central and subnational government spending on human development in a sample of 57 developed and developing countries over the period 2000–18. Specifically, we focus on the effects of health and education public expenditure on the Human Development Index (HDI) and its dimensions (life expectancy, education, and income). Applying data panel analysis, our empirical evidence shows the importance of central and subnational government health expenditure positively impacting on HDI and each of its components, while in the case of the education expenditure, this positive effect is only confirmed on the educational dimension of HDI. Our study shows how governments can stimulate human development, improving the well-being of citizens, by allocating more resources to healthcare through the different administrative levels.

KEYWORDS

decentralization, government health expenditure, human development

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1 | INTRODUCTION

The capacity of governments to improve economic and human development is a major societal concern. Public expenditure on health and education is probably one of the main instruments and basic supports of modern welfare states and certainly essential policies to improve the quality of life of their citizens. But the impact of these public policies on the economic and human development of a society is not just a matter of the volume of public spending. As with public policies more generally, organizational aspects will also have an influence, and one important dimension of organization is the extent to which public expenditures are decentralized.

Over the past decades, there has been a global trend across countries towards fiscal decentralization with the objective of improving citizen welfare and economic development (see Martinez-Vazquez et al., 2017 for a survey). Decentralization has the potential to increase the quality and effectiveness of public policies for a variety of reasons including better informed sub-central officials, the adaptation of policies to local conditions, experimentation and thus learning by doing, and stronger accountability mechanisms at subnational levels (Oates, 1972, 1999; Christl et al., 2020). However, decentralization may also weaken the effectiveness of public policies insofar as these policies experience spillovers or economies of scale, if it leads to uneven access to public resources across subnational jurisdictions, if accountability mechanisms are weaker, and if sub-central officials are more vulnerable to capture by special interests (Prud'homme, 1995; Oates, 2005; Arends, 2020). Recently, a high number of empirical cross-country studies have dealt with the estimation of the economic effects of decentralization with no clear consensus emerging.

Many of the empirical contributions have considered the extent to which decentralizing general government expenditure or revenues impacts on GDP per capita growth (Canare, 2021a), governance (Kyriacou & Roca-Sagalés, 2021), or alternatively on education and health outcomes (Martinez-Vazquez et al., 2017). In general, as can be appreciated in the cited surveys, the evidence on the effects of decentralizing are mixed in the case of economic growth, positive on governance, and also positive in health and especially education outcomes. Surprisingly, although the objective of many decentralization initiatives is to improve economic welfare and human development, there is a lack of empirical literature on the effects of decentralization on variables reflecting human welfare, such as poverty, per capita PPP income, and the human development index, Canare (2021b) being a notable exception. Also, the majority of cross-country contributions focusing on education and health outcomes have used subnational government spending or revenue as a percentage of total spending or revenue to account for decentralization, and just a few employed more disaggregated decentralization indicators reflecting the decentralization of spending in these specific policy areas.[1] But preferably, when trying to evaluate the impact of decentralizing on health or education outcomes, we should account for the level of central and subnational governments health or education spending.

[1] Some of the exceptions are Arends (2017), which uses subnational (regional and local) public health expenditure as a percentage of total health expenditure to evaluate the performance of the health sector in a sample of 32 OECD countries, and Kyriacou and Roca-Sagalés (2019) who employ local education, health, and social spending as a share of total spending on these areas to analyze the effects of local decentralization on the quality of public services.

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In this paper we employ cross-country evidence to analyze how central and subnational expenditure in the areas of health and education can affect to a broader measure of economic and human development, the Human Development Index (HDI), and we also examine the impact on each of the HDI components. The HDI is a multidimensional, composite index of human and economic development, that allows us to include outcomes related to health, education, and income (UNDP, 2020). Based on a sample of 57 developed and developing countries over the period 2000–18, and applying data panel analysis, we find robust evidence that both central and subnational expenditure in the area of health have a positive impact on the HDI, and in each of their dimensions (life expectancy, education, and income), while in the case of the education expenditure, this positive and statistically significant effect on human development can only be confirmed on the educational dimension of HDI. These findings are robust to different lagged structures of the government expenditure variables, alternatives estimations techniques, and the presence of a range of potential confounding variables including measures of the autonomy of subnational governments.

The remainder of the paper is organized as follows. Section 2 offers a brief theoretical and empirical overview of the link between fiscal decentralization, health and education expenditure and human development. Section 3 discusses the key indicators employed in the article to conduct the empirical analysis. Section 4 presents the empirical methodology. Section 5 presents the estimation results. Section 6 discusses the outcomes of several robustness checks. Section 7 concludes.

2 | FISCAL DECENTRALIZATION AND HUMAN DEVELOPMENT: THEORY AND EVIDENCE

In this section, we first provide a comprehensive conceptual framework of the potential channels through which fiscal decentralization might affect human development, and second, we review the relevant empirical literature.

Fiscal decentralization is commonly conceptualized as the transfer of responsibilities (or power) and resources from central government to subnational governments (Schneider, 2003). Specifically, fiscal decentralization theories are mostly based on the Musgrave (1959) allocation functions of government, consisting in assigning resources to the level of government such that social welfare is maximized. In this sense, fiscal decentralization can play an important role in the efficiency allocations of resources and improvement of the political, economic, and social activities (Oates, 1972, 1999).

Many reasons justify the potential gains from decentralizing health and education. Some authors have indicated that subnational governments are more efficient in the provision of public goods and services than the central government because they can better formulate and implement public policies to specific local development needs—local officials have superior knowledge about local preferences (see, for instance, Oates, 1999). In other words, it is claimed that decentralization improves preference matching and allocative efficiency of delivery of government goods and services (Barankay & Lockwood, 2007; Channa & Faguet, 2016). Additionally, fiscal decentralization can enhance greater electoral accountability and yardstick competition among competing jurisdictions, reducing incentives for overspending of subnational government authorities and, especially, the "bad" use of resources by politicians (Besley & Smart, 2007; Adam et al., 2014; Christl et al., 2020). Moreover, fiscal decentralization, as a policy instrument, may contribute to improving the quality and accessibility of important basic public services, such as education, health care, and infrastructure. Also, it can encourage citizens to take part in the political decision-making

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process and make local fiscal authorities more accountable, improving the human development of society (Scott, 2006). Furthermore, subnational government policies can serve as laboratories of experimentation and may cause a variety of policies to be applied to other subnational jurisdictions, and eventually scaled up to the national government level—which is less risky than applying them directly at the national level (Vanberg & Kerber, 1994).

However, decentralization may not always be an effective route for the provision of public goods and services due to the presence of externalities or spillovers, such as imperfect information, economies of scale, and selfish officials (e.g., political rent-seeking) (Oates, 2005). Additionally, decentralization may make it more difficult for citizens to discern which level of government is responsible for good and bad policy—political institutions with clarity of responsibilities reduce corruption (Tavits, 2007). Moreover, decentralization may shift the control of resources from central government to subnational governments reducing the capacity of central government to address essential programs (e.g., poverty, redistribution, and human development) (Oates, 1972, 1999). In this sense, the existence of cross-regional disparities may only be addressed by the central government with redistributive powers. But if subnational government has to deliver on essential responsibilities that national government has failed to achieve, the decentralized government provision of services may lead to poorer fiscal efficiency due to the lack of capacity to implement the programs and limited financial resources—especially when subnational governments are funded by transfers rather than by direct taxation (Scott, 2006; Diaz-Serrano & Rodríguez-Pose, 2015). Furthermore, the government's provision of some public services, such as health and education, probably need larger amounts of public funds for capital and technological investment as well as general planning capacities, which may be limited at the subnational government level (Jiménez-Rubio & García-Gómez, 2017).

Focusing now on the empirical contributions, we should first acknowledge that public spending on health and education can have an important effect on increasing economic growth, promoting income equality, reducing poverty, and improving human development (Barro, 1991; Chu, 1995; Sen, 1999). However, the empirical evidence of the impact of public spending on health and education remains unclear, at least at the macro level. For instance, Baldacci et al. (2003) and Gupta et al. (2002) study a large sample of developing countries and transition economies and find that public social spending plays a significant role in the health and education sectors. Specifically, these studies show that spending on education has more effect on human development indicators than health spending. Nevertheless, some studies consistently find a clear significant positive impact of health spending on health outcomes in poor countries.[2] Other studies have shown that the relationship between health spending and health outcomes depends on the composition and efficacy of spending (Filmer & Pritchett, 1999) and the quality of institutions (Liang & Mirelman, 2014).

Recently, Paliova et al. (2019) have analyzed the effect of public social spending on HDI dimensions for a sample of 68 countries over the period 1995–2016. This study estimates the effects of social government spending (social protection, healthcare, and education) on gross national income (GNI) per capita (in PPP in $), expected years of schooling, and life expectancy. The authors find a significant positive effect of government education expenditure on education and gross national income dimensions, and government health expenditures on life expectancy. In

[2] Anyanwu and Erhijakpor (2009) study a sample of 47 African countries over the 1999–2004 period and find that health expenditures have a significant positive impact on health outcomes; while Nixon and Ulmann (2006) study 15 EU countries over the period 1980–95 finding that increases in health spending reduces infant mortality, but influences life expectancy at birth only marginally.

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other related work, Castells-Quintana et al. (2019) analyze a panel of 117 countries during the 1970–2010 period and find an insignificant impact of government consumption (i.e., government spending excluding government gross investment) on human development.

The empirical literature to date has mostly explored the effect of fiscal decentralization on specific components of the HDI. With regard to the two main public services focused on here, the most resounding finding is a positive impact of decentralizing health and education spending on health and education outcomes—this is particularly confirmed for the latter (Channa & Faguet, 2016; Arends, 2020). A handful of studies have found a positive impact of fiscal decentralization on health outcomes, such as the infant mortality rate.[3] Concerning education, many studies support the view that fiscal decentralization improves education outcomes, such as education attainment (Barankay & Lockwood, 2007), public-school enrolment rates (Habibi et al., 2003; Faguet & Sanchez, 2008; Faguet & Sánchez, 2014), and student achievement (Falch & Fischer, 2012). Finally, Sepulveda and Martinez-Vazquez (2011), study a sample of 65 developed and developing countries covering the period 1971–2000, and find a significant and positive effect of fiscal decentralization on the HDI; variable that they used as a proxy for poverty. However, these authors do not analyze the effects on human development components.

To the best of our knowledge, such an analysis has not given the attention before to the impact of fiscal decentralization, in particular on health and education expenditure, on the HDI and its three dimensions. Therefore, the existing evidence needs further in-depth empirical work. Our paper aims to fill this gap by analyzing this issue using updated data of a broad sample of developed and developing countries.

3 | KEY VARIABLES

In this section we provide information about our main variables of interest, the Human Development Index (HDI), and the public expenditure variables. Our sample consists on a panel of 57 countries during the 2000–18 period A1.[4]

Our dependent variable is human development as measured by the HDI and its three dimensions. The HDI is published annually by the United Nations Development Programme (UNDP) in their Human Development Reports since 1990 to provide an alternative index to the GDP and income-based indicators to measure human development.[5] The HDI is a summary measure of average achievements in three key dimensions of human development in the country: a long and healthy life, access to knowledge, and a decent standard of living. The health dimension is measured by life expectancy at birth, which is used to build the health index; the knowledge dimension is measured by the expected years of schooling (for children of school entering age) and the mean of years of schooling (for adults aged 25 years and more), both are used to build the education index; and, the living conditions dimension is measured by the gross national income (GNI) per

[3] For instance, Robalino et al. (2001) for low- and high-income countries over 1970–95, Habibi et al. (2003) for Argentinian provinces between 1970 and 1994, Jiménez-Rubio (2011) for 20 OECD countries from 1970 to 2001, and Samadi et al. (2013) for Iranian regions in the period 2007–10.

[4] Table A1 of the Appendix provides the list of included countries.

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

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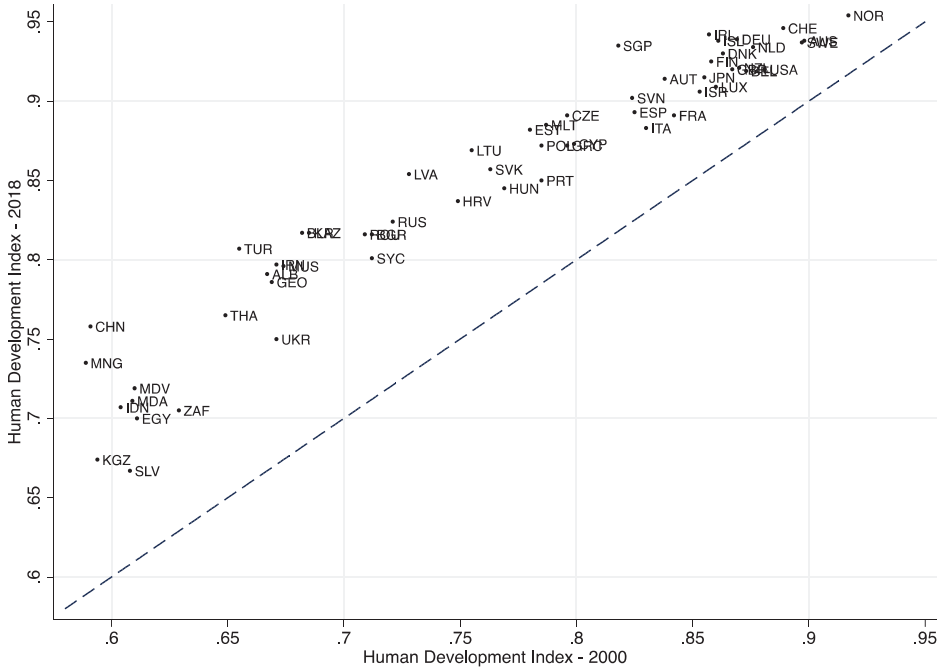

FIGURE 1 Human Development Index in 2000 and 2018. *Note*: The Human Development Index is between 0 and 1; 1 if the country achieves the maximum value. *Source*: Own elaboration based on data from United Nations Development Programme. [Colour figure can be viewed at wileyonlinelibrary.com]

capita (PPP USD), that is used to build the income index. The HDI is the geometric mean of the three-dimensional indices.[6]

Figure 1 presents the levels of HDI in our sample of countries at the beginning and end of the analyzed period, showing that all included countries have increased the HDI (all of them are on the left side of the graph). Figure 1 also illustrates an important heterogeneity across countries, being the richer countries the ones with higher levels of HDI, especially Norway and Sweden (between 0.90 and 0.95), while in the other extreme, poorer countries, like El Salvador and Kyrgyzstan, have much lower levels (between 0.60 and 0.70). Obviously, since one of the components of HDI is the GNI per capita (PPP USD), there is a strong correlation between HDI and the GDP per capita (0.93 in our sample), although a strong correlation also exists between GDP per capita and the health and educational components of the HDI (0.78 and 0.68 respectively). Interestingly, China presents very low HDI values, but it is the country that has improved most during the analyzed period.

To obtain the public expenditure disaggregated variables, we turn to two databases that comprise updated information on different government variables for an extended group of developed and developing economies. Specifically, we consider the IMF Government Finance Statistics (GFS) database, classified by economic functions (COFOG), and the Fiscal Decentralization dataset (Lledó et al., 2018). These sources provide a harmonized and documented set of annual fiscal data for the largest number of countries and years; data are available at gen-

[6] Details of the HDI calculation may be found in UNDP (2020), and Klugman et al. (2011) provide an explanation of its limitations.

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eral/central/subnational government level, where the subnational level corresponds to the addition of state and local government levels correspond to Nuts 1 and 2 respectively.[7]

Specifically, we focus on two of the most important expenditure functions (health and education), which are directly related to two of the three dimensions of the HDI (life expectancy and years of schooling), and that jointly represent approximately one quarter of the general government expenditure in our sample. To account for the remaining public expenditure, in our empirical analysis we also consider a residual catch-all category that contains the rest of the functions including social protection, general public services, economic affairs, defence and public order, and in total comprises the other three quarters of the total public expenditure. Accordingly, in the empirical analysis we consider these three categories of spending (health, education, and other expenditure) at the level of general government (GG), central government (CG), and subnational government (SNG).

Interestingly, in our sample of countries and in average terms over the whole period 2000–18, the relative importance of public expenditure on health and education is quite similar, both accounting the same amount of resources (approximately 5% of GDP); however, we should mention that there exist a high heterogeneity across countries concerning the amount of resources dedicated to public health and education, and also these funds are differently distributed between central and subnational administrations (see Table A3 of the Appendix).

According to OECD-UCLG (2016), at the global level, in 2013 subnational expenditure amounted to 9.0% of GDP, and 23.9% of public expenditure (subnational expenditure accounts for 1.5% of GDP in the case of health, and 2.6% of GDP in the case of education). In our sample of 57 countries, these average ratios in 2013 were similar (subnational spending accounted for 11.2% of the GDP and 27.8% of public expenditure), particularly in the case of subnational expenditure in health and education (1.5% and 2.5% of the GDP, respectively), although there is a high level of variability across countries (see Table A3 of the Appendix). Accordingly, our sample of developed and developing countries seems to be quite representative of the global reality. Further, during the past decades, in the majority of the countries the decentralization processes resulted in an increase in subnational government expenditure, both as a share of GDP and total public spending (OECD, 2019; Martinez-Vazquez et al., 2017), a phenomenon that is also seen in our sample of countries and period when analyzing central and subnational expenditure on health and education.

4 | EMPIRICAL MODEL

Our sample consists on a panel of 57 countries during the 2000–18 period. This sample is limited by the availability, frequency, and quality of data being the expenditure decentralization data the main restriction. We consider annual data and also five-year means for the periods 2000–04, 2005–09, 2010–14, and four-year means for the last period (2015–18). We consider annual and also longer time intervals because our main dependent variable (HDI) moves very slowly over time, and we are also interested in capturing long-term trends and structural relationships between the key variables of interest—that is, to neutralize the business cycle effect. In this section we explain the methodological strategy applied to tackle the aim of this paper.

[7] The general government sector consists of resident institutional units that fulfil the functions of government as their primary activity and includes the central, state and local governments, and the social security funds controlled by these units (Government Finance Statistics Manual, 2014).

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We estimate the following empirical model:

$$HDI_{it} = \beta_0 + \beta_1 GS_{it} + \beta_2 X_{it} + \mu_t + \varepsilon_{it} \quad (1)$$

where i represents the countries in the sample, t denotes the time period, and β are the parameters to be estimated. In Equation (1), *HDI*, the Human Development Index, is the dependent variable. Additionally, we estimate the same specification for each dimension of the HDI: life expectancy index, education index, and income index. In this analysis, we focus on the role of government health and education expenditure, both at the CG and SNG level, on HDI and its components. Thus, we analyze the impact of government spending (*GS*) considering first, GG expenditure on health, education, and other expenditure, and second, CG and SNG expenditure on health, education, and other expenditure. 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.

One of the questions we will be able to deal with following this approach is whether the impact of public health and education spending on human development is influenced by the level of decentralization, that is by the distribution of the corresponding spending between central and subnational administrative levels. It might be the case that local and regional authorities, since they are better informed, spend the resources in a way that has a stronger impact on HDI, or alternatively that spending of central authorities has a greater impact on the HDI because of scale economies. And perhaps the explanations may work in contrary directions depending on the type of expenditure (health versus education).

We estimate the model with OLS based on panel-corrected standard errors (PCSE) that are robust to heteroskedasticity and serial correlation between the residuals of a given cross-section (period weight SUR). In data panel analysis, it is common to account for cross-section fixed effects because it allows to control for unobserved country-specific characteristics or for omitted time-invariant factors (e.g., culture and geography). However, if most of the variation in the key variables is between-country rather than within-country, that limits the potential for analysis of causal effects using panel estimations with cross-section fixed effects. One reason is that long-run confounding factors can be subsumed into the fixed effects, producing unreliable results (Fallah & Partridge, 2007; Castells-Quintana et al., 2019). In our case, this effect may be relevant since our key variables show high between-countries variation compared to the within-country variation. For instance, the HDI variable has a mean value of 0.811 and an overall standard deviation of 0.093, and while the between standard deviation is 0.089, the within standard deviation is only 0.029 (see Table A3 of the Appendix). Accordingly, we do not consider the inclusion of cross-section fixed effects. Nevertheless, we account for several control variables in order to minimize omitted variables bias due to the influence of country specific factors.

In our empirical model we also account for the potential long-term effects provoked by public spending on HDI. For example, increasing health spending may result in higher life expectancy after a lag of several years. In order to do this, we estimate our baseline model considering our spending variables lagged one, two, or three periods, allowing for the possibility that the effects provoked by these variables are not contemporaneous—there could be significant lags between the implementation of spending policy and the impact on human development. There may be also a feedback effect from life expectancy that should be considered because it leads to increase health spending due to older people often requiring costly medical care. Thus, to address endogeneity concerns, we apply an Instrumental Variable (IV) approach, and estimate our baseline model using a two-stage least squares (TSLS) method instrumenting the potential endogenous variables

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with their lagged values. Both strategies provide further reassurance that long-term impacts and endogeneity issues do not affect the estimated results, as the robustness section analyses.

In our empirical analysis, we have controlled for the variables potentially influencing the relationship between government expenditure variables and human development (and its dimensions). Our control variables are in line with those employed by previous work and aim to reduce omitted variable bias. Specifically, we control for urban population, income inequality, inflation, private health spending, political decentralization, democracy, and, finally, a dummy for being member of the European Union .[8] The need to control for these variables is obvious given their possible influence on the HDI, as we detail in the next paragraphs, and the fact that they may be related with the level, distribution and structure of public expenditure.

In the last decades, there has been a significant growth in urban population (e.g., due to rural immigration) and it has been associated with better social facilities and services delivery, which enhances human development (Mehmood et al., 2010). To account for this, we include the variable "urban population participation" defined as the share of urban population over total population from World Bank's World Development Indicator (WDI).

An extensive literature analyzes the effects of inequality on economic development, in particular on economic growth, highlighting multiple mechanisms of transmission through which inequality has predominately a negative effect on growth, but its effect continues to be hotly debated (Voitchovsky, 2011; Neves & Silva, 2014; Bourguignon, 2015; Ferreira et al., 2021). Moreover, inequality can also affect other aspects of human development, such as education and health outcomes; again, even though it is generally pointed a negative effect, there is a lack of consensus about its effects (Ferreira et al., 2021). In a recent paper, Castells-Quintana et al. (2019) studied the relationship between income inequality and human development (and its dimensions) and identified a negative long-run effect of inequality on human development, whereas in the short run find a positive effect on income and a negative effect on educational outcomes. In this article, we consider the variable "income inequality" as measured by the Gini net index (i.e., income inequality after transfers and direct taxes) from The Standardized World Income Inequality Database (SWIID) developed by Solt (2020).[9]

We consider the variable "inflation" that is measured by the consumer prices index growth from WDI. The variable captures the idea that an economy with a high degree of inflation corrodes the purchasing power of the economic agents, and consequently may negatively affect human development (Paliova et al., 2019).

Since we include the variable of public health spending, we need to control for the other resources dedicated to health that may affect HDI, that is to say private health spending, that in our sample of countries represents a volume of resources in average terms close to 2.5% of their GDP, approximately a half of what these countries dedicate to public health, and again we observe a remarkable heterogeneity between countries (see Table A3 of the Appendix).[10] This distinction is important because the level of public health spending is determined by fiscal policy, while private public spending reflects the voluntary or individual choice based on demand for health care (Linden & Ray, 2017).

We are aware that the level of spending decentralization does not necessarily reflect the degree of fiscal autonomy that SNG authorities may have to effectively decide how and where to spend.

[8] The definitions and sources of all variables are presented in Table A2, and descriptive statistics in Table A3, both in the Appendix.

[9] See Solt (2020) for a complete description of the SWIID; we employ version 8.3 (updated in May 2020).

[10] Poullier et al. (2002) provide a clear explanation on the different components of public and private health spending.

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Accordingly, and in order to control for the possible importance that political decentralization (PD) may have on the relationship between public spending at CG and SNG level and the HDI, we include the variable "federalism" from Gerring and Thacker (2004), which is a time-invariant variable that ranges from 1 (unitary) to 5 (fully federal states) and that covers all the countries included in the analysis.

Some scholars have investigated to what extent democracy affects human development, and the resounding conclusion is that a country's level of democracy improves human development. Several transmission channels have been suggested to affect human development through democracy, such as higher levels of citizens and civic associations participation, electoral competition and accountability, political representation, and democratic institutionalization (Gerring et al., 2012, 2021; Bellinger, 2019). Thus, we consider the variable "democracy" obtained by combining the variables political rights and civil liberties from V-Dem Institute (2021) and Freedom House (2021). The political rights variable refers to the electoral process, political pluralism and participation, and functioning of government; meanwhile, the civil liberties variable refers to freedom of expression and belief, associational and organizational rights, rule of law, and personal autonomy and individual rights.

Finally, we also control for being a membership of the European Union (EU Member) since EU laws and policies may have an impact on the size and distribution of public expenditure, and on the different dimensions of human development (Scott, 2006).

5 | RESULTS

This section presents the main findings arising from the estimation of Equation (1) where we consider the HDI and also each of its three dimensions as dependent variable, on a set of explanatory factors by panel regression analysis using annual and five-year means data. We report the results including two classifications of government spending: First, GG expenditure on health, education, and other; and second, CG and SNG expenditure on health, education, and other.

Columns (1) and (3) of Table 1 present the estimates using the general government (GG) expenditure variables showing a positive and significant impact of GG health expenditure on HDI, while the evidence on the effects of the educational expenditure is negative but not robust. In columns (2) and (4), we disaggregate the GG variables into central (CG) and subnational (SNG) expenditure, and the estimated results confirm the positive effects of health expenditure both at CG and SNG level, while the evidence in the case of the CG and SNG expenditure on education is again not conclusive.

In order to clarify how the different spending variables impact on the HDI, in Table 2 we proceed with the analysis considering the three HDI components separately as the dependent variable. The results confirm a robust and positive impact of health expenditure, at GG, CG and SNG level, on the three HDI components. In other words, health expenditure, no matter the level of public administration that is responsible, clearly improves human development, increasing life expectancy, years of schooling and income per capita. The impact of health spending on the education index is also related to its relationship with a country's economic performance, since on the one hand, children who enjoy good health can attend school more regularly, and on the other hand, healthy people have the potential to be more productive at work. Thus, more health spending can be translated into better educational and economic outcomes (Anand & Sen 2000a, 2000b).

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TABLE 1 Human development and public expenditure decentralization

Dependent variable:Human Development Index (HDI)	Annual		Five-year means	
	(1)	(2)	(3)	(4)
Urban population	0.214*** (0.011)	0.210*** (0.011)	0.217*** (0.022)	0.219*** (0.023)
Income inequality	−0.495*** (0.025)	−0.514*** (0.024)	−0.493*** (0.047)	−0.514*** (0.047)
Inflation	−0.224*** (0.029)	−0.207*** (0.028)	−0.360*** (0.068)	−0.343*** (0.072)
Private health expenditure	0.029(0.083)	0.011(0.084)	−0.017(0.182)	-0.028(0.186)
Democracy	0.013*** (0.003)	0.014*** (0.003)	0.006(0.006)	0.007(0.006)
Federalism	0.013*** (0.001)	0.016*** (0.001)	0.013*** (0.002)	0.016*** (0.002)
Dummy EU	0.021*** (0.004)	0.019*** (0.004)	0.017** (0.008)	0.015* (0.008)
GG education	−0.072(0.123)	–	−0.085(0.243)	–
GG health	0.636*** (0.096)	–	0.666*** (0.204)	–
GG other	−0.149*** (0.024)	–	−0.113** (0.053)	–
CG education	–	0.369*** (0.121)	–	0.212(0.249)
SNG education	–	−0.174(0.116)	–	−0.255(0.240)
CG health	–	0.467*** (0.085)	–	0.516*** (0.181)
SNG health	–	0.612*** (0.088)	–	0.698*** (0.187)
CG other	–	−0.134*** (0.025)	–	−0.086* (0.052)
SNG other	–	−0.092** (0.037)	–	−0.107(0.077)
Constant	0.761*** (0.015)	0.754*** (0.014)	0.775*** (0.026)	0.768*** (0.025)
R-squared	0.810	0.813	0.826	0.829
Chi2	5062	5408	1180	1314
Countries	57	57	57	57
Observations	928	922	210	209

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

In the case of education expenditure, this approach allows us to identify a positive and significant effect of this spending at GG, CG and SNG level on the knowledge component of the HDI, but the impact on the other two components is mixed, depends on the level of decentralization considered, and is not always robust. These results suggest that the non-significant impact of the education expenditure on HDI shown in Table 1 may be a consequence of mixed impacts on the three HDI components that neutralize each other (the positive effect on the knowledge component is cancelled by the negative ones on the other components). And finally, the catch-up category of public spending (labelled as other expenditure) shows a negative impact on the three HDI components, but again this effect is not always robust. In this sense, one possible explanation of this negative sign could be that an increase in the other expenditure category, for example an increase in the amount of defence and public order expenditure, may cause a reduction of the public resources committed to health or an increase in income inequality, thus negatively affecting human development.

Insofar as the control variables are concerned, the empirical estimates on Tables 1 and 2 indicate a robust and positive impact of urban population, possibly indicating that a higher level of

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TABLE 2 Human development per components and public expenditure decentralization

	Annual						Five-year means					
	Life expectancy index		Education index		Income index		Life expectancy index		Education index		Income index	
Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Urban population	0.175***	0.163***	0.161***	0.163***	0.300***	0.297***	0.167***	0.163***	0.170***	0.175***	0.304***	0.310***
	(0.010)	(0.009)	(0.014)	(0.014)	(0.018)	(0.018)	(0.020)	(0.018)	(0.029)	(0.027)	(0.039)	(0.038)
Income inequality	−0.461***	−0.567***	−0.634***	−0.538***	−0.353***	−0.416***	−0.482***	−0.585***	−0.634***	−0.547***	−0.329***	−0.392***
	(0.050)	(0.046)	(0.025)	(0.026)	(0.035)	(0.038)	(0.090)	(0.082)	(0.049)	(0.052)	(0.072)	(0.078)
Inflation	−0.376***	−0.309***	−0.001	−0.034	−0.327***	−0.302***	−0.608***	−0.508***	−0.007	−0.073	−0.519***	−0.487***
	(0.043)	(0.037)	(0.030)	(0.030)	(0.045)	(0.043)	(0.105)	(0.098)	(0.077)	(0.077)	(0.108)	(0.108)
Private health expenditure	0.665***	0.578**	−0.021	0.029	−0.445***	−0.461***	0.623**	0.549**	−0.021	0.014	−0.543	−0.537
	(0.122)	(0.103)	(0.185)	(0.178)	(0.164)	(0.162)	(0.251)	(0.219)	(0.402)	(0.386)	(0.354)	(0.350)
Democracy	0.005	0.005	0.027***	0.030***	0.003	0.001	−0.004	−0.003	0.024***	0.027***	−0.008	−0.009
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)
Federalism	−0.003**	0.007***	0.021***	0.012***	0.020***	0.027***	−0.004	0.006*	0.022***	0.013***	0.020***	0.027***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)
Dummy EU	0.008*	0.011***	0.018***	0.011**	0.039***	0.037***	−0.004	0.004	0.022*	0.012	0.031**	0.030**
	(0.004)	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)	(0.008)	(0.007)	(0.011)	(0.010)	(0.013)	(0.012)
GG education	−1.201***	–	1.458***	–	−0.552***	–	−1.247***	–	1.574***	–	−0.642	–
	(0.160)		(0.182)		(0.195)		(0.306)		(0.384)		(0.405)	
GG health	0.831***	–	0.368***	–	0.731***	–	0.860***	–	0.392	–	0.778**	–
	(0.116)		(0.118)		(0.166)		(0.235)		(0.249)		(0.350)	
GG other	−0.089***	–	−0.192***	–	−0.164***	–	−0.029	–	−0.209***	–	−0.096	–
	(0.033)		(0.032)		(0.034)			(0.066)	(0.067)		(0.080)	

(Continues)

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TABLE 2 (Continued)

	Annual						Five-year means					
	Life expectancy index		Education index		Income index		Life expectancy index		Education index		Income index	
Dependent variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
CG education	–	0.366***	–	0.652***	–	0.138	–	0.182	–	0.699*	–	−0.178***
		(0.137)		(0.178)		(0.198)		(0.269)		(0.361)		(0.428)
SNG education	–	−1.379***	–	1.690***	–	−0.996***	–	-1.439***	–	1.702***	–	−1.161***
		(0.130)		(0.179)		(0.164)		(0.258)		(0.368)		(0.362)
CG health	–	0.518***	–	0.256**	–	0.637**	–	0.597***	–	0.241	–	0.727**
		(0.087)		(0.104)		(0.143)		(0.180)		(0.221)		(0.307)
SNG health	–	0.539***	–	0.401***	–	0.915***	–	0.656***	–	0.417	–	1.047***
		(0.102)		(0.123)		(0.146)		(0.217)		(0.257)		(0.318)
CG other	–	−0.165***	–	−0.090***	–	−0.156***	–	−0.112*	–	−0.078	–	−0.075
		(0.031)		(0.031)		(0.036)		(0.060)		(0.062)		(0.078)
SNG other	–	0.038	–	−0.134**	–	−0.173***	–	0.015	–	−0.151	–	−0.177
		(0.063)		(0.053)		(0.054)		(0.125)		(0.111)		(0.113)
Constant	0.907***	0.920***	0.674***	0.637***	0.723***	0.730***	0.946***	0.953***	0.671***	0.640***	0.734***	0.739***
	(0.031)	(0.027)	(0.021)	(0.020)	(0.021)	(0.021)	(0.057)	(0.049)	(0.041)	(0.038)	(0.039)	(0.038)
R-squared	0.665	0.718	0.713	0.726	0.691	0.711	0.709	0.752	0.746	0.753	0.704	0.725
Chi2	1668	2079	3354	3386	2015	2731	490	567	909	962	464	607
Countries	57	57	57	57	57	57	57	57	57	57	57	57
Observations	928	922	928	922	928	922	210	209	210	209	210	209

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

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urbanization is related to high per-capita income and demand for health and education services, suggesting that the urban context enhances socioeconomic conditions (Mehmood et al., 2010). This result is in line with previous studies, such as Castells-Quintana et al. (2019), which finds a significant positive impact on HDI.

Furthermore, we find a significant negative impact of income inequality on human development and its three components (i.e., health, education, and income). In contrast with previous studies, we provide evidence that income inequality is significant and negatively associated also with the income dimension of the HDI. Specifically, Castells-Quintana et al. (2019) study the relationship between income inequality and human development (and its dimensions) and identified a negative long-run effect of inequality on human development, but in the short run find a positive effect on income.

Our results also show a negative and significant impact of inflation on human development and its dimensions, a result also obtained by Castells-Quintana et al. (2019). The economic intuition is that inflation may introduce socioeconomic instability conditions, worsening the standard of living and access to health and education services (Yolanda, 2017).

On the other hand, private health spending has a positive impact on HDI (see Table 1) which is only robust in the case of the health component (see Table 2). Our findings are in line with previous work considering the effects of private and public health expenditure on health outcomes (Linden & Ray, 2017; Ray & Linden, 2020).

The level of political decentralization (PD) in the form of federalism always shows a positive and significant impact on HDI and its components indicating the beneficial effect of decentralized schemes on the political responsibilities and decision process.

We do not find strong evidence that democracy positively impacts on the HDI indicator. While we observe a significant and positive impact on the education dimension, it does not affect the health and income dimension (see Table 2). Our findings are not contradictory to previous works (Gerring et al., 2012, 2021; Bellinger, 2019) because they focus on infant mortality and we consider life expectancy at birth. Regarding the impact of democracy on the education dimension, our reported results are in line with existing studies that reveal that democracy can have greater incentive than autocracy to enhance educational enrollment and years of schooling (Stasavage, 2005; Eterovic & Sweet, 2014; Dahlum & Knutsen, 2017).

Finally, the dummy corresponding to the EU member state is positive and mostly significant at the 1% level, indicating that being a member of the EU positively affects the HDI and its dimensions.

We next want to deal with the potential role that quality of governance (QoG) may have on human development and how it influences the relationship between central and subnational public expenditure and HDI. In fact much empirical research suggests that good QoG can foster economic performance by providing a suitable and favorable environment for production, trade, and investment in physical and human capital (Mauro, 1995; Hall & Jones, 1999; Acemoglu et al., 2005; Setayesh & Daryaei, 2017). According to this view, the QoG could indirectly affect human development at least through economic growth. Beyond economic development, several scholars (Mauro, 1998; Gupta et al., 2001; Rajkumar & Swaroop, 2002) have documented that the QoG in the form of corruption adversely affects the public provision of health care and education services; by increasing their cost, decreasing their quantity, reducing investment in human capital, and reducing government revenues that limit the government expenditure on both services. In order to consider this factor, we now include a "QoG" control, using two different variables from two sources. First, from the Worldwide Governance Indicators (WGI, Kaufmann et al., 2011), we construct a QoG-WGI variable considering the average of the following

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dimensions: government effectiveness, rule of law, regulatory quality, and control of corruption. Second, from the International Country Risk Guide (ICRG, 2013a), we construct the QoG-ICRG variable taking the mean of the following three dimensions: rule of law, bureaucratic quality, and corruption.[11]

Table 3 reports the results when including the QoG on our baseline model and undoubtedly confirm the results previously obtained in the sense that public health expenditure, no matter the public administration responsible, improves human development. Certainly, both QoG variables yield a significant and positive coefficient, and its inclusion modifies the size of the coefficients of the expenditure variables, suggesting that indeed part of their impact on HDI may work through institutional development. Notwithstanding this, it is also true that the QoG, as we measure it, is highly correlated with some of our control variables and therefore its inclusion on our baseline model may provoke multicollinearity issues that limit the validity of the estimated results.[12]

6 | ROBUSTNESS ANALYSIS

In this section, we propose some robustness tests. First, we capture the potential long-run impact of the government expenditure variables on the HDI by introducing a different lagged structure of the government expenditures variables. Second, we deal with the potential endogeneity that can affect the estimates of our baseline models of Table 1 by using an IV approach. And finally, we explore the sensitivity of our results to the inclusion of different political decentralization indicators and also to the inclusion of other variables potentially affecting our results, namely investment and ethnic fractionalization.

We begin by examining the possibility that the expenditure variables do not impact on the HDI contemporaneously. To do this, we estimate our baseline model employing one-, two- or three-period lagged values of the public spending variables. As can be seen in columns (1)–(8) of Table 4, considering a different time structure on the effects does not modify our substantive results since health expenditure at GG, CG and SNG level keeps improving HDI, while the effects of the education and other expenditure variables are again inconclusive and not robust. It is important to remark that this strategy allows us to reduce potential reverse causality concerns provoked from our dependent variable (HDI) to the spending variables.

We turn now to address simultaneity problems. In this sense, it may be reasonable to consider that there could be feedback effects from human development to regressors that change relatively rapidly in the short run. For instance, the short- and medium-run movements in the income dimension of the HDI might affect the policymakers spending decision (or discretionary fiscal policy), making the expenditure variables endogenous. To deal with endogeneity concerns, we estimate our baseline models using TSLS instrumental variables techniques. In the case of annual data, we instrument the potential endogenous explanatory variables (inflation, private health, and government expenditure variables) with their lagged value, while for five-year means data, we

[11] These two indicators of QoG have been widely used in previous work to measure governance (e.g., Olson et al., 2000; Adedokun, 2017; Kyriacou & Roca-Sagalés, 2020). The QoG-ICRG variable do not comprises 5 of the 57 countries of the sample (see Table A3 of the Appendix).

[12] Note that QoG-WGI is highly correlated with democracy (0.66**), urban population (0.65**), and also with the GG health expenditure (0.57**). And QoG-ICRG is highly correlated with urban population (0.65**), democracy (0.56**), and also with the GG health expenditure (0.52**). (**) significance at 5%.

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TABLE 3 Human development, public expenditure decentralization and the role of quality of governance (QoG)

Dependent variable: HDI	Annual				Five-year means			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Urban population	0.102***	0.106***	0.126***	0.124***	0.103***	0.110***	0.116***	0.119***
	(0.009)	(0.009)	(0.011)	(0.010)	(0.018)	(0.018)	(0.020)	(0.020)
Income Inequality	−0.381***	−0.389***	−0.422***	−0.435***	−0.377***	−0.394***	−0.362***	−0.368***
	(0.020)	(0.022)	(0.022)	(0.022)	(0.035)	(0.038)	(0.037)	(0.039)
Inflation	−0.014	−0.025	−0.142***	−0.150***	−0.012	−0.036	−0.175***	−0.191***
	(0.017)	(0.017)	(0.023)	(0.024)	(0.048)	(0.048)	(0.059)	(0.062)
Private health expenditure	−0.035	−0.149**	−0.040	−0.200**	−0.025	−0.132	−0.072	−0.242
	(0.063)	(0.062)	(0.089)	(0.092)	(0.137)	(0.135)	(0.171)	(0.178)
Democracy	−0.004*	−0.008***	0.001	−0.003	−0.006	−0.009**	−0.006	−0.008
	(0.002)	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.006)	(0.006)
Federalism	0.009***	0.012***	0.012***	0.017***	0.009***	0.012***	0.013***	0.017***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Dummy EU	0.006***	0.008***	0.021***	0.020***	0.008	0.008**	0.024***	0.022***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.005)	(0.005)	(0.007)	(0.006)
GG education	−0.405***	–	−0.078	–	−0.505***	–	−0.104	–
	(0.090)		(0.119)		(0.182)		(0.213)	
GG health	0.281***	–	0.425***	–	0.244*	–	0.385***	–
	(0.061)		(0.075)		(0.132)		(0.147)	
GG other	0.012	–	−0.106***	–	0.031	–	−0.099**	–
	(0.019)		(0.022)		(0.039)		(0.042)	
CG education	–	−0.219**	–	0.259**	–	−0.359*	–	0.078
		(0.097)		(0.110)		(0.195)		(0.204)

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TABLE 3 (Continued)

Dependent variable: HDI	Annual				Five-year means			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SNG education	–	−0.134	–	0.082	–	−0.243	–	0.032
		(0.082)		(0.111)		(0.167)		(0.199)
CG health	–	0.172***	–	0.291***	–	0.158	–	0.246*
		(0.053)		(0.070)		(0.113)		(0.134)
SNG health	–	0.276***	–	0.427***	–	0.265*	–	0.403***
		(0.067)		(0.079)		(0.147)		(0.157)
CG other	–	0.059***	–	−0.053**	–	0.076**	–	−0.030
		(0.021)		(0.025)		(0.039)		(0.045)
SNG other	–	−0.162***	–	−0.241***	–	−0.155***	–	−0.249***
		(0.024)		(0.035)		(0.051)		(0.064)
QoG-WGI	0.054***	0.056***	–	–	0.056***	0.058***	–	–
	(0.002)	(0.002)			(0.004)	(0.005)		
QoG-ICRG	–	–	0.144***	0.152***	–	–	0.194***	0.205***
			(0.008)	(0.010)			(0.020)	(0.022)
Constant	0.786***	0.783***	0.729***	0.724***	0.795***	0.794***	0.697***	0.685***
	(0.014)	(0.014)	(0.015)	(0.014)	(0.024)	(0.024)	(0.024)	(0.024)
Adjusted R^2	0.904	0.907	0.859	0.863	0.914	0.918	0.889	0.894
Chi2	8731	8806	6387	6136	2327	2439	1709	1775
Countries	57	57	52	52	57	57	52	52
Observations	928	922	835	829	210	209	195	194

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

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TABLE 4 Human development and public expenditure decentralization: Lagged effects and two-stage least square (TSLS)

		Lagged structure of government expenditure variables							TSLS			
Dependent variable: HDI	**(1)Annual ($h = 1$ lag)**	**(2)Annual ($h = 1$ lag)**	**(3)Annual ($h = 2$ lags)**	**(4)Annual ($h = 2$ lags)**	**(5)Annual ($h = 3$ lags)**	**(6)Annual ($h = 3$ lags)**	**(7)Five-year means($h = 1$ lag)**	**(8)Five-year means($h = 1$ lag)**	**(9)Annual**	**(10)Annual**	**(11)Five-year means**	**(12)Five-year means**
GG education (t-h)	−0.088(0.127)	–	−0.148(0.126)	–	−0.176(0.128)	–	−0.243(0.291)	–	0.026(0.134)	–	−0.032(0.272)	–
GG health (t-h)	0.626***(0.100)	–	0.609***(0.103)	–	0.574***(0.105)	–	0.635***(0.237)	–	0.618***(0.105)	–	0.554***(0.220)	–
GG other (t-h)	−0.148***(0.025)	–	−0.138***(0.025)	–	−0.131***(0.025)	–	−0.076(0.062)	–	−0.161***(0.027)	–	−0.099(0.063)	–
CG education (t-h)	–	0.385***(0.127)	–	0.358***(0.127)	–	0.380***(0.126)	–	0.114(0.304)	–	0.378***(0.137)	–	0.113(0.277)
SNG education (t-h)	–	−0.190(0.121)	–	−0.220*(0.122)	–	−0.209*(0.125)	–	−0.301(0.308)	–	−0.092(0.125)	–	−0.174(0.257)
CG health (t-h)	–	0.463***(0.088)	–	0.459***(0.091)	–	0.431***(0.093)	–	0.532**(0.216)	–	0.444***(0.092)	–	0.457**(0.192)
SNG health (t-h)	–	0.608***(0.091)	–	0.609***(0.094)	–	0.594***(0.096)	–	0.727***(0.217)	–	0.639***(0.107)	–	0.699***(0.228)
CG other (t-h)	–	−0.138***(0.026)	–	−0.137***(0.026)	–	−0.135***(0.027)	–	−0.061(0.064)	–	−0.127***(0.027)	–	−0.062(0.059)
SNG other (t-h)	–	−0.083**(0.038)	–	−0.078**(0.039)	–	−0.071*(0.038)	–	−0.103(0.087)	–	−0.122***(0.046)	–	−0.170*(0.098)
Constant	0.801***(0.016)	0.798***(0.015)	0.755***(0.016)	0.753***(0.015)	0.765***(0.017)	0.805***(0.016)	0.796***(0.032)	0.808***(0.031)	0.814***(0.017)	0.806***(0.019)	0.819***(0.033)	0.816***(0.033)
R-squared	0.803	0.806	0.797	0.801	0.793	0.798	0.793	0.799	0.789	0.791	0.811	0.811
Chi2	4583	4799	4224	4407	3915	4113	777	836	–	–	–	–
F-statistic	–	–	–	–	–	–	–	–	131	119	76	62
Prob(F-statistic)	–	–	–	–	–	–	–	–	0.000	0.000	0.000	0.000
Countries	57	57	57	57	57	57	57	57	57	57	57	57
Observations	876	870	824	818	769	763	155	154	861	856	210	209

Note: All regressions report PCSE in parentheses and include controls and period fixed effects. TSLS: The potential endogenous variables (inflation, private health expenditure, and government expenditure variables) are instrumented by their lag (annual data) and by the first year of each five-year period. Level of significance: 10% (*), 5% (**), and 1% (***).

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instrument them with their initial year of each period. Columns (9)–(12) of Table 4 present the results for the TSLS estimations, showing that the estimates remain basically unchanged to OLS estimates and accordingly, confirm the crucial influence of public health expenditure, at GG, CG and SNG level, on human development.

In our main specification (Equation 1) we control for the role that political decentralization (PD) may have on the relationship between public spending at CG and SNG level and the HDI using the variable of 'federalism', but it is also true that the level of autonomy of the subnational authorities could be different across expenditure functions and administrative levels, and that our aggregate indicator of PD may not capture all these potential differences. Consequently, since we think that PD may be an important factor, we next check the sensitivity of our main findings using alternative variables capturing different facets of PD, although we face the clear limitation that these variables do not allow us to include our entire sample of countries. Firstly, we follow Schneider (2003) that indicates that the existence of elections at the municipal level or the state/provincial level is an indicator of PD because they increase the probabilities that some political functions are decentralized, and consider the variables municipal and state governments locally elected from the Database of Political Institutions (DPI) by Cruz et al. (2018). Secondly, we include the variable "decentralized policies" from the Territorial Self-Governance dataset published by Trinn and Schulte (2020) that measures PD considering the scope of the authoritative powers of a regional legislative or executive in the areas of (i) economic, (ii) cultural-educational, (iii) social, or (iv) internal security or regional/local institutional policy. Finally, we employ the "regional authority index" (RAI) from Hooghe et al. (2016) which is an overall indicator of "regional authority" obtained as the sum of "self-rule" and "shared-rule". We acknowledge the limited validity of the results obtained using this other PD measures since we lose a part of our sample (9, 10 and 14 countries respectively), but in any case, our main results are maintained; the important role of health spending is confirmed, and the level of PD (in the form of electoral decentralization, and decentralized policies) keeps showing a positive and significant impact on HDI (results not included and available upon request).

We now turn to examine the sensitive of our main finding when controlling, first, for investment, and then, for ethnic fractionalization. We consider the inclusion of the variable "investment" from the Penn World Table (Feenstra et al., 2015) since previous empirical work (Castells-Quintana et al., 2019; Paliova et al., 2019) has found a positive and significant effect of investment on human development through the income component transition channel. The results obtained when including this additional control are maintained and we do not find clear and robust evidence of its effect on HDI. On the other hand, we consider the inclusion of ethnic fractionalization from Alesina et al. (2003) since some contributions (Easterly & Levine, 1997; Alesina et al., 1999) support that schooling is adversely affected by ethnic fractionalization because of the difficulty of different ethnic groups agreeing on the type and quality of public services, and conflict may affect negatively economic development through reducing the quality of policy and of institutions (Alesina et al., 2003). The results of introducing the ethnic fractionalization variable into our baseline model are maintained, and we find a negative coefficient on ethnic fractionalization, but its effect on HDI is not always robust. To conclude, for both cases, our main result regarding the link between the spending variables and human development remains valid (results available upon request). The reason why we do not include the investment variable in the main case is because public expenditure on health and education involves investment in the form of research and development, capital, among others, and consequently we would have the risk to double accounting of some specific investment issues, while we prefer not to include

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the variable of ethnic fractionalization since it does not allow us to maintain all our sample of 57 countries.

7 | CONCLUSIONS

Public expenditure on health and education have been used as the main fiscal instruments to improve economic and human development and, as a consequence, the quality of life of the citizens. However, the impact of these public policies on the economic and human development is not just a matter of the amount of resources that they absorb since organizational aspects may have an important influence. In particular, in this paper we hypothesize that the extent to which public expenditures are distributed across different functions and are decentralized could be of great importance.

In this context, we provide novel empirical evidence using data panel techniques from a sample of 57 developed and developing countries over the period 2000 to 2018, showing that health expenditure helps improve the Human Development Index (HDI) no matter the level of administrative is in charge, while in the case of the education expenditure the effects remain unclear. These results would confirm that when analysing the impact of decentralizing public resources on human development, the type of expenditure decentralized is crucial.

Our research offers several important findings that have other policy implications. Thus, public health spending, at general, central and subnational level, is positively associated with life expectancy, level of education, and income per capita, and consequently improves the HDI. These results are robust to estimation techniques that attempt to deal with the problem of reverse causality, to the inclusion of a measure of government quality, and also to the introduction of a range of control variables—most notably, variables that account for the degree of decision-making autonomy enjoyed by subnational governments. The results suggest that committing more public resources to improve the health of citizens, no matter the administrative level responsible of this spending, could be an appropriate strategy to achieve higher levels of human development. Importantly, our results may also be understood as an indication that decentralizing health spending to subnational authorities is not harmful for human development.

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APPENDIX
LIST OF COUNTRIES, DEFINITION OF VARIABLES AND SOURCES AND DESCRIPTIVE STATISTICS

TABLE A1 List of countries and codes

ALB – Albania	GRC – Greece	MUS – Mauritius
AUS – Australia	HRV – Croatia	NLD – Netherlands
AUT – Austria	HUN – Hungary	NOR – Norway
BEL – Belgium	IDN – Indonesia	NZL – New Zealand
BGR – Bulgaria	IRL – Ireland	POL – Poland
BLR – Belarus	IRN – Iran	PRT – Portugal
CHE – Switzerland	ISL – Iceland	ROU – Romania
CHN – China	ISR – Israel	RUS – Russian Federation
CYP – Cyprus	ITA – Italy	SGP – Singapore
CZE – Czechia	JPN – Japan	SLV – El Salvador
DEU – Germany	KAZ – Kazakhstan	SVK – Slovakia
DNK – Denmark	KGZ – Kyrgyzstan	SVN – Slovenia
EGY – Egypt	LTU – Lithuania	SWE – Sweden
ESP – Spain	LUX – Luxembourg	SYC – Seychelles
EST – Estonia	LVA – Latvia	THA – Thailand
FIN – Finland	MDA – Moldova	TUR – Turkey
FRA – France	MDV – Maldives	UKR – Ukraine
GBR – United Kingdom	MLT – Malta	USA – The United States
GEO – Georgia	MNG – Mongolia	ZAF – South Africa

Source: Own elaboration.

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TABLE A2 Definition of variables and sources

Variable	Definition	Source
Human Development Index (HDI)	A summary measure of average achievement in three key dimensions of human development in the country: a long and healthy life, access to knowledge, and a decent standard of living. 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).
Life expectancy 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
Government education expenditure	Expenditure of general/central/subnational government on education as a share of GDP. Expenditure on 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 not elsewhere classified (n.e.c.).	Government Finance Statistics of the International Monetary Fund (GFS-IMF) database and IMF Fiscal Decentralization dataset
Government health expenditure	Expenditure of general/central/subnational government on health as a share of GDP. Expenditure on medical products, appliances and equip, outpatient services, hospital services, public health services, R&D health, health n.e.c.	GFS-IMF database and IMF Fiscal Decentralization dataset
Other government expenditure	Variable obtained subtracting education and health public expenditure from total general/central/subnational government expenditure, as a share of GDP. Total expenditure involves: general public service, defence, public order and safety, economic affairs, environmental protection, housing and community services, health, recreation, culture and religion, education, and social protection services.	GFS-IMF database and IMF Fiscal Decentralization dataset

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TABLE A2 (Continued)

Variable	Definition	Source
Urban population	Urban population, as a share of total population.	World Development Indicators (WDI)
Income inequality	Gini coefficient based on net income inequality (Gini disposable).	The Standardized World Income Inequality Database (SWIID) (Solt 2020)
Inflation	Consumer prices (annual %), divided by 100.	WDI
Variable	**Definition**	**Source**
Private health spending	Variable obtained subtracting from total health expenditure the general government health expenditure, as a share of GDP. It includes expenditure from pooled resources with no government control, such as voluntary health insurance, and the direct payments for health by corporations (profit, non-for-profit, and NGOs) and households. As a financing agent classification, it includes all sources of funding passing through these entities, including any donor (funding) they use to pay for health.	Global Health Expenditure database of the World Health Organization
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 (2021) and Freedom House (2021)
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)
EU member	Dummy variable taking the value of 1 if the country is a member of the European Union.	Eurostat.
Quality of governance—WGI	Average of government effectiveness, rule of law, regulatory quality, and control of corruption dimensions. Ranging from -2.5 (lowest) to 2.5 (highest).	Worldwide Governance Indicators (WGI) as developed by the World Bank (Kaufmann et al. 2011)
Quality of governance—ICRG	Average of law and order and bureaucratic quality, and corruption dimension each normalised between 0 and 1. Ranging from 0 (lowest) to 1 (highest).	International Country Risk Guide (ICRG) as developed by the Political Risk Services Group (ICRG 2013)

Source: Own elaboration.

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TABLE A3 Summary statistics

Variable	Variation	Mean	Std. Dev.	Minimum	Maximum	No. Obs.	
Human Development Index (HDI)(0–1 index)	Overall	0.811	0.093	0.589	0.954	$N =$	1083
	Between		0.089	0.636	0.938	$n =$	57
	Within		0.029	0.718	0.885	$T =$	19
Life expectancy index(0–1 index)	Overall	0.861	0.083	0.515	0.992	$N =$	1083
	Between		0.080	0.582	0.967	$n =$	57
	Within		0.025	0.786	0.954	$T =$	19
Education index(0–1 index)	Overall	0.769	0.112	0.430	0.946	$N =$	1083
	Between		0.104	0.494	0.909	$n =$	57
	Within		0.042	0.626	0.875	$T =$	19
Income index(0–1 index)	Overall	0.811	0.111	0.447	1	$N =$	1083
	Between		0.109	0.491	0.986	$n =$	57
	Within		0.025	0.690	0.915	$T =$	19
Education GG expenditure(/GDP)	Overall	0.050	0.013	0.009	0.094	$N =$	957
	Between		0.013	0.023	0.075	$n =$	57
	Within		0.005	0.017	0.078	$T =$	16.790
Education CG expenditure(/GDP)	Overall	0.026	0.016	0.000	0.070	$N =$	977
	Between		0.016	0.000	0.063	$n =$	57
	Within		0.005	0.006	0.054	$T =$	17.140
Education SNG expenditure(/GDP)	Overall	0.026	0.019	0.000	0.073	$N =$	971
	Between		0.018	0.000	0.068	$n =$	57
	Within		0.005	0.006	0.055	$T =$	17.035
Health GG expenditure(/GDP)	Overall	0.051	0.021	0.003	0.093	$N =$	958
	Between		0.021	0.010	0.081	$n =$	57
	Within		0.006	0.029	0.075	$T =$	16.807
Health CG expenditure(/GDP)	Overall	0.035	0.023	0.000	0.085	$N =$	978
	Between		0.022	0.001	0.077	$n =$	57
	Within		0.006	0.004	0.063	$T =$	17.159
Health SNG expenditure(/GDP)	Overall	0.016	0.020	0.000	0.087	$N =$	972
	Between		0.019	0.000	0.078	$n =$	57
	Within		0.005	0.000	0.060	$T =$	17.053
Other GG expenditure(/GDP)	Overall	0.296	0.074	0.085	0.530	$N =$	957
	Between		0.070	0.114	0.416	$n =$	57
	Within		0.030	0.206	0.565	$T =$	16.790
Other CG expenditure(/GDP)	Overall	0.240	0.065	0.070	0.520	$N =$	977
	Between		0.059	0.114	0.393	$n =$	57
	Within		0.028	0.146	0.507	$T =$	17.140
Other SNG expenditure(/GDP)	Overall	0.071	0.048	0.000	0.242	$N =$	971
	Between		0.047	0.000	0.226	$n =$	57
	Within		0.010	0.009	0.139	$T =$	17.035

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TABLE A3 (Continued)

Variable	Variation	Mean	Std. Dev.	Minimum	Maximum	No. Obs.	
Variable	**Variation**	**Mean**	**Std. Dev.**	**Minimum**	**Maximum**	**No. Obs.**	
Urban population(0–1)	Overall	0.684	0.163	0.277	1	$N =$	1083
	Between		0.162	0.352	1	$n =$	57
	Within		0.023	0.566	0.798	$T =$	19
Income inequality(0–1)	Overall	0.330	0.069	0.226	0.635	$N =$	1056
	Between		0.069	0.237	0.628	$n =$	57
	Within		0.010	0.290	0.379	$T =$	18.526
Inflation	Overall	0.044	0.065	-0.045	0.611	$N =$	1067
	Between		0.044	0.001	0.220	$n =$	57
	Within		0.049	-0.128	0.435	$T =$	18.719
Private health spending (/GDP)	Overall	0.026	0.015	0.006	0.085	$N =$	1083
	Between		0.014	0.010	0.081	$n =$	57
	Within		0.004	0.005	0.050	$T =$	19
Democracy	Overall	2.554	0.700	1	3	$N =$	1083
	Between		0.682	1	3	$n =$	57
	Within		0.178	1.607	3.501	$T =$	19
Federalism	Overall	1.719	1.254	1	5	$N =$	1083
	Between		1.264	1	5	$n =$	57
	Within		0	1.719	1.719	$T =$	19
Quality of governance (WGI)	Overall	0.709	0.930	-1.174	2.185	$N =$	1083
	Between		0.926	-0.908	2.044	$n =$	57
	Within		0.146	-0.273	1.388	$T =$	19
Quality of governance (ICRG)	Overall	0.619	0.219	0.194	1	$N =$	936
	Between		0.214	0.265	0.983	$n =$	52
	Within		0.052	0.443	0.949	$T =$	18

Note: The table presents the summary statistics of the variables used in the analysis (excluding the dummy variable, EU member). Quality of governance (ICRG) data is not available for Georgia, Kyrgyzstan, Maldives, Mauritius, and Seychelles.
Source: Own estimations.

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