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Poverty, income inequality, and government expenditure: Does the quality of governance make a difference?

Abstract

This paper examines the influence of governance on the relationship between government education/health expenditure and income inequality/poverty. This topic is chosen to investigate whether the quality of governance in developing countries affects the effectiveness of the redistributive policies of the government in the way that it reduces poverty and income inequality. A longitudinal dataset is constructed to conduct this empirical research. The results indicate that in countries with a good governance structure an increase in government health and education expenditure is associated with an increase in poverty. On the contrary, the negative effect of government health expenditure on income inequality is independent of the quality of governance. Lastly, government education expenditure is unrelated to income inequality.

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1. Introduction

Poverty and inequality are two major issues developing countries have to cope with, especially since income inequality harms the sustainability of economic growth (Easterly, 2007; Halter, Oechslin, & Zweimüller, 2014). The United Nations declared a new target in 2015 to eliminate extreme poverty further by 2030. Quick and sustainable economic growth is found to be the number one instrument to reduce the amount of people living in poverty (e.g. Dollar & Kraay, 2002; Dollar, Kleineberg, & Kraay, 2016). However, economic growth alone is not enough to reach the objective of the United Nations, as there are fewer individuals closer to the poverty line. This outcome indicates that the economic progress should go through the roof or other things should have to change to bring the poverty ratio to zero (Anderson, Jalles d'Orey, Duvendack, & Esposito, 2018). The increase in economic growth needs to be combined with distributional changes that reduce poverty itself to abolish extreme poverty (Perry, Arias, Lopez, Maloney, & Serven, 2006). Government spending is a factor that has an important influence on those distributional changes (Anderson et al., 2018). Therefore, many researchers scrutinised the relationship between government spending and income inequality/poverty in cross-country studies. However, there exists no consensus in the results with respect to sign and significance.

Researchers linked the lack of clear evidence for the relationship between government spending and poverty/income inequality to the effectiveness of the redistributive function of the government in developing countries (Anderson, Jalles d'Orey, Duvendack, Esposito, 2017). For example, the size of the effect of government spending on poverty reduction or income inequality alleviation can vary substantially depending on whether low-income groups or high-income groups are targeted with a particular policy. To be more precise, Goni, López, & Servén (2011) found evidence that the redistributive role of government policy is restricted in developing countries compared to Organisation for Economic Co-operation and Development (OECD) countries. Furthermore, other researchers indicated that most of the government expenditure on health and education in developing countries arrived at the middle-income groups instead of the poorest individuals of society (Castro-Leal, Dayton, Demery, & Mehra, 1999; Davoodi, Tiongson, & Asawanuchit, 2003; Demery, 2003). Accordingly, it is beneficial to examine factors that might diminish that targeting problem in developing countries. Coady, Grosh, & Haddinnot (2006) provided evidence that government policies are especially less well-targeted in countries with more inadequate governance and low levels of gross domestic product (GDP) per capita.

Therefore, this paper aims to add to the existing body of literature by examining the link between government spending and poverty/inequality reduction and the influence of good governance on this relationship in developing countries all over the world. This topic is chosen to investigate whether the quality of governance in a country influences the effectiveness of the redistributive policies of governments in the way that it reduces poverty and income inequality. A special focus is on public education and health expenditure as these types of social expenditures are seen in the literature as pro-poor policies that potentially lower the number of people living in poverty (Anderson et al., 2018). To conduct this empirical research, a longitudinal dataset is established mostly based on data from the World Bank. This topic is relevant to examine since it has both implications for theory and policy. The current literature mainly focuses on the separate relationships between government spending and poverty/income inequality or on the link between good governance and poverty/income inequality. Accordingly, this is the first study that examines the interdependence of the three relevant variables in one model, which is a contribution to the existing literature. Moreover, this study is also relevant for public policies as it provides guidance especially for policies that focus on making the targeting of government spending more effective in a way that it reduces poverty and income inequality in developing countries. This guidance might be very suitable now as Anderson et al. (2018) indicated that the association between government spending and poverty becomes less negative lately, instead of more negative.

The results provide evidence that in countries with a good governance structure an increase in government education or health expenditure is associated with an increase in the number of people living in poverty in that country. However, an increase in government expenditure specifically at the primary education level might decrease poverty in countries with an effective government and control of corruption. Furthermore, government health expenditure reduces income inequality only if income inequality is measured with the Gini coefficient or the Palma ratio. This effect is independent of the quality of governance. Lastly, the results indicate that government education expenditure is unrelated to income inequality at all.

Hereafter, a theoretical framework presents information about the existing literature on government expenditure, governance, poverty, and income inequality in chapter two. Subsequently, chapter three describes the empirical strategy used and the potential endogeneity problems associated with it. The data sources and main variables are also mentioned in chapter three. Chapter four presents and discusses the results. Lastly, chapter five concludes and provides limitations and suggestions for future research.

2. Literature review

The focus of this study is not only on the effect of government spending on poverty alleviation but also on the impact of public spending on income inequality reduction among individuals, as an increase in public expenditure can have a dissimilar effect on both variables (Anderson et al., 2018). For instance, government spending can decrease inequality while having no effect on poverty alleviation. This outcome can happen if the policy redistributes income from the wealthiest families towards middle-income households. On the other hand, public expenditure can also boost all income across the whole income distribution. This expenditure decreases the number of people living in poverty, while the level of income inequality in a country remains the same.

Furthermore, high-income inequality can have a major burden on economic development (Goni et al., 2011). Researchers mention a couple of reasons for this potential drag on development. First, data show that a high level of income inequality is associated with a higher level of poverty (Perry et al., 2006). For example, if Latin American countries had the same levels of income inequality as many developed countries, then the number of people living in poverty in that area would be reduced in half. Secondly, high income inequality reduces the beneficial effects of economic growth on poverty, for the reason that poverty is more responsive to economic growth in countries with a more equal income distribution (Perry et al., 2006). Easterly (2001) estimated that the income growth elasticity of poverty decreases with an increase in income inequality. Hence, an unequal society needs a faster rate of economic growth compared to a more equal society to accomplish the same reduction in poverty (Goni et al., 2011; Iradian, 2005). Lastly, high inequality may also indicate the failure of the redistributive policies of the government. In general, governments in developed countries are more competent in carrying out their redistributive function than governments in developing countries. The failure of the redistributive policies might indicate that tax policies are not progressive enough, or that in-kind transfers are not targeted towards the people that really need it. This failure of the redistributive function makes these government policies part of the problem. Accordingly, in this chapter, the existing literature on the relationship between public expenditure and poverty/income inequality is highlighted first. After that, information is provided about the association between governance, poverty/inequality, and public spending. The literature review ends with a description of the contribution of this study in the form of the application of good governance in the relationship between government spending and poverty/income inequality.

2.1. Public expenditure, poverty, and income inequality

In economic theory, the justification for government intervention in poverty reduction is based on efficiency and equity principles (Castro-Leal et al., 1999; Iradian, 2005). Whereby government subsidies and spending potentially correct for market failures, and assist with a better distribution of resources among the citizens of a society. However, just increasing the total amount of public spending is not always effective for improving the welfare of the poor (Baldacci, Clements, Gupta, & Cui, 2008; Iradian, 2005). The composition of the government expenditure, the targeting of the government expenditure, and the sector choice of the public expenditure all have a great impact on the outcome. For example, Iradian (2005) made clear that in the past several developing countries were able to keep the social spending on education and health at the same level and targeted towards the poor while reducing the total amount of government expenditure. More specifically, Chile, for instance, carried on with improving the social conditions for the poor via the provision of primary health and nutrition programs while reducing the expenditure on goods and services in general during their period of fiscal adjustments.

Secondly, public expenditure can be targeted directly or indirectly to the public (Anderson et al., 2018). If this expenditure is targeted directly, it means that an investment is made in the primary sector that the government wants to improve (Ferroni & Kanbur, 1992). For example, public spending in the form of a subsidy or cash transfer used for the extension of agriculture for female farmers. On the other hand, public investment can also be an income-enhancing expenditure that increases the market income of the household. This type of spending is referred to as indirect public expenditure; for instance, public spending on education to enhance the human capital of the poor. Ferroni & Kanbur (1992) found that both types of spending should be combined to increase the welfare of the poor the most. Lastly, sometimes it is necessary to combine high public spending on a specific sector with public spending on another sector to reap the full benefits of that expenditure. As an illustration, an increase in health expenditure should be combined with a broader availability of basic infrastructure services, such as access to water and sanitation, to advance the health status of children (Fay, Leipziger, Wodon, & Yepes, 2003). Moreover, individuals are only able to have a meaningful economic use of an expansion in infrastructure such as roads, if they have basic skills, knowledge and other necessary assets (The Asian Development Bank, 2002).

2.1.1. Public expenditure and poverty

Existing literature is inconclusive about the sign and significance of the relationship between government spending and poverty. This variety in results exists among dissimilar studies due to the difference in countries used in the sample, the difference in control variables added in the model specification, and the difference in the type of government spending considered in every study (Anderson et al., 2018). For example, Mosley, Hudson, & Verschoor (2004) looked at public spending on basic needs such as education, county roads, water, health care, and the extension of agriculture. They found that these specific types of government spending have a significant adverse effect on the poverty headcount ratio. On the contrary, Tanzi, Chu, & Gupta (1999) indicated that equity-enhancing public spending, in general, has a limited impact on the reduction of poverty. The authors stated that the low quality and small size of the government expenditure are the causes of this limited impact on poverty. Furthermore, Gomanee, Morrissey, Mosley, & Verschoor (2003) displayed that there is no evidence of any association between government spending on military or agriculture and the welfare of the poor. Lastly, Anderson et al. (2018) conducted a meta-regression analysis of the general relationship between government spending and poverty. They focused especially on low- and middle- income countries and included total government spending and public spending in a particular category such as health. The authors found no clear evidence that government spending reduced the number of people living in poverty.

2.1.2. Public expenditure and income inequality

The literature on public expenditure and income inequality provides some evidence of a moderate negative relationship between government spending and income inequality in developing countries (e.g. Anderson et al., 2017; Goni et al., 2011; Lustig, Lopez-Calva, & Ortiz-Juarez, 2013). However, the same literature also makes clear that it is a very complicated relationship where the type of government spending and the measure of income inequality have a considerable effect on the outcome (Anderson et al., 2017). For example, Anderson et al. (2017) indicated that the effect of government spending on income inequality is more negative when using the income share of the richest ten or twenty per cent as the measure for inequality, instead of the Gini coefficient. On the other hand, concentrating on the income share of the poorest twenty or forty per cent makes the effect less negative, compared to the Gini coefficient according to the same authors. This observation does not immediately indicate that the outcomes of the different measures contradict each other as countries can have the same value for the Gini index and at the same time be at a totally different stage of development. The Gini

coefficient does not give information about the absolute values, only about the relative ones. Two countries obtain the same value for the Gini coefficient if the income is distributed the same in both countries. Therefore, one particular measure of income inequality might be more relevant for certain countries than for others. For example, in highly developed countries, where fewer individuals live in poverty, an adverse effect of government spending on income inequality measured with the income share of the richest twenty per cent might be more important than a negative effect with the same measure for poorer developing countries.

The current literature links the lack of clear results, in the relationship between government expenditure and income inequality, to the effectiveness of the redistribution function of the expenditure (Anderson et al., 2017). For instance, the government expenditure policies of developing countries lack the appropriate redistributive function to lower income inequality in comparison with developed countries (Kappel, 2010). In some cases, Kappel (2010) even found a significant positive effect of government spending on income inequality, instead of no effect or a negative effect. Anderson et al. (2017) only found a negative statistically significant influence of public social welfare spending on income inequality if developed countries are also included in the sample next to developing countries. To be more specific, Goni et al. (2011) compared in their study countries in Latin America with more equal countries in Western Europe. The results made clear that the upper quintiles of the income distribution receive more in-kind transfers, such as spending on education and health, and cash subsidies compared to the lower quintiles in every Latin American country in the sample. The authors, therefore, concluded that the difference in inequality levels between Latin American and Western European countries was even more prominent after taxes and public transfers than before those same public transfers and taxes.

2.1.3. Public health and education expenditure

Although the results concerning government spending, poverty reduction, and income inequality are mixed, public social expenditures on health and education are seen in theory as pro-poor policies that potentially reduce poverty (Anderson et al., 2018). Increasing the public expenditure on these services does not directly reduce the monetary poverty for households, as the quality of the education and health does not directly increase the consumption spending of these families (Dorosh & Thurlow, 2018). However, spending in these sectors does improve the standard of living of the poor, and it also helps with creating opportunities by boosting future labour productivity and the earnings potential of the households (Jimenez, 1995; McKague, Wheeler, & Karnani, 2015; McKay, 2004). Even if the public expenditure policy is

more regressive in nature, it is still likely that increased expenditure in these sectors improves the welfare of the poorest citizens. For that reason, health and education are seen as two crucial elements for human capital. They are, therefore, core objectives in the Millennium Development Goals (MDGs) of the United Nations (Baldacci et al., 2008). Next to the benefits related to public health and education expenditure, there also exist imperfections in the markets for education and health. These imperfections give governments no other choice than to intervene in these sectors (Iradian, 2005). The presence of positive externalities in the market for education and problems of asymmetric information in the market for health care are the main drivers of these imperfections (Poterba, 1996). If parents ignore the positive externalities of education, their private spending into that sector will decrease. Therefore, public policies are planned to increase the educational attainment in a country. In the health care market, there exists asymmetric information between patients and health care providers which leads to adverse selection and moral hazard (Poterba, 1996). Furthermore, nearly all medical services are provided in an imperfect competitive market situation. Both arguments taken together make that government intervention is also necessary in the health care market.

Public spending in education is seen as an investment in human capital (Devarajan, Swaroop, & Zou, 1996). It increases the opportunities for children to seek an education (Abdullah, Doucouliagos, & Manning, 2015). The effect of government spending on education on poverty alleviation is unequal for every stage of education. Hidalgo-Hidalgo & Iturbe-Ormaetxe (2018) found that public spending in primary and secondary education has a powerful long-run effect on lowering the occurrence of poverty later in life. The expenditure might incentivise individuals to improve their human capital by engaging in education, even after finishing mandatory schooling. The association between public spending in education and poverty reduction is mainly driven by individuals with families that have a low level of education. This result illustrates that public expenditure in education assists in the expansion of intergenerational mobility. However, when considering tertiary education, the negative relationship between public spending on education and poverty disappeared (Hidalgo-Hidalgo & Iturbe-Ormaetxe, 2018). Whilst most of the government spending on education is invested in this tertiary stage where the nonpoor have better access to compared to the poor (Abdullah et al., 2015; Lustig, 2017). This observation indicates that the wealthier citizens benefit disproportionately from the public education expenditure (Hanmer, Pyatt, & White, 1999; Jimenez, 1995), rather than the poorest individuals of society that are expected to be targeted with the redistributive policies (Abdullah et al., 2015). This mismatch in redistribution is also

pointed at in the studies of Dollar & Kraay (2002) and Dollar et al. (2016). Both papers showed that public expenditure on education and health has an insignificant effect on the national income share of the poorest twenty per cent of household, which is a standard measure of income inequality.

Another part of literature links public education spending to welfare indicators due to data limitations in poverty data. For example, Gomanee et al. (2003) found that general education expenditure has a significant positive effect on welfare, which they measured with the Human Development Index (HDI). However, the estimated elasticities of this positive effect are low. When the authors measured public education expenditure per education level, they found that HDI is unaffected by an increase in public primary education expenditure. On the contrary, Dabla-Norris & Matovu (2002) indicated that an increase in education spending in primary education has the most significant positive effect on human capital compared to the secondary and tertiary education level. This public expenditure reduces the opportunity costs of schooling, which makes it optimal for a household to increase the amount of schooling for their children. Furthermore, an increase in primary education expenditure at the expense of tertiary education expenditure also leads to more investment in human capital (Dablo-Norris & Matovu, 2002). However, this effect is smaller than the direct relationship between primary education spending and human capital due to the high fixed costs associated with tertiary education.

An essential condition for public education expenditure to be effective in lowering the number of people living in poverty is the long-term policy setting around it (Demery, 2003). For instance, if public primary education spending increases the knowledge of girls, but laws in the labour market prevent these same women from obtaining employment, then increasing government spending in this sector is pointless. The public policies should be aligned with government expenditure plans. In this specific case, this argument suggests that employment opportunities should be available for individuals with increased productivity due to better education (Hanmer et al., 1999). Furthermore, if the poor citizens fail to have enough resources available to attend school, then the public expenditure is not helpful either (Sylwester, 2000). This outcome is especially likely to happen due to the potential increase in taxes to fund for the increase in government spending.

Existing literature on the effect of public health expenditure on poverty/income inequality mainly focuses on aggregate health indicators, as other indicators are not always available per income class (Gupta, Verhoeven, & Tiongson, 2003). In general, the health status of the poor is worse compared to the health status of the wealthier people of society (Bidani & Ravaillon,

1997). Accordingly, public spending on health care is more critical for this particular group (Gakidou & King, 2000). The nonpoor are able to replace public for private health care spending, while the poor depend more on public health care provision. However, this greater demand for public health care by the poor may also indicate that the quality of this health care is worse compared to the quality of private health care. This observation provides an alternative reason why the middle and higher classes prefer private health care over public health care and why the poor use more public health care in comparison with other income groups (Lustig, 2017). To come to more precise conclusions, Gupta et al. (2003) divided the countries in their sample into a category of low-income countries and a category of high-income countries. The authors came to similar conclusions as Bidani & Ravaillon (1997). Namely, the poor have a worse health status compared to the nonpoor, and an increase in public health spending affects them more compared to the nonpoor. The contrast in the influence of public health spending on the health status of individuals is extreme between the two groups. Lastly, Gupta et al. (2003) found evidence for an insignificant relationship between public health spending and child mortality in countries that have a higher income per capita. The authors argued that this insignificant result can be observable due to inefficiencies in the supply of services and inadequate targeting.

On the contrary, some studies argue that public spending on health care does very little or nothing in decreasing the amount of infant and child mortality, which is used as a proxy for health status (e.g. Filmer & Pritchett, 1997; Filmer, Hammer, & Pritchett, 1998). For example, in African countries, public spending on curative health care is mainly going to hospital-based services in urban areas (Castro-Leal et al., 1999; Filmer & Pritchett, 1997; Jimenez, 1995). However, the poor use more primary service, instead of hospital services. Therefore, the households that belong to the poorest twenty per cent of the income distribution receive less than twenty per cent of the health subsidy. In comparison, the richest twenty per cent of the population receive more than twenty per cent of the health subsidy. Part of the investment in hospital-care benefits the poor indirectly (Castro-Leal et al., 1999). Namely, the hospitals use part of the public spending on health care for the schooling of medical staff. Hospitals have an obligation to train medical employees for other levels of health care services. Besides the indirect benefits for the poor, increasing the expenditure on primary services instead of hospital facilities could increase this benefit for the poor even more.

2.1.4. Poor targeting of public expenditure

Based on the literature it can be concluded that even the relative pro-poor public expenditures in the form of education and health spending have a weak and inconclusive impact on poverty alleviation and income inequality reduction in developing countries. The explanation for this weak link in the literature is based on two sets of arguments. The first argument states that public spending potentially crowds out private spending (Rajkamur & Swaroop, 2008). The marginal effect of government expenditure becomes minimal, almost negligible, due to this potential crowding out of private spending. However, this argument does not give any knowledge about the adequacy of the public expenditure itself. It is, therefore, less relevant for this study.

The second argument links the ineffectiveness of government spending to the deficient targeting of public spending and/or incompetence of the institutional environment (Rajkamur & Swaroop, 2008). For example, Anderson et al. (2018) found that the effect of public spending on poverty reduction is more negative for countries in Eastern-Europe compared to other developing countries. These East-European countries use well-targeted cash transfers combined with progressive public spending; this makes the fiscal policy more redistributive and significant (Lelkes & Sutherland, 2009). Furthermore, multiple researchers indicated that most of the government expenditure on health and education in developing countries arrived at the middle-income groups in urban areas instead of at the poorest individuals of society (Alesina, 1998; Castro-Leal et al., 1999; Davoodi et al., 2003; Demery, 2003). In that way, the size of the impact on poverty and income inequality is restrained. Lastly, aforementioned the type of instrument that is used to measure income inequality has a great influence on the outcome of the relationship between public expenditure and income inequality (Anderson et al., 2017). Whereby studies that use the income share of the richest ten or twenty per cent as a measure find the biggest negative effect of public expenditure on income inequality. This outcome suggests that the redistribution of the government expenditure does not cover the whole income distribution, but is mainly condensed towards the middle-income groups.

The poor targeting and therefore the inefficacy of public spending for poverty alleviation and income inequality reduction can not only be ascribed to the dire economic policy itself, but also to other variables influencing that policy (Pritchett, 1996). The quality of governance is an important factor that influences economic policy as it, for example, indicates whether public power can be used for the private gain by certain persons. Secondly, the quality of governance also expresses the ability of the government to formulate and implement government policies,

and the quality of the public services (Kaufmann, Kraay, & Mastruzzi, 2011). For that reason, the existing literature on governance, public expenditure, poverty, and income inequality is highlighted in the upcoming paragraphs.

2.2. Governance, public expenditure, poverty, and income inequality

Many studies focus on the empirical relationship between the quality of governance and development outcomes. For example, Kaufmann, Kraay, & Zoido-Lobaton (1999) and Kaufmann, Kraay, & Mastruzzi (2004) found that good governance has a direct negative influence on infant mortality. Moreover, Hasan, Mitra, & Ulubasoglu (2006) indicated that every governance variable in their study has a negative association with poverty. This evidence suggests that better governance is associated with fewer people living in poverty. However, the authors fail to find a significant estimate for this negative effect in most of their regressions. Kwon & Kim (2014) came with similar outcomes. They indicated that a better governance only influences poverty if the economic and social development level of the country is already above a certain threshold. For that reason, the authors found a correlation between good governance and a decline in poverty for middle-income developing countries and not for low-income developing countries. Although good governance itself does not directly reduce poverty, it is a relevant instrument that could assist in declining the number of people living in poverty (Kwon & Kim, 2014).

Governance does not only have an impact on poverty, but it also influences public expenditure. For example, policies that are focused on reducing the amount of poverty are less well-targeted in countries that have worse governance and inferior levels of GDP per capita (Coady et al., 2006). More specifically, corruption hampers government investment spending, and it makes other public services less efficient (d'Agostino, Dunne, & Pieroni, 2016). Corrupt government employees have a tendency towards spending government money on projects that allow them to take a bribe and to remain hidden at the same time (Rose-Ackerman, 1997). For that reason, they favour very specialised projects, such as major weapons systems or engineering projects, where the market value is hard to determine (Shleifer & Vishny, 1993) and the competition is very low. It is harder to collect bribes on education-related spending, such as textbooks and the salaries of teachers (Mauro, 1998). This type of goods and services can be produced and carried out with solely mature technology, and therefore a relatively large number of suppliers can construct it. Additionally, Mauro (1998) found that public education spending is adversely related to corruption. Hence, if there is more corruption in a country, then the total public spending on education goes down, due to the less favourable circumstances for rent-seeking in

education. Furthermore, the authors also provided weak evidence for the fact that corruption leads to a structure of government expenditure that is less than optimal instead of only indicating that corruption leads to high public spending on projects that are impossible to monitor.

2.3. Contribution to the existing body of literature

Overall, the existing literature makes apparent that there is an unclear link between public expenditure and poverty/income inequality, and that the quality of the governance of a country influences both variables. However, examining the two relationships separately does not catch the whole picture, since the variables are interlinked. This argument is based on two main reasons. First, the poor targeting of the public expenditure towards the poorest citizens of a country is used as a central argument in the literature why studies find no significant negative estimate for the relationship between public expenditure and poverty/income inequality (Rajkamur & Swaroop, 2008). Secondly, government spending is less-well targeted in countries with poor governance (Coady et al. 2006). Therefore, this study contributes to the existing body of literature by examining if the quality of governance can explain the difference in the efficiency of public education and health spending in reducing poverty and income inequality between developing countries. To my knowledge, this has not been done before specifically for poverty and income inequality. Only Rajkamur & Swaroop (2008) looked at the effect of quality of governance on the relationship between public health and education spending and health and education outcomes. They found that public spending in these two sectors does not influence health and education outcomes if a country is poorly governed. For that reason, in this study, I am going to test if the same mechanism holds for the relationship between public education/health spending and poverty/income inequality.

3. Methodology and data

3.1. Baseline specifications

As explained before, this study examines whether the quality of governance in a country moderates the effect of public health and education expenditures on poverty alleviation and income inequality reduction. The most straightforward way of estimating the treatment effects of these two relationships is to estimate equations (1) and (2). Accordingly, an interaction term is included in both regression equations, between government expenditure and governance, to examine if the quality of governance alters the effect of public spending on poverty/income inequality. Both equations are presented in a conventional panel data notation below:

$$P_{it} = \beta_0 + \beta_1 GE_{it} + \beta_2 GO_{it} + \beta_3 GE_{it} * GO_{it} + \varepsilon_{it} \quad (1)$$

$$IE_{it} = \alpha_0 + \alpha_1 GE_{it} + \alpha_2 GO_{it} + \alpha_3 GE_{it} * GO_{it} + \omega_{it} \quad (2)$$

In equation (1), P_{it} denotes a measure of poverty, GE_{it} represents public spending in education or health, and GO_{it} stands for the quality of governance. Lastly, ε_{it} is the error term. Furthermore, in equation (2), IE_{it} symbolises a measure of income inequality. Obviously, also in equation (2) GE_{it} denotes a form of public spending in education or health, and GO_{it} stands for the quality of governance. Finally, ω_{it} represents the error term. In both equations, the subscripts indicate whether a variable changes per country *i* and/or over time *t*.

Estimating both relationships via equations (1) and (2) generate biased results due to multiple reasons. For instance, many variables can be mentioned that have an impact on poverty and influence public expenditure at the same time. Likewise, there are also omitted variables that both affect income inequality and government spending. If these variables are not included in the regressions there are endogeneity problems. Whether the actual causal effect is biased upwards or downwards due to the endogeneity problem depends on the kinds of variables not included in the regressions. Besides omitted variables bias, reverse causality can also be an issue of endogeneity. The government may decide to alter the amount of public spending as a reaction to a decrease or increase in the level of income inequality or the number of people living below the poverty line. Lastly, there might be a problem with the gathering of the data for the study, which creates a difference between the actual value of a variable in a country and the observed value used in the paper. These kinds of problems lead to measurement error. The three mentioned issues that create endogeneity in the results are highlighted separately in the following paragraphs to give a clear description of the potential problems and possible

solutions. After that, the favoured specifications are mentioned to estimate the moderation effect of governance on the link between public education/health expenditure and income inequality/poverty.

3.2. Endogeneity issues

3.2.1. Omitted variable bias

A panel data approach is used to estimate the two econometric specifications, and this is further explained later in the data section of this chapter. An advantage of this panel data model compared to a cross-sectional or time-series data model is that both the time and the cross-sectional dimension can be exploited in one model as different countries are observed over time. This panel data approach does not only generate a more comprehensive dataset with more distinctive observations, but it also helps with controlling for time-invariant unobserved heterogeneity. The countries are observed over a long time period in this study, and it is therefore likely that there are time-invariant country-specific variables that both influence public expenditure and income inequality/poverty. Examples of these country-specific time-invariant variables are, for example, cultural aspects, religion, and history. It can be the case that due to these cultural factors, one country follows a more laissez-faire approach and therefore has an initial lower level of public expenditure, income inequality, and poverty than another country. Although measuring and observing these variables is very hard, not controlling for these unobserved heterogeneities can be seen as an omitted variable bias. These omitted variables create endogeneity in the results. Country characteristics such as cultural, religion, and history do not change significantly over time, and therefore can be considered as time-invariant variables. Accordingly, a country dummy is included in the regression to control for the unobserved time-invariant heterogeneity.

Furthermore, it is also possible that there are year specific aspects that are a determinant of the dependent variables in equations (1) and (2) and have an influence on the main explanatory variables in the same equations. For instance, the financial crisis took place in the timeframe of this study, this crisis likely impacts the variables included in the regression during that time. Again, not controlling for these year effects create biased results. Hence, a time dummy is included in the regressions to control for aggregate time trends. Next to time-invariant and year specific variables, there are also time-variant variables that create a potential omitted variable bias in equations (1) and (2). A clear example of such a variable is economic growth. Many researchers indicated that growth is negatively associated with income inequality (e.g. Alesina & Rodrik, 1994; Kuznets, 1955), and poverty (Iradian, 2005). Moreover, more government

involvement in the form of increased public expenditure means less growth (Iradian, 2005). Hence, leaving the economic growth variable out of the regression creates a biased estimate of the effect of public expenditure on income inequality/poverty. More specifically, as economic growth is likely to be negatively correlated with the dependent and the main explanatory variable in equations (1) and (2), not controlling for this variable creates causal effects that are biased upwards. For that reason, economic growth is one of the control variables included in the two regressions. The whole list of control variables incorporated into the regression specifications is mentioned in the data section.

3.2.2. Measurement error and data issues

The quality and measurement of poverty and income inequality data are problematic sometimes. This bad quality creates measurement error and therefore biases the results of the study. Accordingly, a certain poverty reduction or income inequality alleviation due to a particular policy or economic growth is harder to measure with the data. Most of the time, national surveys are used to construct a distribution of income or consumption for a country and to estimate the number of people living below a poverty line. The outcomes of these surveys are not perfectly comparable across countries, because the questionnaires used for the surveys differ between countries, and sometimes even within countries over time. Some surveys only provide information about income, while other surveys also provide information on consumption. Furthermore, there are also different definitions of poverty in every country, and differences in methodologies used in the surveys which generate a problem with comparing different countries (Iradian, 2005). Consumption data are more accurate for the measurement of poverty than income data according to the literature, as there are fewer errors due to underreporting (Iradian, 2005). The World Bank (2020a) indicated that for two-thirds of the countries in the world information is available on consumption expenditure to measure poverty in their database. Moreover, inequality based on consumption expenditure data results in a lower estimate than inequality measures based on income, due to the higher private savings rates of richer individuals, private transfers, and the size of the informal economy. Poor households in developing and transition countries are engaged in the shadow economy. This shadow economy generates income that is not included in household budget surveys but is part of their consumption expenditure. Even though there is no perfect solution to make the data more comparable across countries as there are no more data available, the focus is on getting estimates for all countries that are comparable across time. The use of a panel data approach provides an extensive advantage for this objective because the measurement per country is

consistent over time due to the panel data approach. For some countries, the distribution can be based on household consumption expenditure while for other countries it can be based on income. When there was a choice, consumption data are preferred over income data for poverty measures. Furthermore, multiple poverty indicators, poverty lines, and income inequality measure are used to be able to compare the results; these different measures are further highlighted in the data section.

The availability in data does not only result in problems for comparing countries over time, but it also gives a lot of missing values in the data. Even though the study covers a time frame of twenty years, for some developing countries only one or two data points are available across that timeframe. Therefore, the decision is made only to include countries that have at least three data points available for poverty and inequality data across the time period used. This selection criterion is also used in other poverty and inequality studies that suffer from data issues (e.g. Iradian, 2005). Furthermore, Semykina and Wooldridge (2010) indicated that the panel data approach assists with conducting a meaningful empirical analysis even though the datasets suffer from missing values. As a result of data unavailability, not all regions are evenly represented in the data sample. This data unavailability makes the sample an incomplete representation of the developing world. The World Bank (2020a) already indicated that the availability and quality of poverty data are the worst in small states, countries that are in fragile circumstances, low-income countries, and sometimes even in middle-income countries (The World Bank, 2020a). This is also visible in the data used for this study as less than twenty per cent of the total observations cover countries situated in Sub-Saharan Africa, the Middle East, or North Africa region. On the contrary, developing countries located in Europa and Central Asia cover a little more than forty per cent of the total observations in the data.

The last potential measurement problem is related to the measurement of government expenditure. As explained before, the study focuses primarily on education and health expenditure as these kinds of government expenditures are likely to be relatively pro-poor. In most literature, government spending is measured as a percentage GDP to get a share that is unrelated to corruption (Mauro, 1998). This argument is based on the generalisation that if bribes can be levied as easily on all incomes, instead of only on public expenditure, then estimating public expenditure as a percentage of GDP should be unrelated to corruption (Barro, 1991; Mauro, 1996). Despite this clear argument, measuring expenditure as a percentage of GDP can give an unclear picture of the actual amount of spending. For example, in a country where the GDP is very high, and only part of that GDP comes to the benefit of a country than

the amount of public spending seems to be very low while it might be higher. Therefore, other measurements of public education and health expenditure are used as well. A clear description can be found in the data section.

3.2.3. Reverse causality

The last potential problem of endogeneity is reverse causality. Studies indicated that if the income inequality rises in a country, governments feel the burden to increase their redistributive activity (e.g. Alesina and Rodrik, 1994; Meltzer and Richard, 198; Persson and Tabellini, 1994). This political pressure exists as more citizens gain from a cash or in-kind transfer if the income inequality is high in a country. Accordingly, the majority in the political system will vote for a more redistributive public policy, for example, in the form of more government spending. Hence, an increase in income inequality is likely to be positively related to government expenditure. On the other hand, it is also assumed that government spending negatively influences income inequality. As a result of this reverse causality problem, the causal effect in equation (2) is underestimated.

Whilst most of the literature investigated if government spending decreases the number of people living in poverty, it is also very likely that poverty itself influences government expenditure. Following the argument of high income inequality, it is expected that governments feel the political pressure to increase public expenditure into education and health if the number of people living in poverty increase, especially since poverty is bad for economic growth (e.g. Perry et al., 2006). This expected positive effect of poverty on public expenditure combined with the expected negative effect of government spending on poverty creates a causal estimate that is underestimated due to the simultaneity bias. A possible solution for the reverse causality problem would be to include an instrumental variable that is highly correlated with government spending and does not violate the exclusion restriction at the same time. For example, Filmer and Pritchett (1997) used the amount of public health care and military spending by a neighbour country as an instrument to examine the relationship between public health spending and health status. This instrument is, however, not available for this study, as not enough data are available for health spending in neighbour countries in the years that poverty data are available.

3.3. Preferred specifications

Taking the endogeneity issues and proposed solutions into account, the following two preferred equations are presented in equations (3) and (4). Equation (3) is used with different measures of poverty as a dependent variable, and also equation (4) is used with different income

inequality measures as a dependent variable. Serial correlation could occur in the error term when countries are correlated with themselves over time. Therefore standard errors clustered by country are used in every specification. Clustered standard errors allow correlation within a cluster, however, the standard errors are not allowed to be correlated across clusters (Stock & Watson, 2014).

$$P_{it} = \beta_0 + \beta_1 GE_{it} + \beta_2 GO_{it} + \beta_3 GE_{it} * GO_{it} + \sum_{m=1}^{M} \gamma_m X_{it}^m + \eta_t + \mu_i + v_{it} \quad (3)$$

$$IE_{it} = \alpha_0 + \alpha_1 GE_{it} + \alpha_2 GO_{it} + \alpha_3 GE_{it} * GO_{it} + \sum_{n=1}^{N} \xi_n X_{it}^n + \varphi_t + \rho_i + \pi_{it} \quad (4)$$

In equation (3), P_{it} symbolises a measure of poverty, GE_{it} denotes public spending in education or health, and GO_{it} stands for the quality of governance. X_{it}^m denotes a group of m control variables, η_t is the time fixed effects, μ_i denotes the country fixed effects, and v_{it} is the error term. In equation (4), IE_{it}stands for a measure of income inequality, GE_{it} represents a form of public spending in education or health, and GO_{it} denotes the quality of governance. Furthermore, X_{it}^n represents a set of n control variables, φ_t is the time fixed effects, ρ_i stands for the country fixed effects, and π_{it} denotes the error term. In both equations, the subscripts indicate whether a variable changes per country i and/or over time t.

3.4. Data

3.4.1. Data sources and coverage

To be able to empirically test the influence of governance on the relationship between public spending on education/health and poverty/inequality, a longitudinal dataset is established that contains observations of multiple countries over time. Most of the data come from the World Bank Databank, especially the World Bank databases that focus on the World Development Indicators (WDI) and the Worldwide Governance Indicators (WGI). The data are extended with observations and variables from the UNU-WIDER World Income Inequality Database (WIID) of the United Nations University. The data on all variables later described in this chapter are retrieved from the World Bank, except if it is written down otherwise. The World Bank is one of the most comprehensive databases for development data in the world. Most of the data points are obtained from national statistical systems of the member countries. To be more specific, the poverty and inequality data for developing countries are mainly collected based on primary household survey data extracted from government agencies and country administrations of the World Bank itself. The WIID is a secondary source that provides access to inequality data from all kinds of databases for many countries in the world. This allocation of multiple resources results in multiple observations per year per country for the same variable. To be able to extend

the World Bank data with the WIID data, only observations are used that are constructed under the same assumptions and decisions as the data of the World Bank.

The study includes observations on developing countries all over the world. The country classification of the World Bank is used to decide which countries to include in the data sample. Whereby the gross national income (GNI) of a country in the year 2000 is used as a benchmark. Based on that benchmark all countries that got the label 'low-income country', 'lower-middle-income country', or 'upper-middle-income country' by the World Bank in that year are included in the sample, if enough data were available. Furthermore, the data sample covers a time frame that is as large and as complete as possible. Both points taken together result in a data sample that includes a maximum of 99 countries and covers a timeframe from 1996 up to and including 2018 with gaps. The list of all countries included in the sample may be found in Appendix 1 Table A.1.

3.5. Variables

3.5.1. Dependent variables

The main dependent variable in the poverty equation (3) is measured with the headcount ratio. This variable measures the number of people, as a percentage of the total population in a country, that live below a specific poverty line. This variable is used in many studies to measure poverty. For example, Anderson et al. (2018) indicated in their meta analyse about government spending and poverty that more than 85% of the studies used the headcount ratio as a measure for poverty. Initially, the international poverty line was set at one dollar per day for low-income countries (Ravaillon, 2020). This poverty line was later increased to 1.25 dollars a day in 2005, because this poverty line was equal to the mean of the national poverty lines of fifteen of the poorest countries in the world. Nowadays, the international poverty is line is set at 1.90 dollars a day on 2011 Purchasing Power Parity (PPP) exchange rates. This threshold is also used in this study to calculate the headcount ratio for every country. The national poverty lines are usually set at a higher rate in lower-middle and upper-middle-income countries. Therefore separate regressions are conducted with the 3.20 dollars a day headcount ratio (2011 PPP) and the 5.50 dollars a day headcount ratio (2011 PPP) as dependent variables.

It is possible to measure poverty in multiple ways, therefore as a robustness check, regressions are conducted with the poverty gap as a measure for poverty to see if the choice of the dependent variable influences the results. The poverty gap variable is a more improved measure compared to the headcount ratio, as it does not only take into account the incidence of poverty, but also

the depth of poverty. The World Bank (2020b) calculates the poverty gap as the mean shortfall in income or consumption from the poverty line. This variable is expressed as a percentage of the poverty line. The nonpoor individuals are included in the calculation with a shortfall of zero. This variable is used in separate regressions as a robustness check with a poverty line of 1.90 dollars a day (2011 PPP), a poverty line of 3.20 dollars a day (2011 PPP), and a poverty line of 5.50 dollars a day (2011 PPP).

The main dependent variable in the income inequality equation (4) is measured with the Gini index (The World Bank estimate). The data on the Gini coefficient are obtained from the World Bank and extended with the data from the WIID where possible. The Gini coefficient indicates to what extent the distribution of income or consumption expenditure of individuals or households in a country deviates from perfect equality (The World Bank, 2020c). This calculation is based on a Lorenz curve, where the cumulative share of individuals from poor to rich is plotted on the horizontal axis, and the cumulative income share received is plotted on the vertical axes. The Gini index measures the area between the curve and the perfect equality line. A disadvantage of the Gini index is that it does not create a unique value for a particular distribution, two dissimilar Lorenz curves can get the same value for the index. Furthermore, it measures relative wealth instead of absolute wealth. Similar to the numerous ways to measure poverty, it is also possible to measure income inequality in different ways. Therefore, multiple robustness checks are conducted with other income inequality measures to see how this influences the results.

The first one is the Palma ratio; this variable is retrieved from the WIID database. This variable divides the gross national income share of the richest ten per cent of the population by the gross national income share of the poorest forty per cent of the population (Cobham & Sumner, 2013). This variable is based on the findings of the paper of Palma (2011), the author indicated in this paper that half of the gross national income in every country comes from the middle fifty per cent of the population and the rest comes from the richest ten per cent and poorest forty per cent of the population. Whereby the division of the income between the richest ten per cent and the poorest forty per cent varies a lot between countries. Therefore, it is a relevant measure of income inequality to investigate differences between countries. Another income inequality measure used in this analysis as a robustness check is the income share held by the poorest twenty per cent of the population. This measure is a regularly used measure for income inequality; for example, the well-known study by Dollar & Kraay (2002) incorporated this

variable. Lastly, the income share of the richest ten per cent is also used as a dependent variable in a separate regression.

Table 1 shows the pairwise correlations of all the alternative dependent variables of the poverty and income inequality models. The pairwise correlations are very high among the different income inequality variables and among the different poverty indicators. The variable that indicates the income share of the poorest twenty per cent is negatively correlated with all other variables, as an increase in income for the poorest of society is associated with fewer people living in poverty and more equality among the citizens of the country. Another point worth mentioning is the relatively low correlations between the different income inequality variables and the multiple poverty indicators. This low correlation suggests that an increase in income inequality is not very highly correlated with an increase in poverty and the other way around.

Table 1: Pairwise correlation matrix of all the alternative dependent variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Gini coefficient	1.000									
2. Palma	0.944*	1.000								
3. Income share lowest 20%	-0.954*	-0.888*	1.000							
4. Income share highest 10%	0.980*	0.960*	-0.882*	1.000						
5. Headcount ratio at $1.90 a day	0.226*	0.197*	-0.137*	0.271*	1.000					
6. Headcount ratio at $3.20 a day	0.191*	0.157*	-0.079*	0.246*	0.942*	1.000				
7. Headcount ratio at $5.50 a day	0.180*	0.152*	-0.056	0.238*	0.804*	0.941*	1.000			
8. Poverty gap at $1.90 a day	0.284*	0.291*	-0.216*	0.317*	0.965*	0.846*	0.696*	1.000		
9. Poverty gap at $3.20 a day	0.235*	0.213*	-0.141*	0.282*	0.996*	0.963*	0.845*	0.957*	1.000	
10. Poverty gap at $5.50 a day	0.209*	0.180*	-0.097*	0.264*	0.942*	0.996*	0.954*	0.860*	0. 965*	1.000

Note: * denotes significance at the 5% level.

3.5.2. Explanatory variables

One of the main explanatory variables in both equations is public expenditure with a special focus on public education and health spending. Aforementioned, different measurements of the variables are used and retrieved from the WDI. For public health expenditure, this means government health expenditure as a percentage of GDP, government health expenditure as a percentage of total government expenditure, government health expenditure as a percentage of current health expenditure, and government health expenditure per capita at PPP. For education spending, this means government education expenditure as a percentage of GDP and government education expenditure as a percentage of total government expenditure. Data on education expenditure are also available per education stage, namely, expenditure on primary education as a percentage of government expenditure on education, expenditure on secondary education as a percentage of government expenditure on education, and expenditure on tertiary

education as a percentage of government expenditure on education. This data can be used to examine if public spending on a particular stage of education is more useful to reduce income poverty/inequality.

The second main explanatory variable is governance. This variable interacts with the public expenditure variable in equations (3) and (4). The data on this variable come from the WGI (Kaufman et al., 2011). The WGI project consists of six dimensions: voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption. The WGI are combined indicators based on thirty data sources, whereby an unobserved components model is used to create the six individual indicators (Kaufman et al., 2011). This strategy results in a score per indicator between -2.5 and 2.5 where a higher score means better governance. Critics indicated that the WGI dataset is inappropriate for country comparison due to limitations in statistical techniques (e.g. Arndt & Oman, 2006; Kurtz & Schrank, 2007). This argument is based on the fact that the indicators are not measured at a fixed scale, but with margins of error within a ninety per cent confidence interval. However, Kaufman, Kraay, and Mastruzzi (2007) indicated that the data can be used to compare across countries as the confidence intervals did not overlap that often when they estimated pair-wise comparisons.

The government effectiveness indicator and control of corruption indicator are used in this research to measure the quality of governance, as both indicators are relevant for the effectiveness of government expenditure. The former is chosen as it represents the government's ability to choose and implement public policies, while the latter is chosen as previous literature indicated that corruption leads to a structure of government expenditure that is less than optimal (Mauro, 1998). The government effectiveness indicator captures the quality of public services, its independence from political pressures, the quality of the formulation, and the commitment of the government to the policies they make. The control of corruption measure indicates to what extent the public power is used for private gain, this includes small-scaled administrative corruption between institutions and individuals on an everyday basis as well as political corruption that exists at the top levels of the public system and private businesses. The descriptive statistics in Table 2 make clear that on average countries have a negative value for both the government effectiveness variable and the control of corruption variable. These negative means indicate that in general developing countries included in the sample have a low quality governance. However, these values change per country over time. For example, Albania has a value of -0.689 for the government effectiveness variable in 1996, and this value increased

to 0.084 in 2017. On the contrary, the value for the control of corruption variable for Mauritania was equal to -0.556 in 1996 and decreased even further to -0.928 in 2014. The pairwise correlation coefficient in Table 2 displays that the two governance indicators are highly correlated with each other. This high correlation could lead to multicollinearity if both variables are included in one model. The 993 observations for the control of corruption variable consist of 249 positive values. For the government effectiveness variable 367 out of the 991 observations are positive. Furthermore, in total 239 observations have a positive value for the government effectiveness variable and at the same time have a positive value the control of corruption variable. This evidence illustrates that in general countries that are in control of corruption are also likely to have an effective government.

Table 2: Descriptive statistics of the two Worldwide Governance Indicators.

Variables	N	Mean	St. dev.	Min	Max	Correlation coefficients	
						1.	2.
1. Government effectiveness	991	-0.148	0.591	-1.582	1.338	1.000	
2. Control of corruption	993	-0.312	0.608	-1.555	1.586	0.828*	1.000

Note: * denotes significance at the 5% level.

Anderson et al. (2018) and Anderson et al. (2017) stated in their meta-analyses about government spending and poverty or income inequality that the kinds of control variables included in the regression have a great influence on the outcome. Therefore, the decision is made to include control variables that are relevant, useful, and often included in these kinds of regressions as indicated by the two beforementioned papers. For the poverty equation (3) this indicates the following control variables: economic output, trade policy, inflation, population growth, income inequality, and education. Secondly, for the income inequality equation (4) this denotes the following control variables: economic output, trade policy, inflation, population growth, and education.

The economic output of a country is measured with the logarithm of GDP per capita at PPP constant 2017 international prices. In the previous omitted variable bias section of this chapter, a clear description is giving why economic growth and therefore the economic output of a country potentially influences poverty, income inequality, and government expenditure. Therefore, the GDP per capita is included in both equations as a control variable. Trade policy refers to any form of regulation or arrangement that controls the number of exports and imports to foreign countries. This variable can be measured in multiple ways, in this study trade policy is measured with trade openness which defines the barriers imposed by the government to the

volumes of international trade (Yanikkaya, 2003). This variable is measured with the logarithm of the sum of imports and exports in goods and services as a percentage of GDP. To measure the annual inflation rate the consumer price index is used. This index presents the annual percentage change of the cost of a weighted average box of consumer goods and services. Inflation and trade policy are two different methods that are used to finance government expenditure (Anderson et al., 2017), therefore, these two indicators are relevant control variables in both equations. In this study, education is measured with the logarithm of the total ratio of secondary school enrolment relative to the population that corresponds to the education level. School enrolment is a significant determinant of the health status and education especially for the poor (Gupta et al., 2003). Therefore, more school enrolment may indicate that spending on education and health has a smaller effect on income inequality/poverty reduction as individuals already have a better health status and better human capital. Correspondingly, Anderson et al. (2018) found that studies that did not include education as a control variable overestimated the impact of government spending on poverty. For that reason, the secondary school enrolment rate is included as a control variable in both regressions. The population size is included as a control variable in equations (3) and (4) as a demographic variable. This variable is measured with the logarithm of the total population. Lastly, income inequality is included in the poverty equation measured with the Gini coefficient (World Bank estimate). Income inequality is a relevant control variable in equation (3) as in general a higher level of income inequality is associated with more poverty (Goni, et al., 2011) and more income inequality is also associated with more government redistributive policies (e.g. Alesina and Rodrik, 1994; Meltzer and Richard, 198; Persson and Tabellini, 1994).

4. Results

An indication of the link between government education spending and the poverty headcount ratio at 1.90 dollars per day and of the link between government health spending and the poverty headcount ratio at 1.90 dollars a day is presented in Figure 1. The average values are calculated per country for every variable. One dot in the graph represents the mean value of one country in the sample. A division is made between countries that have a positive value for both governance indicators and countries that have a negative value for both indicators. Even though there is a lot of variety in the position of the data points, especially for government education expenditure, in general good governance is associated with a low amount of poverty. This link is noticeable in both graphs. Furthermore, a low amount of government health expenditure is associated with more people living in poverty. No clear division can be made between countries with good and worse governance for this relationship. On the contrary, for countries with worse governance, a high amount of government education expenditure does not seem to be associated with a lower amount of poverty. This result suggests that the quality of governance is more important for the effectiveness of government education expenditure than for the effectiveness of government health expenditure. The variety in datapoints is even bigger in Figure 2, which presents the link between government education expenditure and the Gini coefficient on the left-hand side and the relationship between government health expenditure and the Gini coefficient on the right-hand side. Also in this figure, a division is made between countries that have a positive value for both governance indicators and countries that have a negative value for both governance indicators. The two graphs in Figure 2 suggest that there is no clear relationship between government education/health expenditure, the quality of governance, and income inequality. Namely, some countries have good governance, a high level of income inequality and a high amount of government expenditure. On the contrary there are also countries that have worse governance, a high level of income inequality, and a relatively low amount of government expenditure. Therefore, in the rest of this chapter regression models will provide more precise results if the quality of governance influences the link between government education/health expenditure and poverty alleviation and the relationship between government education/health spending and income inequality reduction.

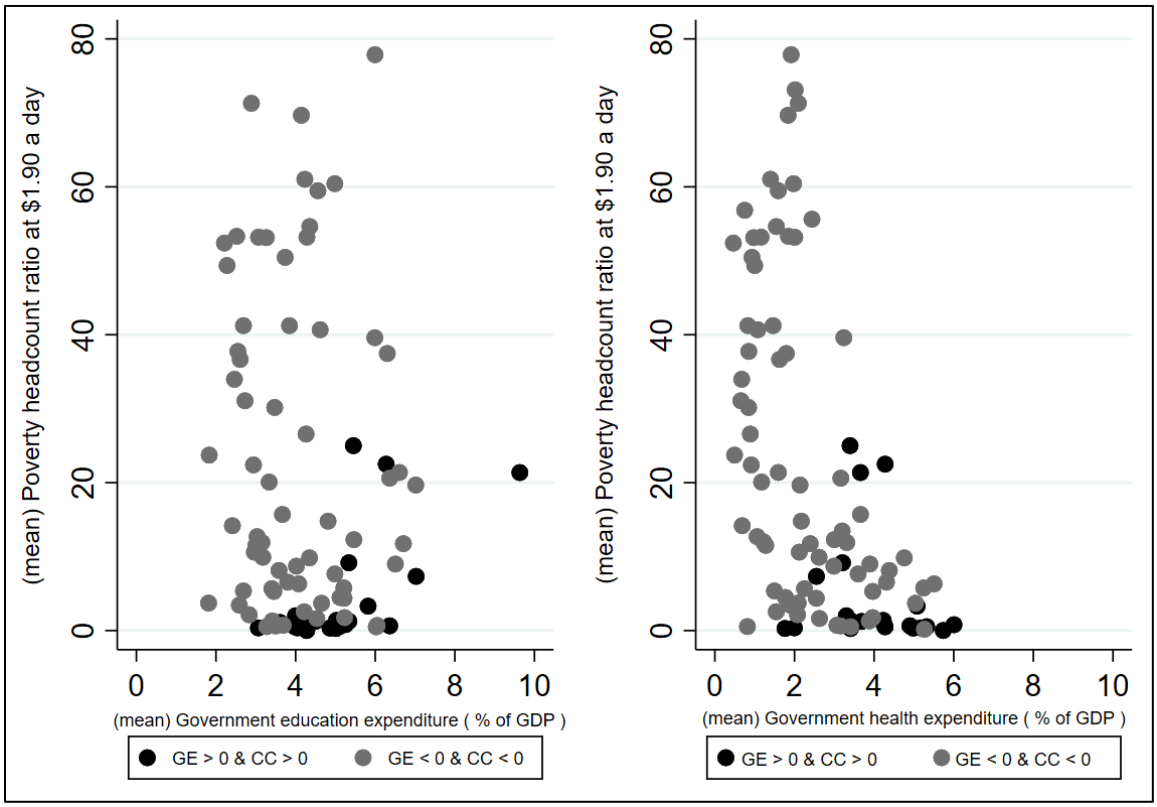

Figure 1: Scatterplot poverty headcount ratio and the government health/education spending division between good and worse governance. and the poverty headcount ratio.

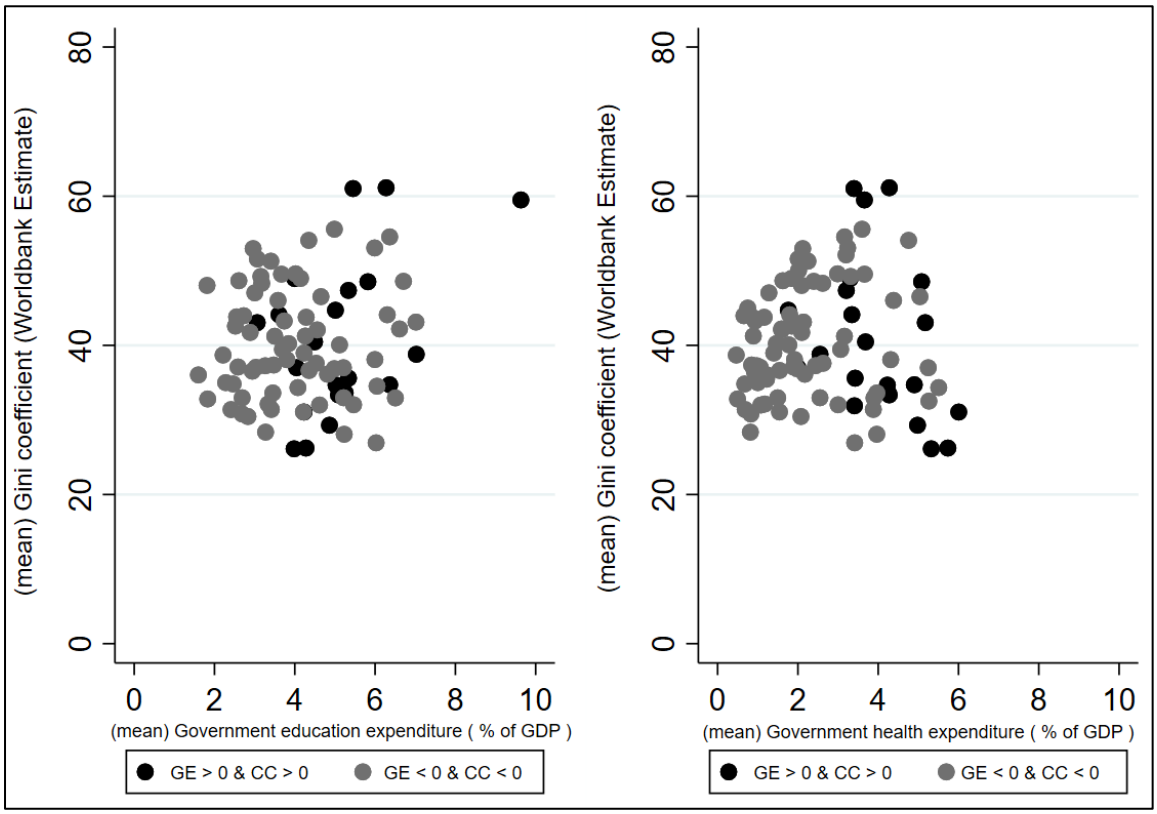

Figure 2: Scatterplot Gini coefficient and the government health/education spending division between good and worse governance.

4.1. Poverty results

Table 3 shows the results of the relationship between government education/health expenditure as a percentage of GDP, governance, and the headcount ratio at the international poverty line of 1.90 dollars a day[1]. The results for this measure of poverty are displayed, as it is the most frequently used measure in other poverty literature. Columns (1) and (4) introduce the government health expenditure into the model, and Columns (2) and (5) include government education expenditure. Furthermore, in Columns (1) and (2) the government effectiveness variable is used to measure good governance and in Columns (4) and (5) control of corruption is used as a proxy for good governance. Even though there is no overall effect of an increase in government health expenditure on poverty in Columns (1) and (4), there is a cross over interaction between good governance government health expenditure. This result indicates that the link between government health expenditure and poverty is dependent on the level of government effectiveness and the control of corruption.

Notwithstanding that the dependence was expected beforehand, the sign of this dependence is positive instead of the predicted negative sign. This result suggests that as the government becomes more effective in a country or the amount of corruption decreases that the government health expenditure increases poverty. This interaction effect is more precisely demonstrated in the margins plots in Figure 3. The multiple simple slopes in every graph give the linear prediction for change in poverty when government health expenditure changes, while holding the value for the governance variable constant. This linear prediction is displayed for multiple values[2] of the government effectiveness (GE) indicator in the left-hand graph, and for multiple values of the control of corruption (CC) indicator in the right-hand graph. The multiple simple slopes in both graphs indicate that if a country, that has a value for the governance indicator between 0.2 and 1.4, increases their government health expenditure than the poverty in that country increases as well. The marginal increase is the strongest for countries that have the highest governance score of 1.4, as this line is the steepest in both graphs. On average, the countries that have the highest positive governance score are situated in Europe and Central Asia. However, there exist some varieties within the regions and across proxies of governance. For example, the countries that have on average the highest and second highest government

[1] The multiple regressions displayed in Table 3 are also conducted with the headcount ratio at 3.20 dollars a day as a dependent variable, and the headcount ratio at 5.50 dollars a day as a dependent variable. These outcomes can be found in Table A.2 and A.3 in Appendix 2. The results are mostly comparable with the results in Table 3 concerning sign and significance.

[2] The x-as values used in both graphs in Figure 3 are based on the sample minimum and sample maximum of the two governance variable as displayed in the descriptive statistics of Table 2.

effectiveness score during the timeframe of the study are Chile and the Republic of Korea. The highest government effectiveness score of a European country is 0.979 on average, which belongs to Estonia. With respect to the control of corruption proxy, Chile also obtained the highest score while Uruguay came second. The European country with the highest score on this governance variable is again Estonia, however this country obtained on average a higher control of corruption score compared to its government effectiveness score.

The effect is the other way around for countries with worse governance. The lines that represent the values for governance between -0.1 and -1.6 in both graphs have a negative slope. This negative slope indicates that in countries with a worse governance, the marginal increase in poverty due to an increase in government health expenditure is smaller compared to countries with a positive score on the governance indicators. On average, the most corrupt countries are situated in East Asia, South Asia and the Pacific while the countries with the most ineffective government are located in Sub-Saharan Africa, North Africa and the Middle East. For a very few countries with a governance score between -1 and -1.6, an increase in government health expenditure might even decrease poverty if the expenditure is very large. This outcome for example holds for Togo and Liberia concerning their average government effectiveness score and for Cambodia and Tajikistan concerning their control of corruption score.

A possible reason for the unexpected positive dependence on the quality of governance can be linked to previous literature. As mentioned before in the literature review, the problem with health expenditure is that most of the money goes to hospital care which is less beneficial for the poor (e.g. Castro-Leal, et al, 2000; Filmer & Pritchett, 1997; Jimenez, 1995). If the government effectiveness increases, it is more likely that government expenditures go to places where it is supposed to go to according to the policy. This argument suggests that the money into hospital care might increase at the expense of primary care if there is better governance in a country. This argument could be a reason why the results in Columns (1) and (4) of Table 3 indicate that better governance is associated with health care expenditure that increases poverty instead of decreases as anticipated beforehand.

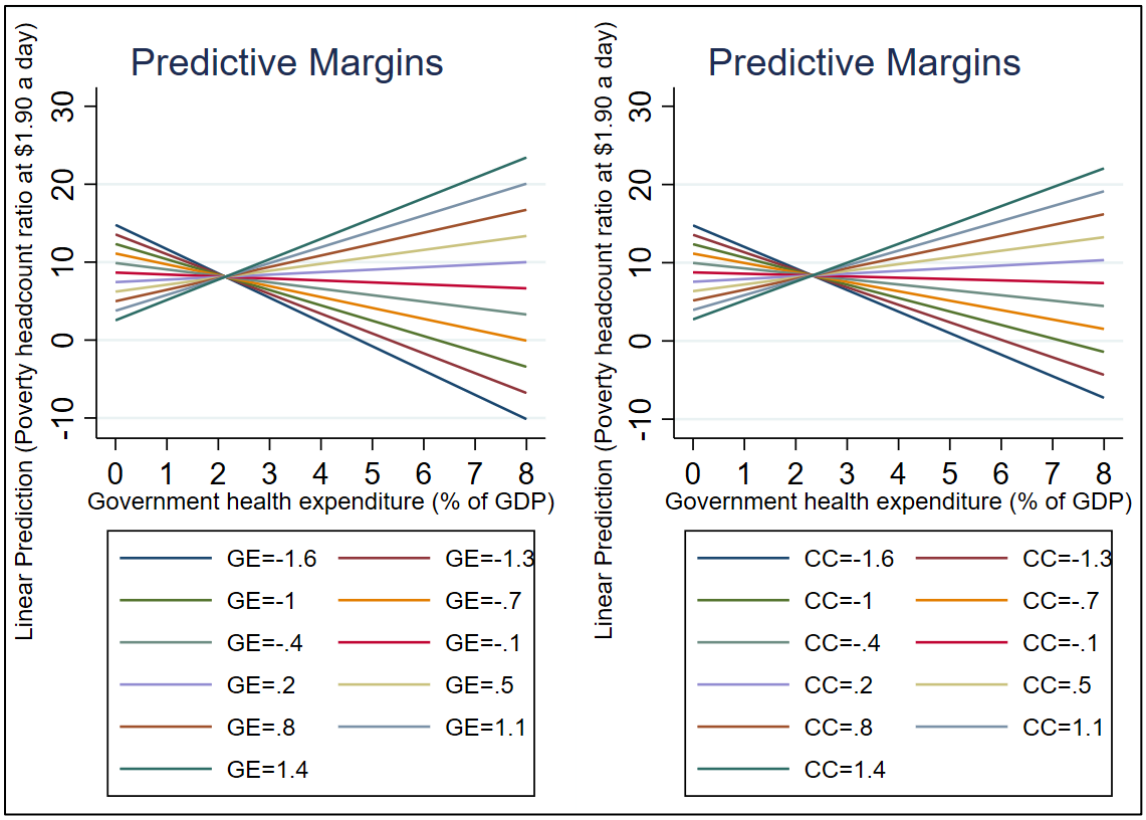

Figure 3: Margins plot for the link between government health expenditure, poverty, and different values for government effectiveness and control of corruption.

The cross over interaction between governance and public education expenditure is also positive and significant in Columns (2) and (5) of Table 3. However, the effect of public education expenditure itself (if there is zero value for governance) is negative and significant. The positive cross over interaction suggests that if the government becomes more effective or the level of corruption decreases government spending in education actually increases the number of people living in poverty in a country. This effect is more precisely demonstrated in the margins plots displayed in Figure 4. Both margins plots demonstrate the positive lines for countries with a positive score for governance, and the negative lines for countries with a negative score on the governance indicators in the relationship between government education expenditure and poverty. However, these lines are a lot steeper in comparison with the lines of the previous margin plots for government health expenditure presented in Figure 3. This result indicates that for countries with a governance score below -0.1 an increase in government education expenditure is actually associated with a decrease in poverty if the expenditure is large enough, for the reason that the simple slopes go below the zero line. Concerning the control of corruption score this outcome holds for all regions in Africa, Asia, Europe, and Latin America on average. Which means that in every region there are more countries that have an

average control corruption score below -0.1 than above -0.1. On the contrary, with respect to the government effectiveness score there are fewer countries that have a score below -0.1 compared to the control of corruption score. For example, Mexico and Georgia have on average a negative control of corruption score while having a positive government effectiveness score during the timeframe of the study.

A possible reason for the positive dependence on governance in the relationship between government education and poverty might be linked to previous literature. Former studies indicated that most government education spending is devoted to tertiary education (e.g. Abdullah et al., 2015; Lustig, 2017), which is harder to access for poorer individuals. Similar to the suggestion for health care expenditure, due to the more effective government, policies are likely to be better implemented. This argument suggests that public spending into tertiary education increases at the expense of government spending in primary education if the quality of the governance in a country develops.

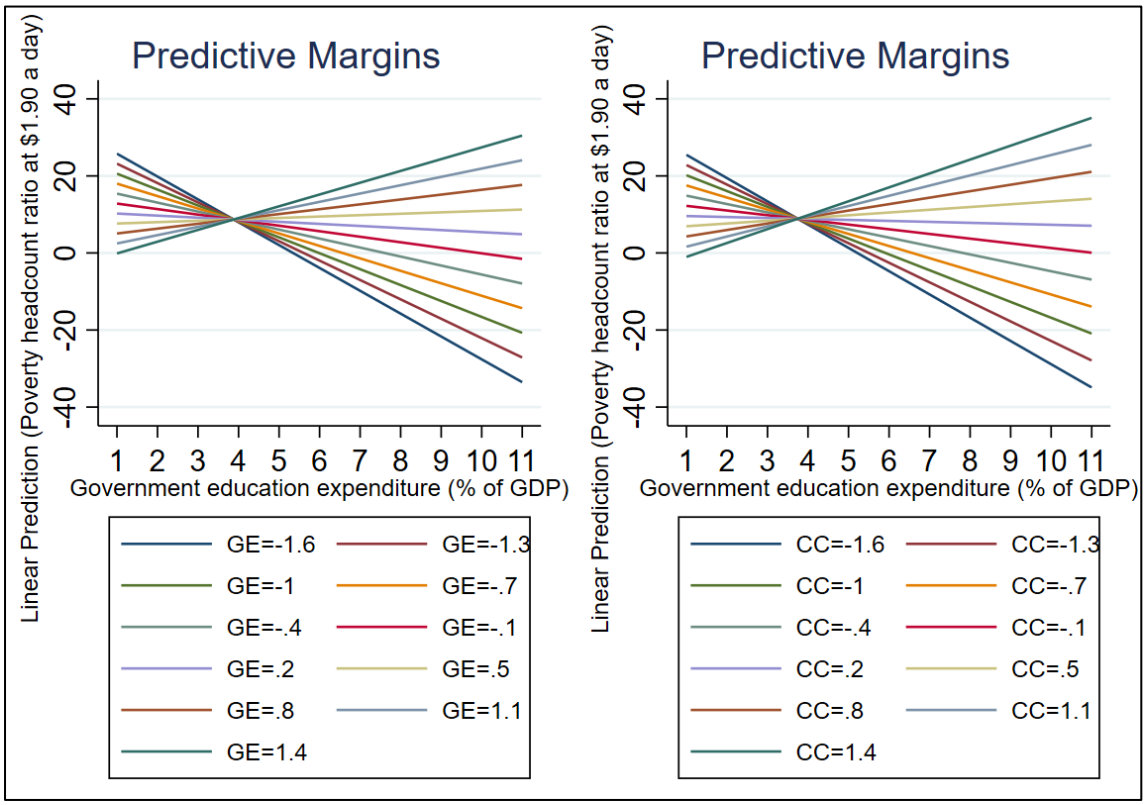

Figure 4: Margins plot for the link between government education expenditure, poverty, and different values for government effectiveness and control of corruption.

If both public health and education expenditure are included in one regression model as in Columns (3) and (6) in Table 3 than the cross interaction effect of public health expenditure and both proxies for governance disappears. Furthermore, the estimates for public education

expenditures and the estimates for the interaction terms with the two governance variables become smaller. This result might suggest that public education expenditure is indeed stronger related to poverty than that public health expenditure is related to poverty. However, both models likely suffer from multicollinearity, due to the high correlation of both governance indicators as demonstrated in Table 2. The regressions in Table 3 are also conducted with the poverty gap as the dependent variable to measure poverty. The results for these regressions outcomes implemented with the multiple poverty lines of 1.90 dollars a day, 3.20 dollars a day, and 5.50 dollars a day can be found in Tables A.4, A.5, and A.6 in Appendix 2. The results are mostly similar to the results in Table 3 concerning sign and significance. This similarity in the results suggests that the results are not driven by the kind of poverty measure used.

Table 3: Estimation results of the link between government education/health expenditure, governance, and poverty (headcount ratio at $1.90 a day) (Fixed-effects panel regressions (1)-(6)).

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
GHE (% of GDP)	-0.062		0.326	0.001		-0.099
	(0.502)		(0.429)	(0.489)		(0.375)
GEE (% of GDP)		-1.135**	-1.071***		-0.894***	-0.705***
		(0.455)	(0.399)		(0.247)	(0.249)
GE	-4.083*	-11.624***	-9.186***			
	(2.147)	(3.716)	(3.070)			
GHE (% of GDP) * GE	1.909***		0.805			
	(0.691)		(0.624)			
GEE (% of GDP) * GE		2.996***	2.108***			
		(0.728)	(0.554)			
CC				-4.006**	-12.048***	-8.897***
				(1.943)	(3.277)	(2.650)
GHE (% of GDP) * CC				1.723***		-0.231
				(0.473)		(0.436)
GEE (% of GDP) * CC					3.216***	2.825***
					(0.642)	(0.602)
ln (GDP per capita)	-14.021***	-12.532***	-16.483***	-14.469***	-13.967***	-18.734***
	(3.433)	(3.666)	(3.969)	(3.500)	(3.813)	(4.085)
ln (Population)	-21.283**	-30.270***	-29.884***	-21.446**	-29.110***	-29.948***
	(8.637)	(9.840)	(10.093)	(8.451)	(9.289)	(9.578)
ln (Trade)	-2.842	-0.876	-3.277	-2.824	0.521	-2.146
	(3.155)	(3.865)	(3.440)	(3.153)	(3.381)	(3.065)
Inflation	0.063**	0.027	0.052*	0.061**	0.012	0.044
	(0.028)	(0.035)	(0.030)	(0.026)	(0.034)	(0.028)
ln (School enrolment)	0.074	2.948	3.579	-0.039	1.573	2.329
	(3.507)	(4.385)	(4.645)	(3.578)	(3.769)	(3.925)
Gini	0.140	0.141	0.150	0.166	0.146	0.161
	(0.177)	(0.183)	(0.176)	(0.165)	(0.160)	(0.162)
Country Fixed-effects	YES	YES	YES	YES	YES	YES

Table 3: Continued.

	(1)	(2)	(3)	(4)	(5)	(6)
Year Fixed-effects	YES	YES	YES	YES	YES	YES
Constant	496.134***	608.311***	647.827***	502.091***	601.561***	669.546***
	(145.746)	(162.265)	(168.024)	(146.445)	(155.802)	(164.129)
Observations	643	492	467	643	492	467
Number of countries	95	85	82	95	85	82
Within R-squared	0.595	0.650	0.669	0.604	0.676	0.690

Notes: Clustered standard errors by country are shown in parentheses; The headcount ratio at 1.90 dollars a day on 2011 PPP is used as a dependent variable; GHE = Government Health Expenditure, GEE = Government Education Expenditure, GE = Government Effectiveness, CC = Control of Corruption; ***, **, and * denote significance at the 1%, 5%, and 10% level.

To examine if the measurement of the government expenditure variables influences the results, alternative variables are used in the regressions model displayed in Table 4. Columns (1), (2), (3), (5), (6), and (7) incorporate three different health expenditure variables and Columns (4) and (8) include an alternative education expenditure variable. In Columns (1), (2), and (3) the positive cross interaction effect between government effectiveness and government health expenditure disappears when government health expenditure is measured per capita, as a percentage of general government expenditure, or as a percentage of current health expenditure instead of as a percentage of GDP in Table 3. This result indicates that the measurement of the health expenditure does influence whether the effect of the expenditure variable is dependent on the effectiveness of the government. The cross interaction with control of corruption remains positive and significant for government health expenditure as a percentage of general government expenditure and marginally significant for government health expenditure as a percentage of current health expenditure.

The results of the alternative government education expenditure measures in Columns (4) and (8) in Table 4 are mostly comparable with the results in Columns (2) and (5) in Table 3. However, margins plots are displayed in Figure 5 to provide a more precise picture of the dependence on the quality of governance in the relationship between government education expenditure and poverty. Again, also these margins plots demonstrate that if countries that have more control of corruption or have a more effective government increase their government health expenditure, than the number of people living in poverty in those countries increase as well. Furthermore, countries that have a governance score below -0.1 might even decrease poverty if their increase in government education expenditure is large enough. Accordingly, based on Table 3 and 4 it can be concluded that the positive crossover interaction effect of

government expenditure in education and both proxies for governance is robust to an alternative measurement of the expenditure variable.

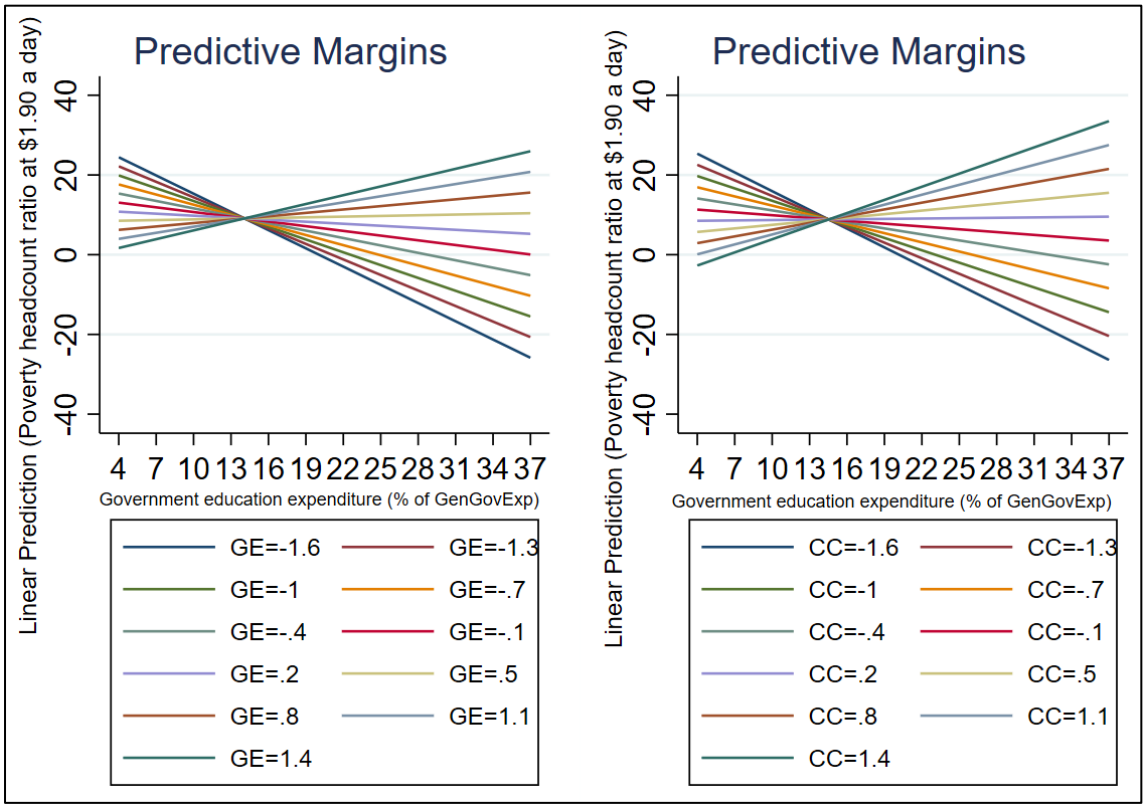

Figure 5: Margins plot for the link between government education expenditure (% of general government expenditure), poverty, and different values for government effectiveness and control of corruption.

Table 4: Estimation results of the link between government health/education expenditure (alternative measurement expenditure variables), governance, and poverty (headcount ratio at $1.90 a day) (Fixed-effects panel regressions (1)-(8)).

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
GHE (% general government expenditure)	0.225*				0.296**			
	(0.115)				(0.128)			
GHE per capita in PPP		0.011***				0.011***		
		(0.003)				(0.003)		
GHE (% of current health expenditure)			0.057				0.063	
			(0.064)				(0.057)	
GEE (% general government expenditure)				-0.319**				-0.146
				(0.141)				(0.088)
GE	-2.208	1.564	-2.745	-10.606**				
	(2.140)	(1.810)	(3.556)	(4.124)				
GHE (% general government expenditure) * GE	0.286							
	(0.189)							
GHE per capita in PPP * GE		-0.001						
		(0.002)						
GHE (% of current health expenditure) * GE			0.072					
			(0.058)					
GEE (% general government expenditure) * GE				0.753***				
				(0.255)				
CC					-2.815	2.025	-2.908	-12.916***
					(2.096)	(1.821)	(2.958)	(3.881)
GHE (% general government expenditure) * CC					0.358**			
					(0.155)			
GHE per capita in PPP * CC						-0.001		
						(0.001)		
GHE (% of current health expenditure) * CC							0.080*	
							(0.046)	
GEE (% general government expenditure) * CC								0.889***
								(0.231)

Table 4: Continued.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln (GDP per capita)	-14.960***	-15.855***	-14.966***	-16.984***	-14.943***	-16.488***	-15.097***	-16.925***
	(3.646)	(3.101)	(3.830)	(4.935)	(3.637)	(3.182)	(3.870)	(4.819)
ln (Population)	-23.028**	-14.174*	-22.436**	-37.305***	-22.247**	-14.537**	-22.160**	-38.016***
	(8.803)	(7.319)	(8.825)	(13.832)	(8.534)	(6.962)	(8.675)	(13.201)
ln (Trade)	-2.747	-3.240	-2.855	-3.469	-2.835	-3.524	-2.874	-2.659
	(3.262)	(2.863)	(3.286)	(3.723)	(3.296)	(2.904)	(3.377)	(3.365)
Inflation	0.079***	0.098***	0.081**	0.054	0.076**	0.100***	0.081***	0.043
	(0.030)	(0.028)	(0.031)	(0.033)	(0.030)	(0.028)	(0.029)	(0.032)
ln (School enrolment)	-0.406	-0.171	-0.510	3.158	-0.385	0.174	-0.429	3.702
	(3.441)	(3.323)	(3.438)	(6.026)	(3.554)	(3.383)	(3.505)	(5.673)
Gini	0.157	0.140	0.156	0.137	0.166	0.124	0.160	0.145
	(0.180)	(0.164)	(0.188)	(0.189)	(0.172)	(0.170)	(0.186)	(0.167)
Country Fixed-effects	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed-effects	YES	YES	YES	YES	YES	YES	YES	YES
Constant	532.065***	397.334***	523.090***	774.579***	518.484***	409.743***	519.301***	778.106***
	(149.015)	(120.224)	(149.627)	(226.735)	(149.101)	(119.314)	(152.472)	(220.243)
Observations	643	643	635	482	643	643	635	482
Number of country	95	95	94	84	95	95	94	84
Within R-squared	0.581	0.628	0.582	0.604	0.588	0.630	0.586	0.626

Notes: Clustered standard errors by country are shown in parentheses; The headcount ratio at 1.90 dollars a day on 2011 PPP is used as a dependent variable; GHE = Government Health Expenditure, GEE = Government Education Expenditure, GE = Government Effectiveness, CC = Control of Corruption; ***, **, and * denote significance at the 1%, 5%, and 10% level.

Previous literature indicated that the effect of public education spending on poverty is not equal for every stage of education (e.g. Hidalgo-Hidalgo & Iturbe-Ormaetxe, 2018). Therefore, separate regressions are conducted to see if the quality of governance also influences this effect. These results are presented in Table 5, due to data limitations the number of observations went down a lot in all the regressions compared to Table 3. Columns (1) and (4) indicate that government education expenditure in primary education itself (if there is zero value for governance) positively affects poverty. However, this association is only marginal significant. The results also indicate that the link between government primary education expenditure is significantly depending on the quality of governance. If the government becomes more effective or the control of corruption increases than the effect of public primary education on poverty becomes more negative. This dependence is highlighted more explicitly in the margins plots in Figure 6. Both graphs display that the lines that represent the highest positive score on the governance indicators have the steepest negative slope. On the other hand, the lines that symbolize the highest negative score on the governance indicators have the steepest positive slope. The slope changes from negative to positive between a governance score of 0.2 and a governance score of 0.5. However, even though the lines that represent a governance score above 0.5 are downward sloping, the lines are still mostly above the zero line. Accordingly, an increase in government primary education expenditure still increases poverty, only at a lower rate. These results indicate that not only should the quality of governance be very high but also the amount of government primary education expenditure, to make it effective in lowering poverty. Chile is the only country that has a high enough average control of corruption score and a high enough average government effectiveness score during the timeframe of the study to potentially lower poverty if the government primary education expenditure is very high. All other countries in the sample have an average government effectiveness score and/or an average control of corruption score that are too low to lower poverty.

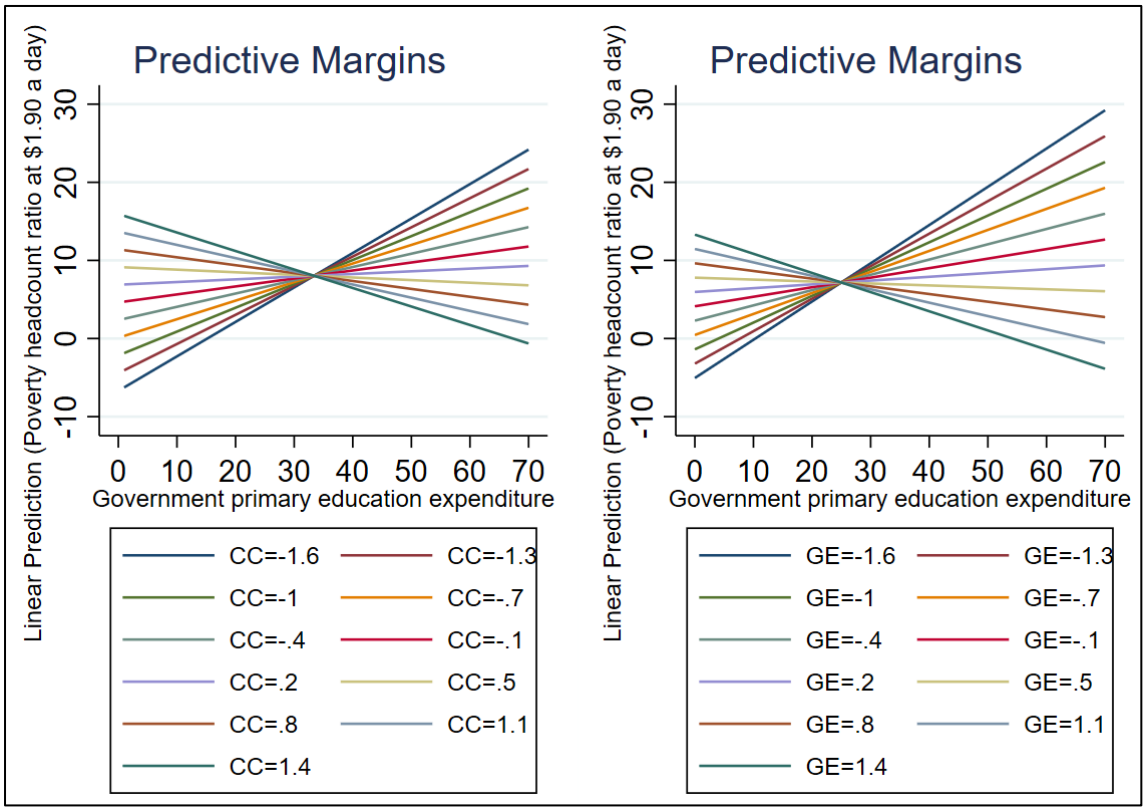

Figure 6: Margins plot for the link between government primary education expenditure, poverty, and different values for government effectiveness and control of corruption.

In Columns (2) and (5) of Table 5, the results indicate that the cross interaction effect for public education spending in secondary education and the quality of governance is positive and significant. The linear prediction of this dependence is graphically demonstrated in Figure 7. The multiple lines displayed in the graph are all above the zero lines, this indicates that for any quality of governance an increase in government secondary education expenditure increases the number of people living in poverty. However, this positive marginal effect becomes smaller for a country that has a governance score below 0.2, and larger for countries with quality of governance score above 0.2. This indicates that for most countries in the sample an increase in government secondary education spending is associated with an increase in poverty when its quality of governance strengthens, as most countries have an average governance score below 0.2. This result suggests that better targeting of government secondary education expenditure increases poverty. Lastly, the results in Columns (3) and (6) make clear that there is no link between government education spending in tertiary education and poverty at all. This result is consistent with previous literature, as the non-poor have better access to tertiary education (e.g. Hidalgo-Hidalgo & Iturbe-Ormaetxe, 2018). Therefore, increasing government spending at the tertiary education level does not reduce poverty for the poorest of society, as the tertiary education level is harder to reach for the poor individuals of society.

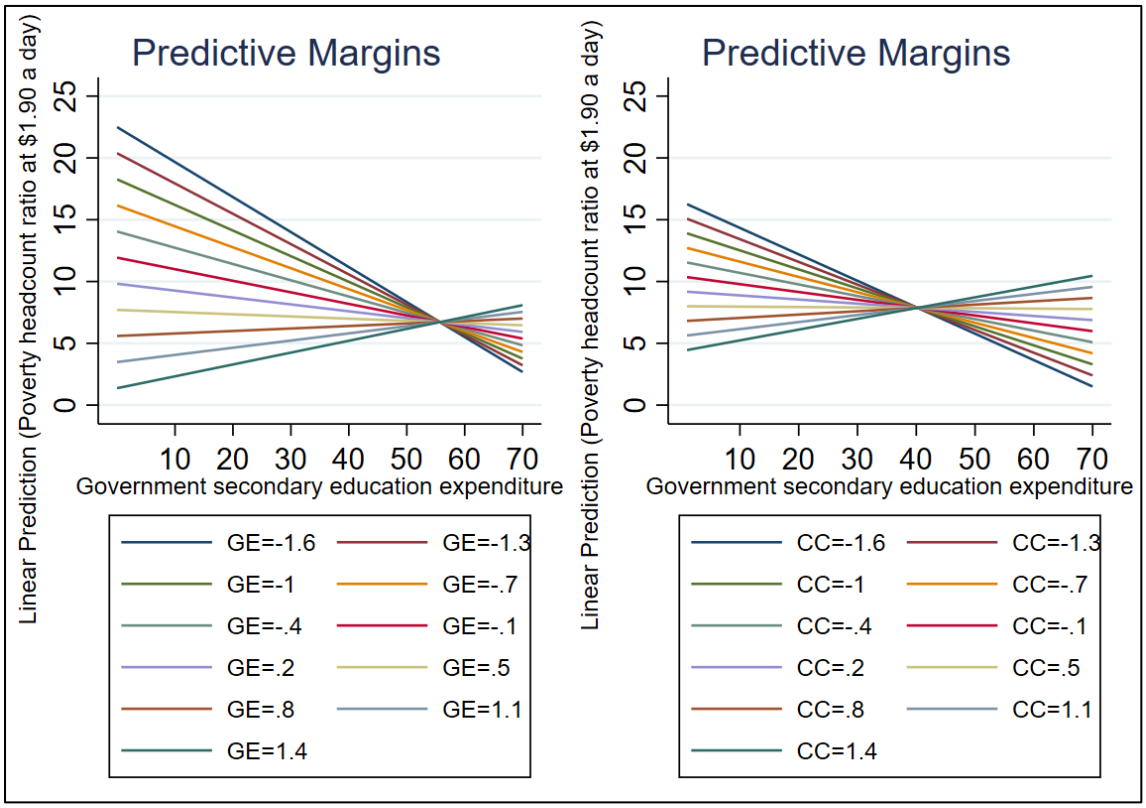

Figure 7: Margins plot for the link between government secondary education expenditure, poverty, and different values for government effectiveness and control of corruption.

Table 5: Estimation results of the link government education expenditure (primary/secondary/tertiary government education expenditure), governance, and poverty (headcount ratio at $1.90 a day) (Fixed-effects panel regressions (1)-(6)).

	(1)	(2)	(3)	(4)	(5)	(6)
GPEE (% of government expenditure on education)	0.098*			0.080*		
	(0.054)			(0.046)		
GSEE (% of government expenditure on education)		-0.081*			-0.053	
		(0.041)			(0.036)	
GTEE (% of government expenditure on education)			0.109			0.113
			(0.079)			(0.075)
GE	6.121**	-7.042**	-2.346			
	(3.052)	(2.712)	(3.143)			
GPEE * GE	-0.245***					
	(0.084)					
GSEE * GE		0.126**				
		(0.060)				
GTEE * GE			-0.023			
			(0.098)			
CC				7.546***	-4.035	-1.381
				(2.712)	(2.428)	(3.156)
GPEE * CC				-0.226***		
				(0.080)		

Table 5: Continued.

	(1)	(2)	(3)	(4)	(5)	(6)
GSEE * CC					0.100*	
					(0.060)	
GTEE * CC						0.023
						(0.101)
ln (GDP per capita)	-9.943***	-8.781*	-10.003**	-11.391***	-10.036**	-10.514**
	(3.442)	(4.500)	(4.028)	(3.663)	(4.609)	(4.425)
ln (Population)	-27.545***	-32.058***	-47.348***	-22.912***	-28.986***	-45.286***
	(6.591)	(8.025)	(12.603)	(6.601)	(8.328)	(12.247)
ln (Trade)	-3.927**	-4.144**	-5.887	-3.424*	-4.387**	-5.808
	(1.894)	(2.077)	(3.749)	(1.887)	(2.071)	(3.889)
Inflation	0.090***	0.130***	0.081	0.086***	0.124***	0.080
	(0.031)	(0.036)	(0.051)	(0.030)	(0.034)	(0.050)
ln (School enrolment)	0.526	0.200	5.869	-1.905	-1.242	5.596
	(2.795)	(2.825)	(5.986)	(2.835)	(2.917)	(5.783)
Gini	0.206	0.295*	0.047	0.252	0.330*	0.063
	(0.164)	(0.174)	(0.233)	(0.168)	(0.187)	(0.235)
Country Fixed-effects	YES	YES	YES	YES	YES	YES
Year Fixed-effects	YES	YES	YES	YES	YES	YES
Constant	550.332***	617.598***	871.230***	494.096***	583.492***	842.525***
	(121.884)	(152.125)	(214.307)	(124.372)	(160.576)	(214.140)
Observations	357	358	425	357	358	425
Number of countries	71	71	76	71	71	76
Within R-squared	0.718	0.698	0.571	0.713	0.688	0.566

Notes: Clustered standard errors by country are shown in parentheses; The headcount ratio at 1.90 dollars a day on 2011 PPP is used as a dependent variable; GPEE = Government Primary Education Expenditure, GSEE = Government Secondary Education Expenditure, GTEE = Government Tertiary Education Expenditure, GE = Government Effectiveness, CC = Control of Corruption; ***, **, and * denote significance at the 1%, 5%, and 10% level.

4.2. Income inequality results

Table 6 presents the results of the link between government education/health expenditure as a percentage of GDP, governance, and the Gini coefficient, to examine if government education and health expenditure have a similar impact on income inequality as on poverty. Columns (1) and (4) indicate that government expenditure on health is significantly negatively associated with income inequality. This association is also economically significant, as an increase of one unit of government health expenditure reduces income inequality with almost one unit in Column (1) and with more than one unit in Column (4). However, this effect is independent of the quality of governance in a country, as both the estimate for the interaction term with government effectiveness in Column (1) and the estimate for the interaction term with control of corruption in Column (4) are statically insignificant. This result suggests that even though an increase in government health expenditure reduces the level of income inequality in a

country, a better governance in form of a more effective government and more control over corruption does not alter this effect.

Despite that the regressions' estimates in Columns (2) and (5) have the expected negative sign for the government education spending variable, an increase in government education spending itself does not significantly influence the income inequality in a country. This result might indicate that more education expenditure benefits all citizens more evenly, which leaves the level of income inequality unaffected. Furthermore, this effect is also not dependent on a more effective government or a better control of corruption as the estimates for the interaction terms in Columns (2) and (5) are insignificant. Government education expenditure specified at the primary, the secondary, and the tertiary level of education also do not seem to have a significant impact on income inequality[3]. When both types of government expenditures are included in one regression, as demonstrated in Columns (3) and (6), then the negative effect of government health expenditure disappears. The disappearance of this significant effect was also the case in the poverty regressions. The effect of government education expenditure remains insignificant in Columns (3) and (6). Palma (2011) indicated in his paper that the income of the top ten per cent and the bottom forty per cent of the population varies the most. For that reason he introduced the Palma ratio as a measure for income inequality to capture that variation. The results with the Palma ratio as a dependent variable are displayed in Table A.8 in Appendix 2. The results are very similar to the results in Table 6 concerning sign and significance.

Table 6: Estimation results of the link between government education/health expenditure, governance, and income inequality (Gini coefficient) (Fixed-effects panel regressions (1)-(6)).

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
GHE (% of GDP)	-0.928**		-0.433	-1.091**		-0.447
	(0.438)		(0.464)	(0.455)		(0.449)
GEE (% of GDP)		-0.279	-0.188		-0.257	-0.200
		(0.226)	(0.209)		(0.256)	(0.239)
GE	-1.460	0.250	-0.649			
	(1.845)	(2.351)	(2.134)			
GHE (% of GDP) * GE	0.452		0.417			
	(0.449)		(0.518)			
GEE (% of GDP) * GE		-0.206	-0.431			
		(0.382)	(0.390)			
CC				0.686	-0.464	-0.100
				(1.927)	(2.518)	(2.203)

[3] The results of the separate regressions per education level can be found in Table A.7 in Appendix 2. The results indicate that neither government education at the primary level, the secondary level or the tertiary level significantly influences income inequality. These relationships are also independent of the quality of governance.

Table 6: Continued.

	(1)	(2)	(3)	(4)	(5)	(6)
GHE (% of GDP) * CC				-0.175		0.139
				(0.387)		(0.386)
GEE (% of GDP) * CC					-0.078	-0.200
					(0.411)	(0.355)
ln (GDP per capita)	1.832	-1.172	0.962	1.172	-0.824	0.676
	(2.887)	(4.348)	(4.002)	(3.031)	(4.566)	(4.563)
ln (Population)	-13.350**	-19.118***	-14.805***	-13.941**	-18.725***	-13.669**
	(5.475)	(6.067)	(5.406)	(5.467)	(6.179)	(5.374)
ln (Trade)	2.053	3.290	3.153	1.946	3.392	3.235
	(2.233)	(2.167)	(1.938)	(2.284)	(2.403)	(2.220)
Inflation	-0.022	0.004	-0.021	-0.017	0.003	-0.018
	(0.027)	(0.043)	(0.044)	(0.028)	(0.043)	(0.044)
ln (School enrolment)	6.108***	12.004***	9.756***	5.984**	12.035***	9.376***
	(2.275)	(2.522)	(2.291)	(2.358)	(2.511)	(2.259)
Country Fixed-effects	YES	YES	YES	YES	YES	YES
Year Fixed-effects	YES	YES	YES	YES	YES	YES
Constant	209.442**	299.149**	220.766**	226.643**	288.939**	206.092*
	(96.562)	(121.715)	(106.897)	(98.923)	(124.938)	(112.614)
Observations	682	525	490	682	525	490
Number of countries	96	87	84	96	87	84
Within R-squared	0.272	0.307	0.284	0.270	0.308	0.277

Notes: Clustered standard errors by country are shown in parentheses; The Gini coefficient (World bank Estimate) is used as a dependent variable; GHE = Government Health Expenditure, GEE = Government Education Expenditure, GE = Government Effectiveness, CC = Control of Corruption; ***, **, and * denote significance at the 1%, 5%, and 10% level.

The lack of significant results for the link between government education/health expenditure, governance, and income inequality in Table 6 can be due to the low variety in the data. A fixed-effects panel regression model is chosen to control for the time-invariant country-specific unobserved heterogeneity that generates endogeneity in the model. By doing so I am only able to examine the variance within a country over time. As a result, if the Gini coefficient does not change that much over time, it is harder to find a significant estimate. Therefore, the results of a pooled OLS regression model without country fixed-effects are displayed in Table 7 to compare with the results of Table 6. In a pooled OLS regression there is more variety in the data as it also incorporates the variance between the countries. The results indicate that the effect of government health expenditure on income inequality is significantly negatively dependent on the quality of governance. This outcome makes clear that if in a country the quality of the government increases, the effect of government health expenditure on income inequality becomes more negative. This effect did not exist in Columns (1) and (3) in Table 6. The interaction effect for government education expenditure and governance is only statistically

significant if government health expenditure is also included in the model as displayed in Columns (3) and (6) of Table 7. Even though the results in Table 7 make clear that the lack of significant results in Table 6 are most likely due to the lack of variation in data within countries, the regression models displayed in Table 7 are also very likely to suffer from endogeneity problems. Aforementioned, as multiple countries are observed over a long time period it is very reasonable that there are time-invariant country-specific variables that both influence public expenditure and income inequality. The results for the pooled OLS regression models displayed in Table 7 do not incorporate variables that control for this unobserved heterogeneity, therefore, the results presented in Table 6 are still preferred.

Table 7: Estimation results of the link between government education/health expenditure, governance, and income inequality (Gini coefficient) (Pooled OLS regressions (1)-(6)).

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
GHE (% of GDP)	0.047		0.641	-0.559		-0.473
	(0.796)		(0.795)	(0.782)		(0.760)
GEE (% of GDP)		0.749	0.527		0.612	0.803
		(0.675)	(0.660)		(0.610)	(0.698)
GE	7.850**	-2.248	0.771			
	(3.321)	(4.586)	(4.889)			
GHE (% of GDP) * GE	-2.429***		-3.340***			
	(0.833)		(0.776)			
GEE (% of GDP) * GE		0.684	2.563***			
		(0.930)	(0.969)			
CC				8.471**	0.034	4.124
				(3.531)	(3.722)	(4.795)
GHE (% of GDP) * CC				-2.015**		-2.671***
				(0.874)		(0.980)
GEE (% of GDP) * CC					0.460	1.757*
					(0.787)	(0.974)
ln (GDP per capita)	-0.036	-0.155	-1.353	-1.014	-0.904	-1.893
	(2.408)	(2.038)	(2.371)	(2.255)	(1.810)	(1.993)
ln (Population)	-0.714	-0.445	-0.341	-0.527	-0.169	-0.046
	(0.634)	(0.728)	(0.701)	(0.710)	(0.806)	(0.801)
ln (Trade)	-7.788***	-9.979***	-8.530***	-8.091***	-9.345***	-8.849***
	(2.369)	(2.414)	(2.103)	(2.263)	(2.458)	(2.193)
Inflation	-0.091	-0.087	-0.077	-0.064	-0.078	-0.059
	(0.079)	(0.089)	(0.090)	(0.081)	(0.089)	(0.091)
ln (School enrolment)	-2.724	-0.570	-1.769	-0.934	-0.072	0.463
	(3.848)	(3.768)	(3.791)	(3.767)	(3.685)	(3.485)
Country Fixed-effects	NO	NO	NO	NO	NO	NO
Year Fixed-effects	YES	YES	YES	YES	YES	YES
Constant	101.191***	89.620***	103.271***	102.833***	87.789***	97.805***
	(18.109)	(19.801)	(18.714)	(15.704)	(19.601)	(18.064)

Table 7: Continued.

	(1)	(2)	(3)	(4)	(5)	(6)
Observations	682	525	490	682	525	490
Number of countries	96	87	84	96	87	84
R-squared	0.232	0.263	0.356	0.222	0.272	0.344

Notes: Clustered standard errors by country are shown in parentheses; The Gini coefficient (World bank Estimate) is used as a dependent variable; GHE = Government Health Expenditure, GEE = Government Education Expenditure, GE = Government Effectiveness, CC = Control of Corruption; ***, **, and * denote significance at the 1%, 5%, and 10% level.

A major disadvantage of the Gini index is that it does not create a unique index for a certain distribution. Therefore, other papers often use another well-known variable to measure income inequality (e.g. Dollar & Kraay, 2002), namely, the income share of the lowest twenty per cent of the population. The results of the regressions with this dependent variable are displayed in Table 8. An increase in the income share of the lowest twenty per cent of society means a decrease in income inequality, and therefore a positive association is expected between government education/health expenditure and the dependent variable. Columns (1) and (3) demonstrate evidence for this positive effect for government health expenditure specifically. However, this effect is statistically insignificant and independent of the quality of governance. This effect was statistically significant when the Gini coefficient was used as a dependent variable, this suggests that government health spending does alter the income distribution in low- and middle-income countries more evenly but not to the benefit of the poorest of society. The positive, but insignificant interaction term for government health expenditure with control of corruption and government effectiveness indicates that a better government does not influence that targeting problem.

Columns (2) and (4) demonstrate an insignificant result for the effect of government education expenditure on the income share of the lowest twenty per cent. These results are comparable with the outcomes of the regression model with the Gini coefficient as a dependent variable in Table 6. This result implicates that there is no association between government education spending and income inequality. When both types of expenditures are included in one regression model as in Columns (3) and (6) then the effects of government education and health expenditure remain insignificant. The last potential measure for income inequality is the income share hold by the highest ten per cent of the population. The results for the multiple regressions with this dependent variable are displayed in Table A.9 in Appendix 2. For this variable, a decrease in the income share is equal to a decrease in income inequality. The results, however, indicate no significant associations analogous to the results in Table 8.

Table 8: Estimation results of the link between government education/health expenditure, governance, and income inequality (income share of the lowest 20% of the population) (Fixed-effects panel regressions (1)-(6)).

	(1)	(2)	(3)	(4)	(5)	(6)
GHE (% of GDP)	0.039		-0.058	0.076		-0.037
	(0.101)		(0.087)	(0.106)		(0.087)
GEE (% of GDP)		0.016	0.022		0.012	0.011
		(0.057)	(0.059)		(0.069)	(0.063)
GE	0.215	-0.081	0.077			
	(0.428)	(0.530)	(0.517)			
GHE (% of GDP) * GE	-0.013		-0.014			
	(0.114)		(0.120)			
GEE (% of GDP) * GE		0.078	0.059			
		(0.092)	(0.101)			
CC				-0.338	-0.000	-0.098
				(0.438)	(0.530)	(0.473)
GHE (% of GDP) * CC				0.088		0.058
				(0.093)		(0.098)
GEE (% of GDP) * CC					0.035	-0.007
					(0.084)	(0.088)
ln (GDP per capita)	-0.479	-0.696	-0.329	-0.201	-0.730	-0.183
	(0.669)	(0.937)	(0.944)	(0.704)	(0.993)	(1.000)
ln (Population)	0.807	0.575	0.532	0.716	0.341	0.205
	(1.210)	(1.341)	(1.260)	(1.258)	(1.411)	(1.325)
ln (Trade)	-0.307	-0.872*	-0.823*	-0.258	-0.888*	-0.816*
	(0.527)	(0.467)	(0.435)	(0.529)	(0.522)	(0.486)
Inflation	0.003	0.005	0.004	0.002	0.005	0.003
	(0.005)	(0.008)	(0.008)	(0.005)	(0.008)	(0.008)
ln (School enrolment)	-1.144**	-1.838***	-1.909***	-1.079*	-1.795***	-1.775**
	(0.526)	(0.648)	(0.687)	(0.545)	(0.651)	(0.699)
Country Fixed-effects	YES	YES	YES	YES	YES	YES
Year Fixed-effects	YES	YES	YES	YES	YES	YES
Constant	2.654	14.634	11.422	0.978	18.664	14.812
	(22.399)	(27.344)	(25.342)	(23.180)	(28.317)	(26.239)
Observations	643	492	467	643	492	467
Number of countries	95	85	82	95	85	82
Within R-squared	0.262	0.366	0.321	0.265	0.363	0.317

Notes: Clustered standard errors by country are shown in parentheses; The income share held by the lowest twenty per cent of the population is used as a dependent variable; GHE = Government Health Expenditure, GEE = Government Education Expenditure, GE = Government Effectiveness, CC = Control of Corruption; ***, **, and * denote significance at the 1%, 5%, and 10% level.

Another potential factor that might influence the results is the measurement of the government expenditure variables. Table 9 shows the results of three alternative government health expenditure variables and one alternative government education expenditure variable. The results make clear that only government health expenditure as a percentage of current health

expenditure has a significant negative impact on income inequality. However, this effect is independent of the quality of governance. This result indicates that a higher amount of health expenditure financed by the government makes the income distribution more even in a country measured with the Gini coefficient. Even though the sign of this effect is comparable with the results in Table 6 where health expenditure is measured as a percentage of GDP, the magnitude is a lot smaller. Hence, the measurement of the government health expenditure variable does influence the results for income inequality, this was also the case in the poverty equation.

Table 9: Estimation results of the link between government health/education expenditure (alternative measurement expenditure variables), governance, and income inequality (Gini coefficient) (Fixed-effects panel regressions (1)-(8)).

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
GHE (% general government expenditure)	-0.088				-0.135			
	(0.094)				(0.106)			
GHE per capita in PPP		-0.001				0.002		
		(0.003)				(0.002)		
GHE (% of current health expenditure)			-0.080**				-0.090**	
			(0.035)				(0.036)	
GEE (% general government expenditure)				0.019				0.017
				(0.088)				(0.072)
GE	-0.549	-0.785	-1.303	-0.396				
	(2.105)	(1.191)	(2.372)	(2.798)				
GHE (% general government expenditure) * GE	0.019							
	(0.167)							
GHE per capita in PPP * GE		0.001						
		(0.002)						
GHE (% of current health expenditure) * GE			0.023					
			(0.040)					
GEE (% general government expenditure) * GE				-0.049				
				(0.135)				
CC					1.029	0.684	0.492	-0.941
					(2.168)	(1.370)	(2.037)	(2.841)
GHE (% general government expenditure) * CC					-0.104			
					(0.149)			
GHE per capita in PPP * CC						-0.002		
						(0.001)		
GHE (% of current health expenditure) * CC							-0.005	
							(0.029)	
GEE (% general government expenditure) * CC								-0.020
								(0.155)

Table 9: Continued.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln (GDP per capita)	1.662	1.901	2.192	2.163	1.268	0.903	1.641	2.441
	(3.030)	(3.088)	(2.908)	(4.208)	(3.121)	(3.191)	(2.976)	(4.593)
ln (Population)	-14.129**	-13.891**	-12.177**	-18.611***	-14.063**	-13.553**	-11.947**	-18.119***
	(5.925)	(6.564)	(5.866)	(6.162)	(5.733)	(6.233)	(5.700)	(6.004)
ln (Trade)	2.302	2.283	2.472	3.001	2.245	2.427	2.367	3.034
	(2.220)	(2.296)	(2.238)	(1.994)	(2.250)	(2.209)	(2.289)	(2.095)
Inflation	-0.014	-0.015	-0.016	0.004	-0.010	-0.003	-0.014	0.003
	(0.030)	(0.026)	(0.028)	(0.045)	(0.031)	(0.027)	(0.029)	(0.045)
ln (School enrolment)	5.560**	5.585**	5.648**	11.029***	5.455**	5.540**	5.475**	11.050***
	(2.495)	(2.486)	(2.364)	(2.539)	(2.553)	(2.665)	(2.403)	(2.484)
Country Fixed-effects	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed-effects	YES	YES	YES	YES	YES	YES	YES	YES
Constant	223.165**	216.384*	189.028*	264.883**	226.883**	219.048*	192.156*	254.143**
	(103.220)	(113.790)	(102.871)	(123.425)	(102.501)	(110.666)	(101.827)	(124.010)
Observations	682	682	674	513	682	682	674	513
Number of country	96	96	95	86	96	96	95	86
Within R-squared	0.246	0.246	0.267	0.307	0.248	0.249	0.266	0.309

Notes: Clustered standard errors by country are shown in parentheses; The Gini coefficient (World bank Estimate) is used as a dependent variable; GHE = Government Health Expenditure, GEE = Government Education Expenditure, GE = Government Effectiveness, CC = Control of Corruption; ***, **, and * denote significance at the 1%, 5%, and 10% level

5. Conclusion

Given the recent objective of the United Nations to eliminate extreme poverty further by 2030, this study has investigated the link between government health/education expenditure, governance, and income inequality/poverty in developing countries. This topic is chosen to examine if good governance makes government education/health expenditure more effective in reducing poverty and income inequality. Although numerous precautions are taken to overcome the potential endogeneity problems, there still might be concerns, for example, due to the possible influence of reverse causality on the results. Therefore, the following conclusions should be interpreted with caution.

On the bases of the supplied results for poverty, multiple conclusion can be drawn. Namely, for countries with good governance, which means that the countries obtained a positive value for a governance indicator, an increase in government education expenditure or an increase government health expenditure is associated with an increase in poverty. This marginal positive effect is smaller or even negative for countries with worse governance. Worse governance indicates that a country acquired a negative score for the governance indicator. This conclusion is the same if control of corruption is used as a proxy for governance or if government effectiveness is used as a proxy for governance. Furthermore, the conclusion for government education expenditure is robust to an alternative measure of government education expenditure while the effect of government health expenditure is dependent on the kind of measure used. Government education expenditure is an aggregated measure that includes education expenditure to all levels of education such as, primary, secondary, and tertiary education. Previous literature already indicated that every level of education is not equally accessible to the poor (Abdullah et al., 2015; Lustig, 2017). Accordingly, the effect of government education expenditure on the poor is also depending on the level of education where the investment is made. Based on the results of this study similar conclusions can be drawn. Namely, an increase in primary education expenditure is associated with a reduction in poverty, if the expenditure is very large and if the government is very effective and is in control of corruption. On the contrary, an increase in government secondary education expenditure only results in a boost in the number of people living in poverty for any quality of governance. An expansion in government tertiary education expenditure is even unrelated to poverty et al.

For the relationship between government health/education expenditure, governance, and income inequality different conclusions can be drawn. Namely, an expansion in government health expenditure is associated with a decrease in income inequality. This impact is the same

for countries with a good and bad governance structure. However, this effect is different depending on the type of measure used for income inequality. For example, government health expenditure alleviates income inequality when it is measured with the Gini coefficient while it has no impact on income inequality when it is measured with the income share of lowest twenty per cent of the population. This difference might suggest that government health spending does alter the income distribution in low- and middle-income countries more evenly but not to the benefit of the poorest of society. Lastly, a boost in government education expenditure is unrelated to income inequality. This conclusion might indicate that more education expenditure influences all citizens evenly, which leaves the level of income inequality unaffected.

Lastly, Rajkumar & Swaroop (2008) concluded that government education and health expenditures only positively impact health and education outcomes in countries with a good governance structure. Overall it can be concluded that this same mechanism does not hold for relationship between public education/health spending and poverty/income inequality. For the reason that the link between government health/education expenditure and income inequality is unrelated to the quality of governance. Furthermore, in countries with a good governance an increase in government health or education expenditure is associated with a rise in poverty.

Even though this research provides an interesting contribution to the current literature given the availability in data, some limitations concerning this study and recommendations for future research can be specified. Aforementioned, the quality and measurement of poverty and income inequality data are problematic sometimes, this also generated a lot of missing values in the data sample used for this study. This data problem results in a sample of countries that is an uneven representation of the developing world, even though one of the most comprehensive databases on poverty data is exploited. Most observations are from developing countries in Europa and Central Asia, instead of from the poorest countries in Sub-Saharan Africa for example. This mixture in the data sample makes it hard to generalise the results to all developing countries. Furthermore, a limited sample size also reduces the statistical power of the study and increases the margin of error. Therefore, future research might exploit the possible increase in availability and quality of poverty and income inequality data to redo the current research with a more comprehensive data set that includes a larger sample of countries and more observations per country.

The problem with the relationship between government health/education expenditure and income inequality/poverty is that it is hard to observe how the relationship precisely works. For example, an increase in government education expenditure is likely to incentivize more

individuals to go to school. However, it might take some years before those same individuals can use that obtained knowledge from increased education to find a job, earn money, and to become nonpoor. Therefore, it is beneficial to have more data on how many children are actually going to school, and what kinds of environments those children come from to have more precise knowledge about the kinds of children going to school. In that way, it is possible to more accurately estimate the treatment effect of an increase in government education expenditure on poverty. These data were not available for this research, but it is a good suggestion for future research to focus more elaborately on these intermediate steps to estimate the treatment effect.

Lastly, this study is likely to suffer from a reverse causality problem as no suitable solution was found to control for this potential endogeneity problem. Due to this reverse causality problem the true causal effect of government expenditure on poverty/income inequality is expected to be underestimated. For the reason that an increase in government expenditure is associated with a decrease in poverty or income inequality. Secondly, an increase in poverty or income inequality stimulates government officials to increase their government expenditures. If this bias is really sufficient it may even change the sign of the effect, this might be reason for the counterintuitive results in the poverty regression models concerning the dependence on governance. Filmer and Pritchett (1997) tried to solve this endogeneity problem by using the government expenditure of neighbouring countries as an instrumental variable for government expenditure in other countries. This option was not achievable for this study, as it would decrease the number of observations even more. However, future research might exploit this option if the availability and quality in poverty and income inequality data increase in the future

Another endogeneity problem that might have caused the positive dependence on governance in the poverty equation is an omitted variable bias. Multiple time varying variables, country dummies, and year dummies are included in the poverty regression equation as controls. However, it is still plausible that there is a variable that is correlated with government expenditure and the dependent variable that is not included in the regression equation. Hence, the non-inclusion of this variable might have driven the positive dependence on the quality of governance in the multiple poverty regression models.

References

Abdullah, A., Doucouliagos, H., & Manning, E. (2015). Does education reduce income inequality? A meta-regression analysis. *Journal of Economic Surveys, 29*(2), 301-316.

Alesina, A. (1998). The political economy of macroeconomic stabilisations and income inequality: Myths and reality. In V. Tanzi and K. Chu (Eds.), *Income Distribution and High-Quality Growth* (pp. 299–332). London: MIT Press.

Alesina, A., & Rodrik, D. (1994). Distributive politics and Economic Growth. *The Quarterly Journal of Economics, 109*(2), 465-490.

Anderson, E., Jalles d'Orey, M. A., Duvendack, M., & Eposito, L. (2018). Does government spending affect income poverty? A Meta-regression Analysis. *World Development, 103,* 60-71.

Anderson, E., Jalles d'Orey, M. A., Duvendack, M., & Esposito, L. (2017). Does government spending affect income inequality? A meta-regression analysis. *Journal of Economic Surveys, 31*(4), 961-987.

Arndt, C,. & Oman, C. (2006). *Uses and abuses of governance indicators*. Paris: OECD.

Asian Development Bank (2002). *Impact of rural roads on poverty reduction: A case study based analysis*. Manila, The Philippines: ADB Operations Evaluation Department.

Baldacci, E., Clements, B., Gupta, S., & Cui, Q. (2008). Social spending, human capital, and growth in developing countries. *World Development, 36*(8), 1317–1341.

Barro, R. (1991). Economic growth in a cross-section of countries. *Quarterly Journal of Economics, 106*(2), 407–443.

Bidani, B., & Ravallion, M. (1997). Decomposing social indicators using distributional data. *Journal of Econometrics, 77*(1), 125–139.

Castro-Leal, F., Dayton, J., Demery, L., & Mehra, K. (1999). Public spending on health care in Africa: Do the poor benefit? *Bulletin of the World Health Organization, 78*(1), 66-74.

Coady, D., Grosh, M., & Hoddinott, J. (2006). *Targeting of transfers in developing countries*. Washington, DC: The World Bank.

Cobham, A., & Sumner, A. (2013). *Putting the Gini back in the bottle? 'The Palma' as a policy-relevant measure of inequality*. King's International Development Institute. London: King's College.

d'Agostino, G., Dunne, J. P., & Pieroni, L. (2016). Government spending, corruption, and economic growth. *World Development, 84*, 190-205.

Dabla-Norris, E., & Matovu, J. M. (2002). *Composition of government expenditures and demand for education in developing countries.* International Monetary Fund Working Paper No. 02/78. Washington, DC: International Monetary Fund.

Davoodi, H., Tiongson, E., & Asawanuchit, S. (2003). *How useful are benefit incidence analyses of public expenditure and health spending*? International Momentary Fund Working Paper No. 03/227. Washington, DC: International Monetary Fund.

Demery, L. (2003). Analyzing the incidence of public spending. In F. Bourguignon & L. A. Pereira da Silva (Eds.), *The impact of economic policies on poverty and income distribution: Evaluation techniques and tools* (pp. 41-68). Washington, DC: The World Bank.

Devarajan, S., Swaroop, V., & Zou, H. F. (1996). The composition of public expenditure and economic growth. *Journal of Monetary Economics, 37*(2-3), 313–344.

Dollar, D., & Kraay, A. (2002). Growth is good for the poor. *Journal of Economic growth, 7*(3), 195-225.

Dollar, D., Kleineberg, T., & Kraay, A. (2016). Growth is still good for the poor. *European Economic Review, 81*(C), 68-85.

Dorosh, P., & Thurlow, J. (2018). Beyond agriculture versus non-agriculture: Decomposing sectoral growth–poverty linkages in five African countries. *World Development, 109*, 440-451.

Easterly, W. (2001). *The effect of IMF and World Bank programmes on poverty.* WIDER Discussion Paper No. 2001/102. Helsinki: The United Nations University World Institute for Development Economics Research (UNU-WIDER).

Easterly, W. (2007). Inequality does cause underdevelopment: Insights from a new instrument. *Journal of Development Economics, 84*(2), 755–76.

Fay, M., Leipziger, D., Wodon, Q. & Yepes, T. (2003). *Achieving the millennium development goals: The role of infrastructure*. Policy Research Paper No. 2390. Washington, DC: The World Bank.

Ferroni, M. & Kanbur, R. (1992). Poverty-conscious restructuring of public expenditure. In A. Chhibber & S. Fischer (Eds.), *Economic reform in sub-Saharan Africa* (pp. 127-148). Washington, DC: The World Bank.

Filmer, D., & Pritchett, L. (1997). *Child mortality and public spending on health: How much does money matter?* World Bank Policy Research Working Paper No. 1864. Washington, DC: The World Bank.

Filmer, D., Hammer, J., & Pritchett, L. (1998). *Health policy in poor countries: Weak links in the chain*. World Bank Policy Research Working Paper No. 1874. Washington, DC: The World Bank.

Gakidou, E., & King, G. (2000) *An individual-level approach to health inequality: Child survival in 50 countries.* Global Programme on Evidence for Health Policy Discussion Paper No. 18. Geneva, Switzerland: World Health Organization.

Gomanee, K., Morrissey, O., Mosley, P., & Verschoor, A. (2003). *Aid, pro-poor government spending, and welfare*. CREDIT Research Paper No. 03/03. Nottingham: The University of Nottingham, Centre for Research in Economic Development and International Trade (CREDIT).

Goni, E., López, J. H., & Servén, L. (2011). Fiscal redistribution and income inequality in Latin America. *World Development, 39*(9), 1558–1569.

Gupta, S., Verhoeven, M., & Tiongson, E. R. (2003). Public spending on health care and the poor. *Health Economics, 12*(8), 685-696.

Halter, D., Oechslin, M., & Zweimüller, J. (2014). Inequality and growth: The neglected time dimension. *Journal of Economic Growth, 19*(1), 81–104.

Hanmer, L. C., Pyatt, G., & White, H. (1999). What do the World Bank's poverty assessment teach us about Poverty in Sub-Saharan Africa? *Development and Change, 30*(4), 795-823.

Hasan, R., Mitra, D., & Ulubasoglu (2006). *Institutions and policies for growth and poverty reduction: The role of private sector development.* ERD Working Paper Series No. 82. Manila: Asian Development Bank (ADB).

Hidalgo-Hidalgo, M., & Iturbe-Ormaetxe, I. (2018). Long-run effects of public expenditure on poverty. *Journal of Economic Inequality, 16*(1), 1-22.

Iradian, G. (2005). *Inequality, poverty, and growth: Cross-country evidence.* International Monetary Fund Working Paper No. 05/28. Available at:

Jimenez, E. (1995). Human and Physical Infrastructure: Public Investment and Pricing Policies in Developing countries. In J. Behrman & T. N. Srinivasan (Eds.), *Handbook of Development Economics, Volume III* (pp. 2773-2843). Elsevier Science B.V.

Kappel, V. (2010). *The effects of financial development on income inequality and poverty.* Economics Working Paper Serie No. 10/127. Zurich: Center of Economic Research (CER-ETH).

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2004). Governance matters III: Governance indicators for 1996, 1998, 2000, and 2002. *World Bank Economic Review, 18*(2), 253–287.

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2007). *The Worldwide Governance Indicators project: Answering the critics.* Washington, DC: World Bank.

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2011). The worldwide governance indicators: Methodology and analytical issues. *Hague Journal on the Rule of Law, 3*(2), 220-246.

Kaufmann, D., Kraay, A., & Zoido-Lobaton, P. (1999). *Governance matters.* Washington, DC: Development Economics Research Group, The World Bank.

Kurtz, M. J., & Schrank, A. (2007). Growth and governance: Models, measures, and Mechanisms. *Journal of Politics, 69*(2), 538–554.

Kuznets, S. (1955). Economic growth and income inequality. *American Economic Review, 45*(1), 1-28.

Kwon, H., & Kim, E. (2014). Poverty reduction and good governance: Examining the rationale of the millennium development goals. *Development and Change, 45*(2), 353-375.

Lelkes, O., & Sutherland, H. (Eds.). (2009). *Tax and benefit policies in the enlarged Europe: Assessing the impact with microsimulation models.* Farnham: Ashgate.

Lustig, N. (2017). *Fiscal policy, income redistribution, and poverty reduction in low- and middle-income countries.* CGD Working Paper No. 448. Washington, DC: Center for Global Development.

Lustig, N., Lopez-Calva, L. and Ortiz-Juarez, E. (2013) Declining inequality in Latin America in the 2000s: The cases of Argentina, Brazil, and Mexico. *World Development, 44*, 129–141.

Mauro, P. (1996). *The effects of corruption on investment, growth, and government expenditure.* International Monetary Fund Working paper No. 96/98. Available at SSRN: https://ssrn.com/abstract=882994

Mauro, P. (1998). Corruption and the composition of government expenditure. *Journal of Public Economics, 69*(2), 263–279.

McKague, K., Wheeler, D., & Karnani, A. (2015). An integrated approach to poverty alleviation: roles of the private sector, government and civil society. In V. Bitzer, R. Hamann, M. Hall, & E. W. Griffin-El (Eds.), *The business of social and environmental innovation* (pp. 129-145). Switzerland: Springer International Publishing.

McKay, A. (2004). Assessing the impact of fiscal policy on poverty. In T. Addison & A. Roe, (Eds.), *Fiscal policy for development: Poverty, reconstruction and growth*. Basingstoke: Palgrave Macmillan.

Meltzer, A., & Richard, S. (1981). A rational theory of the size of government. *Public Choice, 41*, 403–418.

Mosley, P., Hudson, J., & Verschoor, A. (2004). Aid, poverty reduction and the 'new conditionality'. *The Economic Journal, 114*(496), F217–F243.

Palma, J. G. (2011). Homogeneous middles vs. heterogeneous tails, and the end of the 'inverted-U': It's all about the share of the rich. *Development and Change, 42*(1), 87-153.

Perry, G., Arias, O., Lopez, H., Maloney, W., & Serven, L. (2006). *Poverty reduction and growth: Virtuous and vicious circles.* Washington, DC: The World Bank.

Persson, T., & Tabellini, G. (1994). Is inequality harmful to growth? Theory and evidence. *American Economic Review, 84*(3), 600–621.

Poterba, J. M. (1996). Government intervention in the markets for education and health care: how and why? In V. R. Fuchs (Ed.), *Individual and social responsibility: Child care, education, medical care, and long-term care in America* (pp. 277-308). Chicago: The University of Chicago Press.

Pritchett, L. (1996). *Mind your P's and Q's: The cost of public investment is not the value of public capital.* World Bank Policy research Working Paper No. 1660. Washington, DC: The World Bank.

Rajkumar, A. S., & Swaroop, V. (2008). Public spending and outcomes: Does governance matter? *Journal of Development Economics, 86*(1), 96-111.

Ravallion, M. (2020). *An introduction to PovcalNet.* The World Bank PovcalNet. http://iresearch.worldbank.org/PovcalNet/introduction.aspx

Rose-Ackerman, S. (1997). The political economy of corruption. In K. A. Elliott (Ed.), *Corruption and the global economy* (pp. 31-60). Washington, DC: Institute for International Economics.

Semykina, A., & Wooldridge, J. M. (2010). Estimating panel data models in the presence of endogeneity and selection. *Journal of Econometrics, 157*(2), 375-380.

Shleifer, A., & Vishny, R. W. (1993). Corruption. *The Quarterly Journal of Economics, 108*(3), 599–617.

Stock, J. H., & Watson, M. W. (2014). The Fixed Effects Regression Assumptions and Standard Errors for Fixed Effects Regression. In *Introduction to Econometrics* (pp. 411-414). Harlow: Pearson Education Limited.

Sylwester, K. (2000). Income inequality, education expenditures, and growth. *Journal of Development Economics, 63*(2), 379–398.

Tanzi, V., Chu, K. Y., & Gupta, S. (1999). *Economic Policy and Equity*. Washington, DC: International Monetary Fund.

The World Bank. (2020a). *Poverty headcount ratio at $1.90 a day (2011 PPP) (% of population)* | *Data*. https://data.worldbank.org/indicator/SI.POV.DDAY

The World Bank. (2020b). *Poverty gap at $1.90 a day (2011 PPP) (%)* | *Data.* https://data.worldbank.org/indicator/SI.POV.GAPS

The World Bank. (2020c). *GINI index (World Bank estimate)* | *Data*. https://data.worldbank.org/indicator/SI.POV.GINI

Yanikkaya, H. (2003). Trade openness and economic growth: a cross-country empirical investigation. *Journal of Development Economics, 72,* 57-89.

Appendix 1: Countries

Table A.1: List of countries included in the sample.

	Countries	
Albania	Ghana	Nicaragua
Angola	Guatemala	Niger
Armenia	Guinea	Nigeria
Bangladesh	Honduras	North Macedonia
Belarus	Hungary	Pakistan
Benin	India	Panama
Bhutan	Indonesia	Paraguay
Bolivia	Iran, Islamic Rep.	Peru
Botswana	Jamaica	Philippines
Brazil	Jordan	Poland
Bulgaria	Kazakhstan	Romania
Burkina Faso	Kenya	Russian Federation
Burundi	Korea, Rep	Rwanda
Cabo Verde	Kyrgyz, Rep	Samoa
Cambodia	Lao, PDR	Senegal
Cameroon	Latvia	Serbia
Chile	Lesotho	Seychelles
China	Liberia	Sierra Leone
Colombia	Lithuania	Slovak Republic
Costa Rica	Madagascar	South Africa
Cote d'Ivoire	Malawi	Sri Lanka
Croatia	Malaysia	Tajikistan
Czech Republic	Mali	Tanzania
Djibouti	Mauritania	Thailand
Dominican Republic	Mauritius	Timor-Leste
Ecuador	Mexico	Togo
Egypt, Arab rep.	Micronesia, Fed. Sts.	Tonga
El Salvador	Moldova	Tunisia
Estonia	Mongolia	Turkey
Eswatini	Montenegro	Ukraine
Ethiopia	Morocco	Uruguay
Gambia	Mozambique	Vietnam
Georgia	Namibia	West Bank and Gaza

Appendix 2: Additional results

Table A.2: Estimation results of the link between government health/education expenditure, governance, and poverty (headcount ratio at $3.20 a day) (Fixed-effects panel regressions (1)-(6)).

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
GHE (% of GDP)	-0.660		0.428	-0.455		-0.121
	(0.690)		(0.679)	(0.659)		(0.596)
GEE (% of GDP)		-1.704**	-1.714**		-1.320***	-1.112**
		(0.781)	(0.762)		(0.471)	(0.516)
GE	-4.117	-12.942***	-11.586**			
	(3.730)	(4.431)	(4.956)			
GHE (% of GDP) * GE	3.267***		1.141			
	(1.143)		(1.054)			
GEE (% of GDP) * GE		4.425***	3.526***			
		(1.012)	(0.991)			
CC				-5.668*	-16.172***	-14.339***
				(3.404)	(4.076)	(4.339)
GHE (% of GDP) * CC				2.937***		-0.416
				(0.782)		(0.805)
GEE (% of GDP) * CC					4.932***	4.837***
					(0.931)	(1.128)
ln (GDP per capita)	-25.151***	-24.857***	-28.451***	-24.987***	-26.637***	-30.693***
	(5.478)	(5.469)	(5.974)	(5.466)	(5.517)	(5.653)
ln (Population)	-16.448	-29.501*	-29.252	-18.877	-30.570*	-32.227*
	(15.262)	(17.320)	(19.015)	(14.809)	(16.774)	(18.095)
ln (Trade)	1.885	4.950	2.492	1.890	7.226	4.695
	(5.700)	(7.178)	(6.920)	(5.639)	(6.285)	(6.268)
Inflation	0.102***	0.074*	0.094**	0.093**	0.044	0.070*
	(0.037)	(0.039)	(0.041)	(0.036)	(0.036)	(0.036)
ln (School enrolment)	4.963	9.088	11.057	5.477	7.397	9.786
	(5.643)	(6.982)	(7.437)	(5.781)	(6.078)	(6.097)
Gini	0.241	0.292	0.312	0.276	0.303	0.324
	(0.258)	(0.263)	(0.248)	(0.236)	(0.218)	(0.215)
Country Fixed-effects	YES	YES	YES	YES	YES	YES
Year Fixed-effects	YES	YES	YES	YES	YES	YES
Constant	488.221*	665.270**	698.745**	522.561**	694.991**	763.252**
	(253.133)	(292.756)	(314.121)	(250.887)	(284.343)	(302.911)
Observations	643	492	467	643	492	467
Number of countries	95	85	82	95	85	82
Within *R*-squared	0.632	0.686	0.692	0.638	0.714	0.713

Notes: Clustered standard errors by country are shown in parentheses; The headcount ratio at 3.20 dollars a day on 2011 PPP is used as a dependent variable; GHE = Government Health Expenditure, GEE = Government Education Expenditure, GE = Government Effectiveness, CC = Control of Corruption; ***, **, and * denote significance at the 1%, 5%, and 10% level.

Table A.3: Estimation results of the link between government health/education expenditure, governance, and poverty (headcount ratio at $5.50 a day) (Fixed-effects panel regressions (1)-(6)).

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
GHE (% of GDP)	-1.298*		-0.446	-1.207*		-0.788
	(0.765)		(0.936)	(0.701)		(0.782)
GEE (% of GDP)		-1.260**	-1.106*		-1.100**	-0.792
		(0.553)	(0.577)		(0.494)	(0.599)
GE	-0.563	-5.420	-5.152			
	(3.977)	(4.002)	(5.117)			
GHE (% of GDP) * GE	2.340**		0.862			
	(1.089)		(1.179)			
GEE (% of GDP) * GE		2.967***	2.430***			
		(0.732)	(0.878)			
CC				-0.514	-6.371*	-5.844
				(2.923)	(3.502)	(4.159)
GHE (% of GDP) * CC				1.950**		-0.195
				(0.782)		(0.912)
GEE (% of GDP) * CC					3.079***	3.054***
					(0.710)	(0.857)
ln (GDP per capita)	-29.559***	-29.488***	-31.064***	-30.780***	-32.003***	-33.909***
	(5.077)	(5.396)	(5.851)	(4.610)	(5.075)	(4.810)
ln (Population)	10.072	8.006	9.178	7.473	5.893	5.470
	(14.697)	(15.139)	(16.115)	(13.379)	(14.301)	(15.138)
ln (Trade)	8.559*	14.961**	13.536**	8.167*	16.078***	14.636***
	(4.890)	(5.803)	(5.697)	(4.803)	(5.425)	(5.501)
Inflation	0.099**	0.078	0.084	0.095**	0.060	0.070
	(0.043)	(0.048)	(0.052)	(0.047)	(0.051)	(0.053)
ln (School enrolment)	3.484	4.710	7.994*	4.242	3.529	7.397
	(4.490)	(5.224)	(4.694)	(4.219)	(5.486)	(4.841)
Gini	0.672***	0.677***	0.680***	0.683***	0.684***	0.674***
	(0.209)	(0.241)	(0.221)	(0.199)	(0.222)	(0.208)
Country Fixed-effects	YES	YES	YES	YES	YES	YES
Year Fixed-effects	YES	YES	YES	YES	YES	YES
Constant	74.166	74.657	63.907	126.480	131.603	149.496
	(241.787)	(260.368)	(270.567)	(225.616)	(245.654)	(254.556)
Observations	643	492	467	643	492	467
Number of countries	95	85	82	95	85	82
Within *R*-squared	0.743	0.763	0.768	0.747	0.772	0.773

Notes: Clustered standard errors by country are shown in parentheses; The headcount ratio at 5.50 dollars a day on 2011 PPP is used as a dependent variable; GHE = Government Health Expenditure, GEE = Government Education Expenditure, GE = Government Effectiveness, CC = Control of Corruption; ***, **, and * denote significance at the 1%, 5%, and 10% level.

Table A.4: Estimation results of the link between government education/health expenditure, governance, and poverty (poverty gap at $1.90 a day) (Fixed-effects panel regressions (1)-(6)).

	(1)	(2)	(3)	(4)	(5)	(6)
GHE (% of GDP)	0.053		-0.013	0.040		-0.153
	(0.251)		(0.187)	(0.247)		(0.161)
GEE (% of GDP)		-0.364***	-0.294**		-0.296***	-0.216**
		(0.127)	(0.115)		(0.089)	(0.099)
GE	-2.514***	-5.252***	-4.424***			
	(0.951)	(1.371)	(1.344)			
GHE (% of GDP) * GE	0.612**		0.385			
	(0.260)		(0.290)			
GEE (% of GDP) * GE		0.977***	0.598***			
		(0.220)	(0.193)			
CC				-1.927**	-4.498***	-3.175***
				(0.807)	(1.314)	(1.165)
GHE (% of GDP) * CC				0.570***		0.150
				(0.175)		(0.223)
GEE (% of GDP) * CC					0.970***	0.649***
					(0.199)	(0.182)
ln (GDP per capita)	-4.798***	-4.109**	-5.659***	-5.222***	-4.642***	-6.649***
	(1.342)	(1.602)	(1.636)	(1.332)	(1.693)	(1.674)
ln (Population)	-10.184***	-10.721***	-11.053***	-9.371***	-9.466***	-9.991***
	(3.238)	(2.966)	(2.887)	(3.096)	(2.818)	(2.755)
ln (Trade)	-2.527**	-1.105	-2.032**	-2.489**	-0.733	-1.814*
	(1.032)	(1.131)	(0.986)	(1.023)	(1.061)	(0.939)
Inflation	0.021*	0.001	0.009	0.022*	-0.001	0.010
	(0.012)	(0.013)	(0.011)	(0.012)	(0.013)	(0.012)
ln (School enrolment)	-1.823	-1.399	-0.902	-2.146	-1.922	-1.438
	(1.420)	(1.989)	(2.029)	(1.450)	(1.987)	(2.054)
Gini	0.220***	0.190**	0.186**	0.232***	0.190**	0.192**
	(0.077)	(0.079)	(0.077)	(0.075)	(0.076)	(0.076)
Country Fixed-effects	YES	YES	YES	YES	YES	YES
Year Fixed-effects	YES	YES	YES	YES	YES	YES
Constant	224.606***	220.030***	243.419***	215.806***	204.881***	236.219***
	(55.047)	(55.995)	(53.440)	(53.166)	(54.674)	(53.091)
Observations	643	492	467	643	492	467
Number of countries	95	85	82	95	85	82
Within *R*-squared	0.592	0.637	0.645	0.593	0.635	0.641

Notes: Clustered standard errors by country are shown in parentheses; The poverty gap at 1.90 dollars a day on 2011 PPP is used as a dependent variable; GHE = Government Health Expenditure, GEE = Government Education Expenditure, GE = Government Effectiveness, CC = Control of Corruption; ***, **, and * denote significance at the 1%, 5%, and 10% level.

Table A.5: Estimations result of the link between government health/education expenditure, governance, and poverty (poverty gap at $3.20 a day) (Fixed-effects panel regressions (1)-(6)).

	(1)	(2)	(3)	(4)	(5)	(6)
GHE (% of GDP)	-0.108		0.199	-0.051		-0.102
	(0.359)		(0.306)	(0.347)		(0.268)
GEE (% of GDP)		-0.838**	-0.797**		-0.657***	-0.530***
		(0.333)	(0.302)		(0.180)	(0.191)
GE	-3.166*	-8.366***	-7.057***			
	(1.661)	(2.427)	(2.331)			
GHE (% of GDP) * GE	1.472***		0.606			
	(0.517)		(0.466)			
GEE (% of GDP) * GE		2.195***	1.608***			
		(0.495)	(0.417)			
CC				-3.254**	-8.873***	-7.015***
				(1.491)	(2.235)	(2.072)
GHE (% of GDP) * CC				1.349***		-0.101
				(0.355)		(0.343)
GEE (% of GDP) * CC					2.365***	2.105***
					(0.445)	(0.466)
ln (GDP per capita)	-11.105***	-10.311***	-12.837***	-11.349***	-11.271***	-14.344***
	(2.481)	(2.595)	(2.814)	(2.506)	(2.702)	(2.850)
ln (Population)	-14.591**	-19.985***	-20.094**	-14.727**	-19.309***	-20.202***
	(6.576)	(7.346)	(7.776)	(6.360)	(6.983)	(7.367)
ln (Trade)	-1.825	-0.071	-1.664	-1.789	0.972	-0.784
	(2.419)	(2.955)	(2.741)	(2.405)	(2.575)	(2.459)
Inflation	0.047**	0.022	0.036*	0.045**	0.010	0.029
	(0.020)	(0.022)	(0.021)	(0.019)	(0.022)	(0.019)
ln (School enrolment)	0.194	2.078	2.876	0.112	1.119	2.015
	(2.505)	(3.129)	(3.320)	(2.556)	(2.734)	(2.847)
Gini	0.192	0.186	0.190	0.212*	0.190	0.199*
	(0.131)	(0.133)	(0.127)	(0.121)	(0.115)	(0.115)
Country Fixed-effects	YES	YES	YES	YES	YES	YES
Year Fixed-effects	YES	YES	YES	YES	YES	YES
Constant	350.667***	415.794***	446.186***	354.320***	412.549***	461.245***
	(109.009)	(123.133)	(128.676)	(108.296)	(118.111)	(124.796)
Observations	643	492	467	643	492	467
Number of countries	95	85	82	95	85	82
Within *R*-squared	0.632	0.684	0.696	0.641	0.710	0.716

Notes: Clustered standard errors by country are shown in parentheses; The poverty gap at 3.20 dollars a day on 2011 PPP is used as a dependent variable; GHE = Government Health Expenditure, GEE = Government Education Expenditure, GE = Government Effectiveness, CC = Control of Corruption; ***, **, and * denote significance at the 1%, 5%, and 10% level.

Table A.6: Estimation results of the link between government health/education expenditure, governance, and poverty (poverty gap at $5.50 a day) (Fixed-effects panel regressions (1)-(6)).

	(1)	(2)	(3)	(4)	(5)	(6)
GHE (% of GDP)	-0.515		0.066	-0.413		-0.287
	(0.478)		(0.470)	(0.441)		(0.406)
GEE (% of GDP)		-1.106**	-1.046**		-0.884***	-0.702**
		(0.447)	(0.413)		(0.266)	(0.319)
GE	-2.936	-8.827***	-7.724**			
	(2.518)	(2.854)	(3.255)			
GHE (% of GDP) * GE	2.116***		0.835			
	(0.747)		(0.712)			
GEE (% of GDP) * GE		2.883***	2.210***			
		(0.575)	(0.534)			
CC				-3.359	-10.006***	-8.489***
				(2.136)	(2.495)	(2.718)
GHE (% of GDP) * CC				1.886***		-0.128
				(0.518)		(0.502)
GEE (% of GDP) * CC					3.115***	2.905***
					(0.519)	(0.540)
ln (GDP per capita)	-18.334***	-17.818***	-20.476***	-18.677***	-19.334***	-22.421***
	(3.427)	(3.318)	(3.653)	(3.343)	(3.313)	(3.334)
ln (Population)	-9.411	-15.722	-15.370	-10.611	-16.019	-16.931
	(9.542)	(10.261)	(11.067)	(8.952)	(9.709)	(10.367)
ln (Trade)	1.439	4.555	2.790	1.381	5.894	4.028
	(3.561)	(4.464)	(4.252)	(3.509)	(3.946)	(3.903)
Inflation	0.071***	0.047*	0.060**	0.066***	0.030	0.048**
	(0.025)	(0.024)	(0.026)	(0.025)	(0.022)	(0.022)
ln (School enrolment)	1.967	4.221	5.810	2.200	3.031	4.933
	(3.092)	(3.723)	(3.846)	(3.112)	(3.306)	(3.250)
Gini	0.317*	0.325*	0.333**	0.339**	0.331**	0.339**
	(0.168)	(0.173)	(0.162)	(0.155)	(0.147)	(0.144)
Country Fixed-effects	YES	YES	YES	YES	YES	YES
Year Fixed-effects	YES	YES	YES	YES	YES	YES
Constant	316.849**	391.402**	413.057**	337.919**	408.611**	454.683***
	(154.798)	(170.331)	(180.327)	(149.480)	(161.514)	(171.035)
Observations	643	492	467	643	492	467
Number of countries	95	85	82	95	85	82
Within *R*-squared	0.701	0.738	0.745	0.707	0.759	0.762

Notes: Clustered standard errors by country are shown in parentheses; The poverty gap at 5.50 dollars a day on 2011 PPP is used as a dependent variable; GHE = Government Health Expenditure, GEE = Government Education Expenditure, GE = Government Effectiveness, CC = Control of Corruption; ***, **, and * denote significance at the 1%, 5%, and 10% level.

Table A.7: Estimation results of link between government education expenditure (primary/secondary/tertiary government education expenditure), governance, and income inequality (Gini coefficient) (Fixed-effects panel regressions (1)-(6)).

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
GPEE (% of government expenditure on education)	0.072			0.067		
	(0.051)			(0.055)		
GSEE (% of government expenditure on education)		-0.030			-0.005	
		(0.057)			(0.051)	
GTEE (% of government expenditure on education)			0.009			-0.002
			(0.039)			(0.037)
GE	-0.745	-5.819*	-2.539			
	(2.965)	(2.990)	(2.143)			
GPEE * GE	-0.087					
	(0.072)					
GSEE * GE		0.056				
		(0.069)				
GTEE * GE			0.037			
			(0.065)			
CC				-0.373	-2.037	-1.552
				(3.224)	(2.613)	(1.833)
GPEE * CC				-0.053		
				(0.074)		
GSEE * CC					-0.027	
					(0.063)	
GTEE * CC						-0.005
						(0.049)
ln (GDP per capita)	1.145	2.400	-1.992	0.294	1.852	-1.777
	(4.394)	(5.314)	(4.367)	(5.279)	(5.922)	(4.766)
ln (Population)	-15.971**	-18.410***	-20.397***	-14.478**	-17.249**	-19.995***
	(6.616)	(6.880)	(6.940)	(7.145)	(7.262)	(6.933)
ln (Trade)	2.706	2.742	2.761	2.814	2.489	2.956
	(1.937)	(2.048)	(1.867)	(1.959)	(1.965)	(1.924)
Inflation	0.005	0.021	0.015	0.007	0.004	0.016
	(0.052)	(0.057)	(0.042)	(0.054)	(0.054)	(0.041)
ln (School enrolment)	8.957***	8.839***	10.363***	8.716***	8.961***	10.456***
	(2.149)	(2.294)	(2.484)	(2.182)	(2.201)	(2.363)
Country Fixed-effects	YES	YES	YES	YES	YES	YES
Year Fixed-effects	YES	YES	YES	YES	YES	YES
Constant	238.792*	270.730*	335.606**	222.681	256.606	325.947**
	(133.427)	(144.247)	(133.313)	(146.630)	(155.881)	(136.198)
Observations	376	378	453	376	378	453
Number of countries	72	72	77	72	72	77
Within *R*-squared	0.419	0.395	0.332	0.397	0.380	0.331

Notes: Clustered standard errors by country are shown in parentheses; The Gini coefficient (World bank Estimate) is used as a dependent variable; GPEE = Government Primary Education Expenditure, GSEE = Government Secondary Education Expenditure, GTEE = Government Tertiary Education Expenditure, GE = Government Effectiveness, CC = Control of Corruption; ***, **, and * denote significance at the 1%, 5%, and 10% level.

Table A.8: Estimation results of the link between government health/education expenditure, governance, and income inequality (Palma ratio) (Fixed effects panel regressions (1)-(6)).

	(1)	(2)	(3)	(4)	(5)	(6)
GHE (% of GDP)	-0.143*		-0.023	-0.169**		-0.026
	(0.072)		(0.044)	(0.077)		(0.046)
GEE (% of GDP)		-0.032	-0.026		-0.031	-0.040
		(0.037)	(0.034)		(0.038)	(0.037)
GE	-0.393	0.021	-0.179			
	(0.301)	(0.390)	(0.313)			
GHE (% of GDP) * GE	0.128		0.063			
	(0.079)		(0.059)			
GEE (% of GDP) * GE		-0.005	-0.053			
		(0.059)	(0.050)			
CC				0.036	-0.017	0.167
				(0.265)	(0.370)	(0.315)
GHE (% of GDP) * CC				0.032		0.066
				(0.057)		(0.045)
GEE (% of GDP) * CC					-0.013	-0.081
					(0.061)	(0.061)
ln (GDP per capita)	0.152	-0.161	0.183	-0.023	-0.131	0.029
	(0.429)	(0.715)	(0.651)	(0.450)	(0.744)	(0.764)
ln (Population)	-3.502***	-3.922***	-2.470**	-3.511***	-4.000***	-2.274**
	(1.262)	(1.123)	(0.951)	(1.301)	(1.198)	(0.899)
ln (Trade)	-0.121	0.096	0.215	-0.144	0.086	0.179
	(0.394)	(0.274)	(0.237)	(0.401)	(0.307)	(0.259)
Inflation	-0.001	0.009	0.003	0.000	0.009	0.004
	(0.003)	(0.007)	(0.005)	(0.003)	(0.008)	(0.006)
ln (School enrolment)	1.130**	1.932***	1.284***	1.129**	1.960***	1.275***
	(0.511)	(0.454)	(0.446)	(0.536)	(0.481)	(0.444)
Country Fixed effects	YES	YES	YES	YES	YES	YES
Year Fixed effects	YES	YES	YES	YES	YES	YES
Constant	53.994**	59.154**	34.604*	55.958**	60.058**	33.071
	(22.053)	(23.522)	(20.135)	(22.847)	(24.631)	(20.435)
Observations	586	457	429	586	457	429
Number of countries	76	69	67	76	69	67
Within *R*-squared	0.414	0.368	0.407	0.406	0.369	0.402

Notes: Clustered standard errors by country are shown in parentheses; The Palma ratio is used as a dependent variable; GHE = Government Health Expenditure, GEE = Government Education Expenditure, GE = Government Effectiveness, CC = Control of Corruption; ***, **, and * denote significance at the 1%, 5%, and 10% level.

Table A.9: Estimation results of the link between government health/education expenditure, governance, and income inequality (income share highest 10% of the population) (Fixed-effects panel regressions (1)-(6)).

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
GHE (% of GDP)	-0.425		-0.026	-0.526		0.019
	(0.404)		(0.280)	(0.426)		(0.286)
GEE (% of GDP)		-0.078	-0.098		-0.095	-0.165
		(0.149)	(0.160)		(0.167)	(0.184)
GE	-0.987	1.110	0.785			
	(1.713)	(1.343)	(1.594)			
GHE (% of GDP) * GE	0.284		0.152			
	(0.428)		(0.377)			
GEE (% of GDP) * GE		-0.202	-0.244			
		(0.251)	(0.274)			
CC				0.469	0.917	1.422
				(1.577)	(1.676)	(1.763)
GHE (% of GDP) * CC				-0.110		0.156
				(0.334)		(0.280)
GEE (% of GDP) * CC					-0.242	-0.369
					(0.264)	(0.283)
ln (GDP per capita)	1.522	-0.474	-0.866	0.930	-0.214	-1.079
	(2.109)	(2.976)	(2.774)	(2.366)	(3.402)	(3.372)
ln (Population)	-6.952	-5.563	-4.203	-7.100	-6.080	-4.288
	(4.899)	(4.070)	(3.940)	(4.922)	(3.858)	(3.697)
ln (Trade)	0.396	0.089	0.409	0.280	-0.015	0.207
	(1.669)	(1.406)	(1.380)	(1.718)	(1.576)	(1.569)
Inflation	0.018	0.035	0.034	0.022	0.036	0.036
	(0.018)	(0.033)	(0.032)	(0.018)	(0.034)	(0.033)
ln (School enrolment)	3.784*	5.157***	4.437**	3.660*	5.383***	4.514**
	(2.146)	(1.760)	(1.808)	(2.195)	(1.703)	(1.806)
Country Fixed-effects	YES	YES	YES	YES	YES	YES
Year Fixed-effects	YES	YES	YES	YES	YES	YES
Constant	115.872	102.934	88.880	125.089	108.516	92.998
	(82.653)	(86.508)	(77.871)	(85.425)	(85.295)	(76.414)
Observations	643	492	467	643	492	467
Number of countries	95	85	82	95	85	82
Within *R*-squared	0.317	0.374	0.328	0.315	0.375	0.332

Notes: Clustered standard errors by country are shown in parentheses; The income share held by the highest ten per cent of the population is used as a dependent variable; GHE = Government Health Expenditure, GEE = Government Education Expenditure, GE = Government Effectiveness, CC = Control of Corruption; ***, **, and * denote significance at the 1%, 5%, and 10% level.