

**MASTERS DEGREE
ECONOMICS**

THE ROLE OF EDUCATION FUNDING IN POVERTY REDUCTION IN DEVELOPING COUNTRIES

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Abstract

Poverty remains a persistent challenge in developing countries, affecting millions of lives and hindering socio-economic progress. Education is widely recognised as a crucial tool for poverty alleviation, yet access to quality education is often limited in developing countries. This dissertation explores the role of education funding in reducing poverty, focusing on both national government expenditure and foreign aid directed towards education. While the topic of aid effectiveness in education is widely studied in the literature, the relationship between this specific funding and poverty has not yet been explored.

Using a panel data set covering 90 low- and middle-income countries from 1999 to 2021, this research investigates the impact of education funding on poverty alleviation through both monetary and multidimensional approaches.

The findings suggest that while government expenditure on education significantly reduces poverty, the impact of foreign aid to education is less consistent and, in some cases, may even be associated with increased poverty levels. This outcome highlights the complexity of aid effectiveness and suggests that foreign aid alone may not be sufficient to achieve substantial poverty reduction without strong governmental support and effective implementation strategies.

JEL codes: F35, H52, I25, I30

Keywords: Education, Foreign Aid to Education, Poverty, Government Expenditure in Education, Education Funding, Developing Countries

Resumo

A pobreza continua a ser um desafio persistente nos países em desenvolvimento, afetando milhões de vidas e dificultando o progresso socioeconómico. A educação é amplamente reconhecida como um instrumento crucial para a redução da pobreza, mas o acesso a uma educação de qualidade é frequentemente limitado nestas regiões. Esta dissertação explora o papel do financiamento da educação na redução da pobreza, centrando-se tanto na despesa nacional do governo, como na ajuda externa dirigidas à educação. Embora o tema da eficácia da ajuda na educação seja amplamente estudado na literatura, a relação entre este financiamento específico e a pobreza ainda não foi explorada.

Utilizando um conjunto de dados em painel que abrange 90 países de baixo e médio rendimento de 1999 a 2021, é investigado o impacto do financiamento da educação na redução da pobreza através de perspetivas monetária e multidimensional.

Os resultados sugerem que, embora a despesa nacional em educação reduza significativamente a pobreza nestes países, o impacto da ajuda externa à educação é menos consistente e, em alguns casos, pode até estar associado ao aumento dos níveis de pobreza. Este resultado realça a complexidade da eficácia da ajuda e sugere que a ajuda externa, por si só, pode não ser suficiente para alcançar uma redução substancial da pobreza sem um forte apoio governamental e estratégias de implementação eficazes.

Códigos JEL: F35, H52, I25, I30

Palavras-Chave: Educação, Ajuda Externa na Educação, Pobreza, Despesa Nacional em Educação, Financiamento da Educação, Países em Desenvolvimento

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1. Introduction

Poverty alleviation, particularly in developing countries, is a persistent global challenge that affects hundreds of millions of lives. The relevance of this topic is evident, as the United Nations expressed in its "Sustainable Development Goals" in 2015 a clear intention: "to end poverty in all its forms everywhere" (United Nations, 2015, p. 14). These goals, which follow on from the Millennium Development Goals (MDG), are crucial as the MDGs adoption was instrumental to poverty reduction (Asadullah & Savoia, 2018).

Education is widely recognised as an essential means of socio-economic development. However, in many developing countries, access to quality education is limited, and poverty persists as a chronic problem. Several questions arise, such as the quality of education and how it is financed. If the highest quality education is private, the difference in opportunities is notorious and inequality is accentuated. Todaro and Smith (2011) give the example of a country like Mali, where elite schools offer excellent preparation, and rural schools have only one textbook for a range of pupils. Education funding is the subject of debate.

Public expenditure on education includes both direct spending on educational institutions and educational related public subsidies to households administered by educational institutions (OECD, 2016). According to World Bank data from 2019,¹ 8 out of the 10 countries that spent the most on education as a percentage of GDP are developing countries.

Foreign aid, usually understood as the "voluntary transfer of resources to a sovereign entity without necessarily a payback obligation" (Kabir, 2020), is not a consensual topic in the literature concerning its effects. Although some recognise the importance of this channel, with a unidirectional causality from poverty to foreign aid (Mahembe & Odhiambo, 2019), others argue that foreign aid lacks the capacity to mobilise societal and governmental transformation, thus failing to promote the economic development of recipient countries (Schabbel, 2007). Other findings emphasise the importance of combining aid with reforms, thereby maximising the country's growth and subsequent poverty reduction (Agénor et al., 2008). Despite the positive contributions of foreign aid to education, Riddell & Zarazúa (2016) highlight a gap between the actual outcomes of aid and its potential, particularly regarding its contribution to improving educational quality.

The contribution of this dissertation to the academic community is centered primarily on

¹ <https://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS> (accessed on 03.11.2023).

understanding the impact of education spending on improving socio-economic development and reducing poverty in developing countries. Our focus is on the financing of education - national vs foreign funding - aiming to discuss the effectiveness of the application of funds and the fulfilment of the primary objective. Studying the impact of foreign aid on education is particularly useful given that “development objectives in this field have been set out very clearly and have been agreed upon among all international donors at various occasions” (Michaelowa & Weber, 2006). The literature points to the effectiveness of education and aid in the socio-economic development of a developing country, albeit low, as in the studies by Yogo (2017) and Riddell & Zarazúa (2016). It is claimed that primary education should be the focus of these investments (Todaro & Smith, 2011, p. 406), but literature still reaches diverse conclusions regarding the role of education and aid on poverty alleviation. This research aims to address this topic by analysing the effectiveness of the use of foreign aid funds to education in reducing poverty.

Therefore, the question to answer is the following: do public expenditure in education and education-oriented foreign aid contribute positively to poverty reduction in developing countries? This research therefore seeks to analyse the evolution of expenditure on education, both financed by national and foreign funds, in order to understand its effects on the school enrolment and poverty alleviation. In order to carry out this study, we use an econometric model with panel data covering 90 low and middle-income countries for the period 1999-2021 estimated considering poverty rate as depend variable and education funding, both national and external, as explanatory variables, besides other control variables.

This study is relevant to the academic community as it fills a literature gap on the role of education funding in poverty, a topic not yet thoroughly studied in the literature, differing from studies that link education funding (e.g. Birchler & Michaelowa, 2016) with educational outcomes or educational outcomes and poverty (Datzberger, 2018). To the best of our knowledge, there is no study on the role of foreign aid oriented to education on poverty reduction. It is also relevant to policymakers, donors, international organisations, and governments in developing countries as it can shed light on the effectiveness of different types of education funding. The overall aim of this work is to provide insights that can help to design more effective policies and strategies to combat poverty through structural investments in education.

This dissertation is structured as follows. The next section deals with the literature on the

concepts of foreign aid, poverty and the relationship between foreign aid and education, national expenditure and education and poverty and education. Chapter 3 presents the methodology used in the research, as well as a description of the data and variables used in the analysis. Chapter 4 reveals the results of the estimations carried out, as well as a discussion of these results, which relate foreign aid in education and national expenditure in education to poverty variables. Finally, Chapter 5 concludes this dissertation.

2. Research background on poverty and foreign aid to education

In order to study the role of education funding in poverty reduction, it is important to define the concepts involved, as well as to identify the interactions between poverty, foreign aid and education.

2.1 Foreign aid

Foreign aid is "the international transfer of public funds in the form of loans or grants either directly from one government to another or indirectly through the vehicle of a multilateral assistance agency such as the World Bank" (Todaro & Smith, 2011, p. 747). Foreign aid is usually measured through Official Development Assistance (ODA), and has been the major source of financing for aid since 1969 (OECD, 2016), widely used in the field of development economics.

In 1970, many nations accepted a United Nations goal to contribute 0.7% of their national income as aid (ODA/GNI). European Union countries reaffirmed this commitment in both 2005 and 2015 (EUEA, 2016). Despite this, only a small number of countries have reached the 0.7% target, and even fewer have consistently met it.

In 1970, the sector that received the most foreign aid funds was education, which was overtaken in 1978 by economic infrastructure and services. In 1990, the top three sectors were, respectively, economic infrastructure and services; agriculture, forestry and fishing; education. Since then, although aid has continued to increase in all these three sectors, the primary sector of the economy and the education sector have been gradually overtaken by others: health; government and civil society; humanitarian aid. In 2021, the education sector was only the fifth sector receiving the most foreign aid, with around 16B\$, in a ranking led by humanitarian aid, with over 39B\$ (OECD, 2024).

2.2 Poverty

According to the UN (2020), poverty is not defined solely by hunger, lack of income or low productive resources, but by a more global nature, which includes, for example, limited access to basic services such as health or education. For several decades, poverty was understood

only as income or nutritional deprivation, but later the UNDP (1997) defined poverty as "the denial of opportunities and choices" (p. 12). This definition is based on the work of Sen (1985) who introduced the term "capabilities", particularly their deprivation, which inhibits an individual's freedom to choose what they want to do, what they think and what they want to be.

Absolute poverty is "the situation of being unable or only barely able to meet the subsistence essentials of food, clothing, and shelter" (Todaro & Smith, 2011, p. 33) and is counted as the total number of people living below a poverty line, usually income based. To recognise extreme poverty, the World Bank² defined, in 2022, a new poverty line of \$2.15 per day in 2017 purchasing power parities (PPPs). Higher poverty lines emerged to measure poverty in lower-middle and upper-middle income countries, \$3.65 and \$6.85, respectively.

Following a multidimensional framework, we intend to analyse the role of education funding in reducing poverty. Sen & Anand (1997) consider as poor those who suffer deprivation in several dimensions. The idea gained widespread acceptance by the United Nations Development Programme, which, in 2010, established the Multidimensional Poverty Index (MPI), identifying multiple deprivations at the household level in health, education and standard of living.

2.3 Foreign aid and education

The education sector, particularly since the MDGs, has received a substantial increase in foreign aid. There are various aid modalities for education, from the traditional project aid to more recent modalities such as sector-wide approaches and budget support.

Project aid is a type of foreign aid where the donor commands every input required in the production of a specifically development good (Cordella, & Dell'Ariccia, 2007). The emphasis lies in achieving concrete outcomes, such as the construction of a school or the improvement of the electricity infrastructure. So, project aid involves providing support for specific initiatives or programs rather than giving general financial assistance.

A sector-wide approach (SWAP) is an approach to international development where "all significant funding for the sector supports a single sector policy and expenditure programme,

² <https://www.worldbank.org/en/news/factsheet/2022/05/02/fact-sheet-an-adjustment-to-global-poverty-lines>

under government leadership, adopting common approaches across the sector, and progressing towards relying on government procedures to disburse and account for all funds” (Foster et al, 2000, p.13), and in the education sector, the main objective is to achieve universal primary enrolment (Brown et al., 2001). In order to be successful, both the donors and the recipients need to be really committed to a joint strategy. According to Ratcliffe & Macrae (1999), the two major advantages of this modality are the potentially more effective links between governments and funding agencies, as well as, in the case of the education sector, a more detailed concern with quality and results through "greater emphasis on policy, budgetary and institutional concerns and arrangements".

The donor countries can directly contribute parts of their development assistance to recipient countries' budgets, in what is known as budget support (OECD, 2012), usually imposing conditionality in the allocation of the available resources (Cordella, & Dell'Ariccia, 2007). Just like SWAPs, this modality only became relevant in the late 1990s, when the effectiveness of the project-aid approaches was being more questioned. The study of Schmitt et al. (2017) argues that budget support effectively promotes development outcomes, specifically by improving public financial management and the provision of public goods and services.

Riddell & Zarazúa (2016) believe that the emergence and expansion of the new aid modalities, which take a more systemic approach, is due to criticisms of the weaknesses of project aid, which are based on the creation of "islands of excellence amidst seas of disadvantage" and do not structurally solve countries' problems. Since most of the project aid is managed by the funding bodies, the responsibilities of the beneficiary countries are limited, increasing transaction costs, and hampering mobilisation of resources. Furthermore, it can conduct to a policy and strategy fragmentation (Ratcliffe & Macrae, 1999).

Cordella and Dell'Ariccia (2007) demonstrated that when recipients have limited resources and their development preferences differ significantly from those of the donor, project aid is recommended, while budget support is more indicated when the previous premisses are not true. The study by Dreher et al. (2008), which concludes that there is no evidence that aid works by increasing government spending on education, puts into perspective the possibility of former supra-budgetary aid from donors or historically very fungible aid (this means that the donor's intervention might either obstruct or substitute for the development spending that the recipient government would have carried out on its own if the donor had

not been involved) and this debate could be resolved if budget support became the predominant means. Pritchett & Woolcock (2004) argue that project aid, which is often tied to specific initiatives or sectors, can sometimes be less effective compared to budget support that provides general financial resources for government use. While project aid can lead to inefficiencies and a lack of coherence in national development strategies, support allows for greater flexibility and alignment with recipient countries' strategic priorities, thus potentially leading to more sustainable outcomes (Pritchett & Woolcock, 2004).

Kenny (2008) highlights that early studies on aid effectiveness often measured success by the increase in per capita GDP growth rates in recipient countries. However, this is just one of several dimensions of aid effectiveness, to which must be added the reduction of inequalities or the poverty reduction; non-income factors in the recipient country (e.g. education or health); impacts on donor countries such as a lower threat of terrorism or environmental degradation and the maximisation of aid flows themselves (Kenny, 2008).

The literature specifying the effectiveness of foreign aid in the education sector, briefly described in Appendix 1, is relatively recent, not vast and in almost all cases has the net primary school enrolment rate, i.e. the percentage of children who are registered in primary school, as an explained variable (Birchler & Michaelowa, 2016; Dreher et al., 2008; Michaelowa & Weber, 2006; D'Aiglepieire & Wagner, 2013). This choice, in addition to data-related reasons, is linked to the former MDGs' goal no. 2 on achieving universal primary education. Another study by Michaelowa & Weber (2007), looks at outcomes by education level, i.e. primary, secondary, and tertiary education, where at primary level they analyse net primary enrolment and primary completion rates, while in the following they only obtained data for enrolment. The obtained results show that foreign aid is effective in all the studies carried out, although in half of the cases there is no strong positive correlation between foreign aid and education.

2.4 Government expenditure on education

Public spending on education ensures that even the poorest segments of society can access basic education. A recent report from UNESCO (2021) highlights that countries with higher government spending on education tend to have better educational outcomes and lower poverty rates.

Research by Gupta et al (2002) finds that increased public spending on education in

developing countries led to significant improvements in literacy rates and reductions in poverty. Their study showed that every 1% increase in education expenditure (% GDP) led to a reduction in poverty by 0.7%. Additionally, a study by Glewwe & Kremer (2006) found that government investment in education, particularly at the primary and secondary levels, leads to significant reductions in poverty rates by improving the employability and productivity of the workforce.

It is important to note that the impact of government expenditure on education goes beyond immediate economic gains, contributing to broader social outcomes that are essential for sustainable poverty alleviation. Educated individuals tend to have better health outcomes, lower fertility rates, and greater civic participation—which are factors that contribute to long-term poverty reduction (Glewwe, 1999). For example, educated women are more likely to seek healthcare for themselves and their children, leading to lower child mortality rates and improved family well-being (Schultz, 1993). These effects are particularly important in impoverished communities, where access to healthcare and other social services is often limited.

2.5 Poverty reduction and education

According to Todaro & Smith (2011), education improves individuals' capabilities, enabling them to secure better-paying jobs and improve their standards of living. Higher levels of education correlate with lower unemployment rates and higher income, which can significantly reduce poverty levels in the long term (World Bank, 2018). Moreover, educated individuals tend to have fewer children, invest more in their offspring's education, and participate more actively in the economy, thereby contributing to overall economic growth and poverty reduction (Duflo, 2012).

The role of education on poverty reduction is a very-studied issue in developed countries. Hofmarcher (2021), in a study conducted in 32 European countries and using various measures of poverty, inferred that an additional year of education reduces the likelihood of an individual falling below the poverty line. In addition, in a study also conducted in Europe by Bellani & Bia (2019), it was found that the likelihood of an individual who was not poor in childhood completing at least secondary education is 1.5 times higher than an individual who experienced childhood poverty. These are alarming results, given that in a developing country social inequalities and lack of access to education are much higher than in Europe.

With respect to developing countries, literature usually confirms the importance of education for poverty reduction. A study made in Latin America argued that the only way to bring the region out of poverty in the 2000s was as a massive increase in human capital development (Londono, 1996). In Asia, “(...) the popularization of primary education has significantly reduced poverty in China, especially in urban areas.” (Song, 2012, p. 105).

However, findings from Uganda reveal that “progress in poverty alleviation is not only stagnant but the role of education therein can be described as ‘modest’ at best” (Datzberger, 2018, p.124). Datzberger (2018) also stresses the role of the institutional and legal framework of a country, while Uganda's education strategy, whether at national level or at international level, targeting also the donors, does not have the transformative capacity to empower the poor into decision-making positions, thus failing to change the political, economic, and social context that drives poverty. In Tanzania, the increase in primary school enrolment has not been able to impact poverty, especially due to the poor quality of education, leading to a low percentage of pupils finishing secondary school, which means that basic skills are not being provided (Wedgwood, 2007), and when education is weaker, the poor suffer more (Van der Berg, 2008).

3. Methodology

In this chapter, we examine the research methodology used to investigate the effects of education funding on poverty alleviation. Firstly, we present the model, followed by a detailed description of data and variables employed in our study.

3.1 The Model

This dissertation analyses the role of education funding in poverty reduction, using a sample of 90 countries over the period 1999 to 2021.

We use panel data estimation, as we are dealing with cross-sectional and time-series data. Using panel data models offers several advantages. They account for implicit differences between entities, which are common in these types of relationships, and they help reduce collinearity between variables. This makes them particularly well-suited for analyzing changes over time (Gujarati & Porter, 2009). Some model variations are Fixed Effects Model (FEM) and Random Effects Model (REM).

The FEM assumes that the individual-specific effects are constant and correlated with the independent variables, capturing only within-group variation. In contrast, the REM assumes that these effects are random and uncorrelated with the independent variables, allowing for both within-group and between-group variation (Greene, 2012).

Our econometric model can be described as follows:

$$POV_{it} = \beta_1 + \beta_2 AIDEDUC_{it} + \beta_3 GOVEDUC_{it} + \beta_4 X_{it} + \alpha_{it} + \epsilon_{it}$$

where i represents the country ($i = 1, \dots, 90$) and t represents the year ($t = 1999, \dots, 2021$). POV_{it} is the dependent variable and it refers to a measure of poverty; β_1 is the common intercept; β_2 is the vector of coefficients associated with the foreign aid to education variable; β_3 is the vector of coefficients associated with the government spending on education variable; $GOVEDUC_{it}$ and $AIDEDUC_{it}$ are the explanatory variables and refer to government spending on education and foreign aid to education, respectively; β_4 are the coefficients associated with the control variables; X_{it} is the vector of control variables described in the literature (e.g. GDP per capita, Gini index, urbanization rate, school enrolment rates); α_{it} is the vector of unobserved specific effects and ϵ_{it} is the error term.

For the estimation of the model, we used Stata/BE software package, version 18.

3.2 Data

The countries selected for this research were the 134 countries classified as low- and middle-income by the World Bank in 2023. Of these, 44 were excluded, either because they had no data on foreign aid for education or because they had fewer than three observations on monetary poverty in the period under analysis, 1999-2021, which coincides with the availability of the Development Aid Committee (DAC) aid disbursement data. The reduced final sample comprises 90 countries.

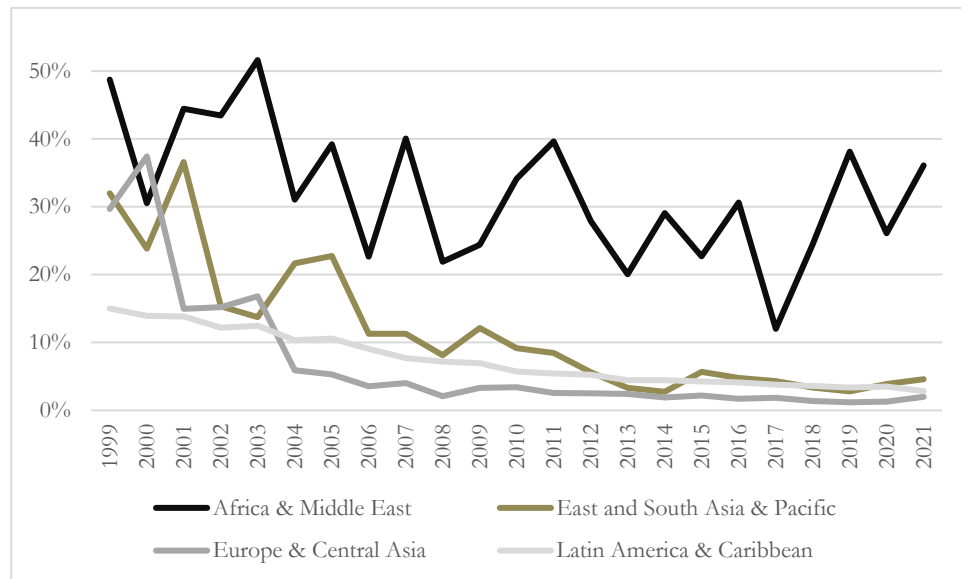
Dependent variable

The dependent variable is poverty. To address the two main dimensions of poverty, we use both a monetary measure and a multidimensional approach.

As a measure of monetary poverty, we choose the **Poverty Headcount Ratio** at \$2.15 a day (2017 PPP). Since it is the most conventional measure of poverty, its selection facilitates comparative analysis with other studies.

Regarding multidimensional poverty, we choose the **Multidimensional Poverty Measure (MPM)**, which allows us to ‘understand poverty beyond monetary deprivations (World Bank, 2024), also collected on the World Bank's website. This measure is based on the Multidimensional Poverty Index (MPI) but also includes monetary poverty below \$2.15 per day, ensuring consistency with monetary poverty. MPM data is only available since 2010; therefore, data for our multidimensional dependent variable is also limited to this period.

Figure 1 – Poverty Headcount Ratio (%) by geographic region, 1999-2021



Source: Own elaboration. Data from World Bank available at <https://data.worldbank.org/>. Accessed on March 13th, 2024.

First, we should recognise that the tendencies depicted in Figure 1 are affected by our unbalanced dataset.

In the early years of our analysis, the region with the lowest monetary poverty was Latin America & Caribbean. At the other pole were Africa & Middle East. Over the years, with the exception of this last region, all the others have seen a progressive decrease to below 5%. On the other hand, Africa & Middle East continues to have very high poverty rates and is, by far, the poorest of the four regions under study.

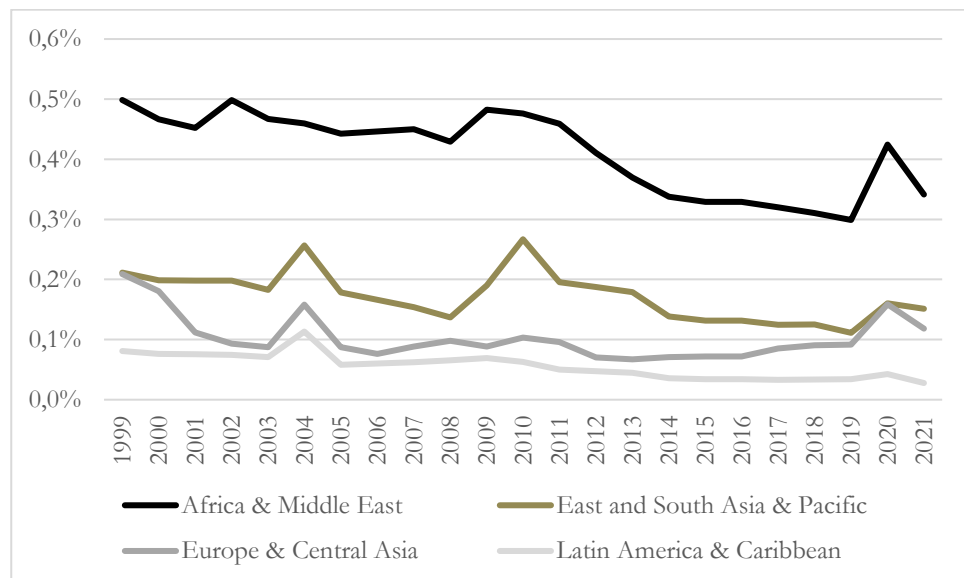
When it comes to multidimensional poverty, the results are very similar, with Africa & Middle East having an average of over 35%. Europe & Central Asia has the lowest average, at 3.78%, with the other two at around 6.7%. However, while East and South Asia & Pacific had an average of 15% in 2010, almost twice the Latin America & Caribbean score, the first has seen a very aggressive decline over the following years, while the second has seen a much softer decline.

Explanatory and control variables

We first describe the explanatory variables related to the financing of education in the countries under study, both through government and international funds, and then the control variables typically listed in the literature:

- **Aid to Education**, measured by Official Development Assistance *per capita* (ODA), more specifically total aid to education, corresponds to “direct aid to education plus 20 per cent of general budget support” (UNESCO, 2023). This data was collected by extracting the Aid Tables from the Global Education Monitoring Report. The literature does not focus on the effects of this specific type of aid on poverty, but more on its effects on educational outcomes, as mentioned in chapter 2.2 (e.g. Birchler & Michaelowa, 2016; Dreher et al., 2008; Michaelowa & Weber, 2006). There is also a large body of literature that uses total ODA to understand the dynamics of aid on poverty. The study by Alvi & Senbeta (2011) find strong evidence that, controlling for the effect of this increase in income and its distribution, foreign aid does reduce poverty. Recognising that growth promotes poverty reduction (Adams, 2003), Asiedu (2014), using aid for education, find that aid in primary education has a positive and significant effect on growth, with growth increasing when the share of aid in these early school years is bigger. However, we should not expect aid to cause disproportionate growth effects (Kraay & Raddatz, 2007). Despite the scarcity of literature, we expect that there will be a negative impact of aid to education on poverty.

Figure 2 – Aid to education (% GDP) by geographic region, 1999-2021



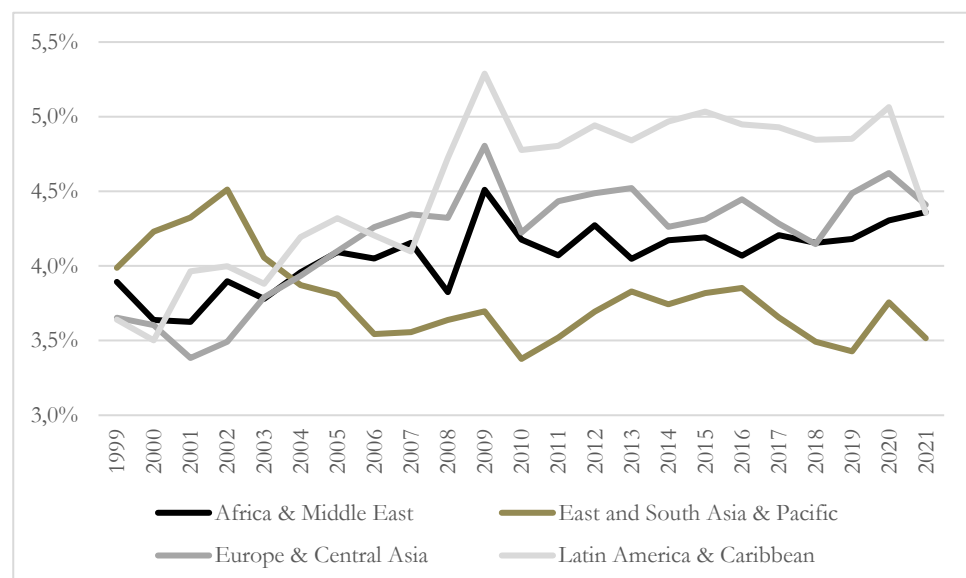
Source: Own elaboration. Data from UNESCO available at <https://www.unesco.org/gem-report/en/aid-tables>. Accessed on March 28th, 2024.

Figure 2 shows that African and Middle Eastern countries were the primary recipients of educational aid during the period under review. This is largely due to their significant need

for financing large investment projects (George 2021), their colonial history with European countries, and the numerous internal and external conflicts these regions have experienced, which have led to the destruction of many school facilities. In contrast, the Latin America & Caribbean region received the least educational aid throughout the analysed period.

- **Government expenditure on education**, expressed as a percentage of GDP. A low value in this indicator reveals a lack of prioritisation of the education sector in public spending and/or a heavy reliance of the private sector and family contributions to education (World Bank, 2024). When focused in developed countries, as in the study carried out in 17 European countries by Hidalgo-Hidalgo & Iturbe-Ormaetxe (2018), the national expenditure on primary education significantly contributes to lifting individuals out of poverty. As far as developing countries are concerned, it is difficult to find a long-term relationship between national expenditure on education and poverty alleviation (Ahmad & Batul, 2013), but the results of Jung & Thorbecke (2003) suggest that the higher the educational expenditure in the poorest households, the higher the income of the poor, highlighting the importance of supporting education, as well as those from Gupta et al (2002), described in chapter 2.4. Therefore, like foreign aid, we anticipate a negative relationship between government expenditure on education and poverty.

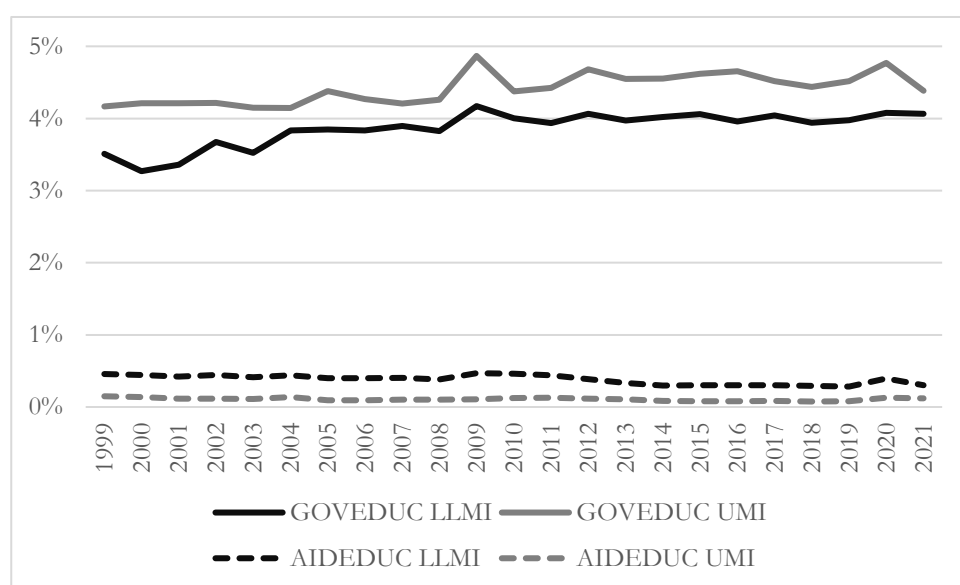
Figure 3 – Government expenditure on education (% GDP) by geographic region, 1999-2021



Source: Own elaboration. Data from World Bank available at <https://databank.worldbank.org/>. Accessed on March 28th, 2024.

By looking at Figure 3 we notice that Latin America & Caribbean, which spent the least on education in the first few years of the analysis, was the region that spent the most in almost all the years analysed, demonstrating a possible change of mindset. On the flipside, the region that brings together East and South Asia and the Pacific countries, which until 2003 was in first place in this indicator, has been reducing its spending on education since then and has been strongly overtaken by the other regions.

Figure 4 – Aid to education and Government expenditure on education (% GDP) by income level, 1999-2021



Source: Own elaboration. Data from UNESCO and World Bank available at <https://www.unesco.org/gem-report/en/aid-tables> and <https://databank.worldbank.org/>. Accessed on March 28th, 2024.

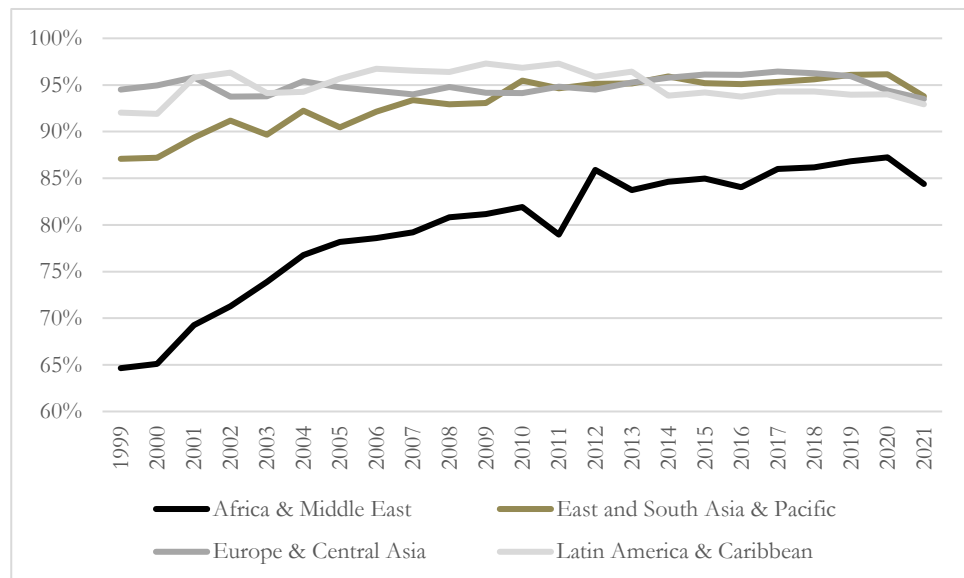
In terms of income level, aid to education (AIDEDUC) is higher in low and low-middle income countries (LLMI) and national expenditure on education (GOVEDUC) is higher in upper-middle countries (UMI).

Now we look at schooling rates, which are very important for monitoring the evolution of educational performance metrics and are fundamental in controlling the sector's financing outputs.

- **Primary, Low Secondary and Upper Secondary enrolment rates:** These are the three levels of education that correspond to all the education that is obtained before

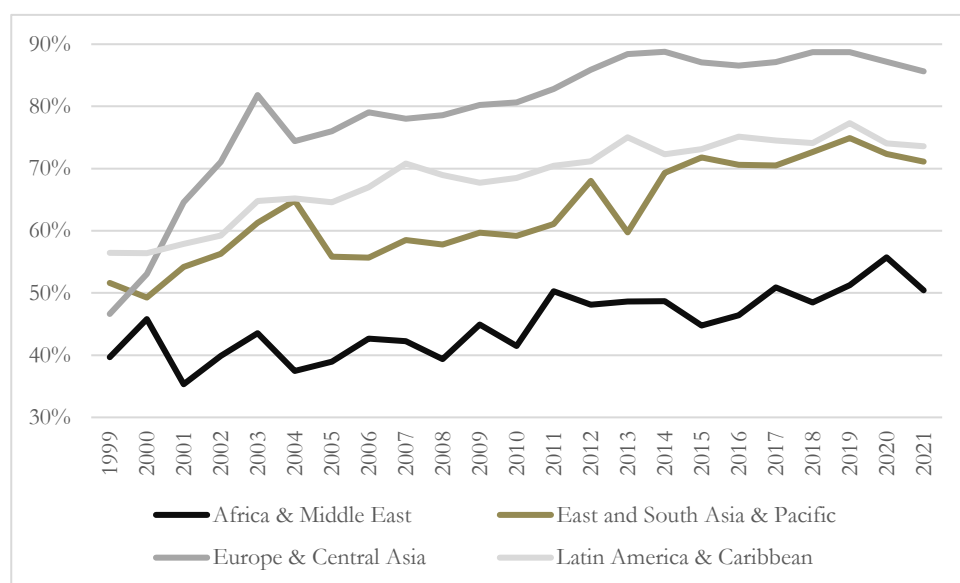
tertiary education. Primary school corresponds to the first stage of formal education, usually associated with ages between 6 and 11, which is currently compulsory in almost all countries in the world. Secondary education is the stage that follows, from the age of 11 or 12 until the age of 18 or 19, and can be subdivided into two distinct groups: lower secondary, commonly known as middle school, between the ages of 12 and 15, and upper secondary, commonly known as high school, which can be from the ages of 15 to 18 or 19, depending on the education system. Based on the literature (chapter 2.3), we expect these variables to be negatively related to poverty, especially the primary rate, which has the greatest effect (e.g. Song, 2012).

Figure 5 – Primary enrolment rate by geographic region, 1999-2021



Source: Own elaboration. Data from UNESCO available at <https://data.uis.unesco.org/>. Accessed on March 14th, 2024.

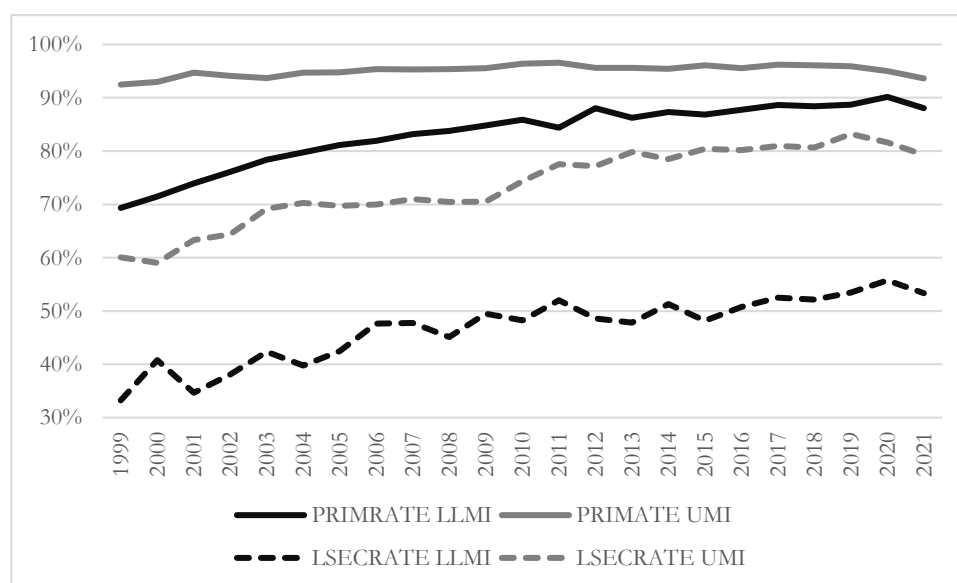
Figure 6 – Low-secondary enrolment rate by geographic region, 1999-2021



Source: Own elaboration. Data from UNESCO available at <https://data.uis.unesco.org>. Accessed on March 14th, 2024.

Figures 5 and 6 highlight the Africa & Middle East region as the most backward in terms of both primary and low-secondary schooling. While there is a balance between the other regions in the primary schooling rate, in the case of the low-secondary rate, Europe and Central Asia is well above the other regions, with a gap of more than 10 p.p since 2003.

Figure 7 – Primary and low-secondary enrolment rate by income level, 1999-2021



Source: Own elaboration. Data from UNESCO available at <https://data.uis.unesco.org/>. Accessed on March 14th, 2024.

With the help of Figure 7, we can see that there is a link between income and the level of schooling, with the poorest countries in our sample also being the countries with the lowest schooling rates. While we can see an approximation in the primary enrolment rate, the same does not happen for the low-secondary rate, where the LLMI countries are still very far from the UMI countries.

The following macroeconomic, demographic and institutional variables are used to control the impact of education funding on poverty:

- **GDP per capita (GDPPC):** The literature linking economic growth and poverty is vast and consensual: economic growth reduces poverty (e.g. Dollar & Kraay, 2001; Sala-i-Martin & Pinkovskiy, 2010), so an increase in GDPpc is expected to be negatively correlated with our poverty measures.
- **Gini index (GINI):** This indicator is used to measure income inequality between individuals or households in a country, ranging from 0 to 100, where 0 represents perfect equality and 100 represents perfect inequality (World Bank, 2024). Poverty and inequality are not the same, but poverty is a consequence of inequality (Lynch et al, 2020). For Beker (2020, p.173), “if income distribution becomes less equal with growth, poverty might not be declining or even worsen”. Increased inequality leads to more individuals or families being at the top of the richest and at the top of the poorest, increasing the probability of falling below the monetary poverty measure, so a positive relationship between the Gini index and poverty is to be expected.
- **Inflation rate (INFLATION):** Inflation is a factor that intensifies poverty, making the poorest even poorer (e.g. Easterly & Fischer, 2001). Inflation is therefore expected to be positively correlated with poverty.
- **Gross Capital Formation (GCF):** It consists of “outlays on additions to the fixed assets of the economy plus net changes in the level of inventories” (World Bank, 2024). Akobeng (2017), using a panel-data set of 41 Sub-Saharan African countries, concludes that the higher the GCF, the lower the poverty.
- **Fuels, Ores and Metals exports (FOM):** This indicator represents the percentage of exports of oil and mineral resources as a percentage of GDP, capturing the

dependence of developing countries on primary extractive activities typically non intensive in labour. A positive correlation is expected between this variable and the dependent one, due to empirical evidence that this dependency can have harmful effects on poverty (Pegg, 2003).

- **Trade (TRADE):** Trade liberalisation can lead to a reduction in inequalities by facilitating increased competition, removing excessive protection from the most privileged groups in the current context of developing countries, such as sub-Saharan Africa (Tupy, 2005), but at the same time these effects seem to affect the middle class more than the poor (Le Goff & Singh, 2014), so there is still uncertainty about its effectiveness in reducing poverty. Only with the right political context and combined with a range of policies that stimulate development (e.g. Bayar & Sezgin, 2017; Tsai & Huang, 2007) will this trade openness be able to emancipate the poorest (Le Goff & Singh 2014), so it is not possible to predict a sign for this variable coefficient.
- **Urban Population (URBANPOP):** For Liddle (2017), accelerated and excessive population growth in cities tends to make room for more poverty. On the other hand, Ravallion et al (2007) and Muggah (2012) indicate that although urbanisation can create more poverty in absolute terms, it is in rural areas that people are most at risk of poverty, while relocating to urban areas is an opportunity to escape these risks and reduce poverty. Therefore, the sign for the coefficient of urbanisation rate cannot be predicted.
- **Control of Corruption (CORRUPT):** This variable expresses the “perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as capture of the state by elites and private interests” (World Bank, 2024) and has a scale between -2.5, which corresponds to the maximum value of corruption and 2.5, the minimum value of corruption. Tebaldi & Mohan (2010) emphasise that corruption and political instability are risk factors for poverty. Mbaku (2014) warns that either African countries establish institutional frameworks that guarantee the rule of law, or poverty will continue to be widespread. Negin et al (2010) states that efforts to alleviate poverty need to be accompanied by strong measures to combat corruption. We therefore expect a negative relationship between the control of corruption and poverty.

Descriptive Statistics

In Table 1, the summary of descriptive statistics of the variables considered in our study are presented, as well as the data source. Table 2 our correlation matrix is included, used to evaluate the relationship between each pair of variables.

The results in Table 2 show that the correlation between AIDEDUC and the dependent variables HCR and MPI is positive and significant at 1%. As the correlation coefficient expresses a positive relationship, we can predict, at first sight, that aid to education does not reduce poverty in our sample.

On the other hand, the correlation between GOVEDUC and the poverty variables has coefficients with the a negative sign, and could indicate that public expenditure on education does alleviate poverty.

We can also see that almost all the correlation coefficients are low, with the distinct exception of enrolment rates and the MPI, with correlations above 0.6, GDPPC and the MPI, with a negative correlation of -0.65, and between the three enrolment rates, which is not problematic since only one will be used in each model.

Table 1 – Summary Statistics

Variable		Mean	Max	Min	Standard Deviation	Source
Dependent variables						
HCR	Poverty Headcount Ratio (% population)	13.554	88.545	0.000	18.740	World Bank
MPM	Multidimensional Poverty Measure (% population)	12.471	85.7	0.000	19.612	World Bank
Explanatory variables						
AIDEDUC	Development assistance to education by recipient per capita	0.253	2.921	0.000	0.387	Unesco
GOVEDUC	Government expenditure on education (% of GDP)	4.192	12.935	0.622	1.646	World Bank

PRIMRATE	Total net enrolment rate, primary (%)	88.401	100	9.327	13.930	Unesco
LSECRATE	Total net enrolment rate, lower secondary (%)	80.640	100	8.432	8.432	Unesco
UPSECRATE	Total net enrolment rate, upper secondary (%)	60.839	99.693	3.512	23.491	Unesco
Control variables						
GDPPC	GDP per capita (%)	7020.979	30710.52	452.484	5596.013	World Bank
GINI	Gini index	40.776	64.800	24	8.687	World Bank
INFLATION	Inflation rate	7.775	557.218	-8.975	557.218	World Bank
URBANPOP	Urban Population (% of total)	48.466	99.979	2.958	18.870	World Bank
GCF	Gross Capital Formation (% GDP)	24.509	70.335	-15.917	8.823	World Bank
FOM	Fuels, Ores and Metals exports (%GDP)	44.724	184.245	21.237	18.382	World Bank
TRADE	Trade (% of GDP)	74.244	34.342	5.832	37.322	World Bank
CORRUPT	Control of Corruption	-0.507	1.618	-1.597	0.530	World Bank

Table 2 - Correlation Matrix

	HCR	MPI	AIDEDUC	GOVEDUC	PRIMRATE	LSECRATE	UPSECRATE	GDPPC	GINI	INFLATION	GCF	FOM	TRADE	URBANPOP	CORRUPT
HCR	1.0000 ---														
MPM	0.7731*** (0.0000)	1.0000 ---													
AIDEDUC	0.3288*** (0.0000)	0.2616*** (0.0000)	1.0000 ---												
GOVEDUC	-0.2007*** (0.0000)	-0.1455** (0.0128)	0.0866*** (0.0006)	1.0000 ---											
PRIMRATE	-0.4135*** (0.0000)	-0.6193*** (0.0000)	-0.1435*** (0.0000)	0.1026*** (0.0007)	1.0000 ---										
LSECRATE	-0.5759*** (0.0000)	-0.7753*** (0.0000)	-0.1981*** (0.0000)	0.1887*** (0.0000)	0.7087*** (0.0000)	1.0000 ---									
UPSECRATE	-0.5065*** (0.0000)	-0.7655*** (0.0000)	-0.2092*** (0.0000)	0.2778*** (0.0000)	0.5251*** (0.0000)	0.7962*** (0.0000)	1.0000 ---								
GDPPC	-0.4946*** (0.0000)	-0.6512*** (0.0000)	-0.3694*** (0.0000)	0.1940*** (0.0000)	0.4426*** (0.0000)	0.5489*** (0.0000)	0.6432*** (0.0000)	1.0000 ---							
GINI	0.1349*** (0.0002)	0.1300** (0.0181)	-0.0683* (0.0535)	0.0652* (0.0985)	0.0509 (0.2321)	-0.0250 (0.5907)	-0.1674*** (0.0003)	-0.0336 (0.3442)	1.0000 ---						
INFLATION	0.0477 (0.1903)	0.1100** (0.0486)	-0.0575** (0.0109)	-0.0012 (0.9623)	0.0029 (0.9155)	0.0125 (0.6891)	0.0374 (0.2338)	-0.0564** (0.0130)	-0.0085 (0.8150)	1.0000 ---					
GCF	-0.1237*** (0.0007)	-0.0028 (0.9595)	0.0213 (0.3585)	0.1033*** (0.0001)	0.1514*** (0.0000)	0.0096 (0.7616)	0.0080 (0.8021)	0.1001*** (0.0000)	-0.2894*** (0.0000)	-0.0086 (0.7204)	1.0000 ---				
FOM	0.2125*** (0.0001)	0.0904 (0.2730)	-0.0321 (0.3513)	-0.0091* (0.0122)	-0.0377 (0.4183)	-0.0151 (0.7464)	-0.0135 (0.7726)	0.0466 (0.1771)	0.0052 (0.9257)	-0.0042 (0.9050)	0.0390 (0.2922)	1.0000 ---			
TRADE	-0.1512*** (0.0000)	-0.0175*** (0.0018)	0.0321 (0.1646)	0.2621*** (0.0000)	0.0491* (0.0766)	0.1644*** (0.0000)	0.1460*** (0.0000)	0.1684*** (0.0000)	-0.3010*** (0.0000)	0.0134 (0.5712)	0.1747*** (0.0000)	-0.0363 (0.3219)	1.0000 ---		
URBANPOP	-0.5022*** (0.0000)	-0.5809*** (0.0000)	-0.2515*** (0.0000)	0.2165*** (0.0000)	0.2394*** (0.0000)	0.4349*** (0.0000)	0.5269*** (0.0000)	0.5942*** (0.0000)	0.2661*** (0.0000)	-0.0103 (0.6499)	-0.0691** (0.0229)	0.0916*** (0.0078)	0.1467*** (0.0000)	1.0000 ---	
CORRUPT	-0.1304*** (0.0004)	-0.2217*** (0.0000)	0.1602*** (0.0000)	0.3650*** (0.0000)	0.0902*** (0.0012)	0.1271*** (0.0001)	0.2418*** (0.0000)	0.3331*** (0.0000)	0.2196*** (0.0000)	-0.1126*** (0.0000)	0.1931*** (0.0000)	-0.0212 (0.5535)	0.1670*** (0.0000)	0.2368*** (0.0000)	1.0000 ---

Notes: p-value in parenthesis; 1% (***), 5% (**) and 10% (*).

4. Does the type of education funding impact poverty?

In this section, we present and discuss the main results of the estimation of the model presented in section 3.1, to understand the role of education funding in poverty reduction.

4.1 Pre-tests Results

The Hausman test is a statistical test applied in panel data analysis to determine whether a fixed effects or random effects model is appropriate. It tests the null hypothesis that the preferred model is random effects, based on the assumption that the unique errors are not correlated with the regressors. If the test rejects this hypothesis, it suggests that the fixed effects model is more suitable, as it accounts for possible correlations and provides consistent estimates (Greene, 2012). This decision is crucial for ensuring accurate and reliable results in econometric studies.

The results obtained on Table 3 show that the Hausman test rejects the null hypothesis of no correlation between the effects and the regressors, implying that fixed effects are the appropriate choice for our estimation.

Table 3 – Diagnostic Tests

	Model 1	Model 2	Model 3	Model 4
Hausman	3.37**	13.03***	3.37**	17.76*
Test	(0.0318)	(0.0046)	(0.0355)	(0.0591)

Notes: p-value in parenthesis; 1% (***), 5% (**) and 10% (*).

4.2 Full Sample

Our depending variable is poverty, either measured in monetary (HCR) or multidimensional terms (MPM). For both, we define four different models. The first three only consider LSECRATE and GDPPC as control variables, while model IV considers an extended number of control variables.

Table 4 reveals an unexpected and significant finding: aid to education (AIDEDUC) is positively correlated with poverty, indicating that increased aid to education is associated with a higher number of individuals below the poverty line. This relationship is consistent across the four models where AIDEDUC is included, with the most significant impact observed in Model III, in which a 1 percentage point increase in aid to education is associated

with a 14.5 percentage points increase in the poverty rate. These findings are both critical and concerning, as they suggest that AIDEDUC might be contributing to an increase in poverty rather than alleviating it.

Table 4 – Impact of education funding on monetary poverty (HCR) – full sample (1999-2021) – Panel Data Model with period fixed effects

Dependent Variable: HCR				
	Model I	Model II	Model III	Model IV
AIDEDUC	4.9147** (0.0126)	-----	14.4977*** (0.0009)	13.2398** (0.0350)
GOVEDUC		-1.5116*** (0.0001)	-1.4775*** (0.0002)	-1.2587*** (0.0024)
LSECRATE	-0.2343*** (0.0000)	-0.2346*** (0.0000)	-0.2466*** (0.0000)	-0.0680** (0.0265)
GDPPC	-0.0007*** (0.0000)	-0.0007*** (0.0000)	-0.0007*** (0.0000)	-0.0004*** (0.0025)
GINI	-----			0.3022*** (0.0035)
INFLATION	-----			0.0935*** (0.0025)
GCF	-----			-0.2885*** (0.0000)
FOM	-----			-0.0186 (0.5123)
TRADE	-----			-0.0425* (0.0663)
URBANPOP	-----			-0.1144 (0.5290)
CORRUPT	-----			-1.0998 (0.4574)
CONSTANT	38.1370*** (0.0000)	43.5862*** (0.0000)	42.6597*** (0.0000)	28.3679** (0.0193)
R-squared	0.2854	0.3303	0.3528	0.6826
F-statistic	51.7893	53.0972	43.8896	21.8931
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000
Observations	464	390	390	162
Number of countries	72	64	64	39

Notes: p-value in parenthesis; 1% (***), 5% (**) and 10% (*).

On the other hand, GOVEDUC has a negative and significant relationship with our dependent variable in all the models in which it was considered, suggesting that government spending on education has been able to reduce monetary poverty in the sample analysed, supporting more the results of Jung & Thorbecke (2003) than the ones from Ahmad & Batul (2013).

Regarding the schooling rates, we chose to present the low secondary rate, as this was the one for which we obtained the most significant results, with the results for the primary and upper secondary rates available in Appendices 2 and 3. In all the models, an increase in the low secondary rate (LSECRATE) leads to a decrease in poverty. The combination of these last two results reinforces the need for government investment in human capital in order to improve the conditions of the poorest.

The findings related to income per capita are consistent with existing literature, such as Dollar & Kraay (2001), showing an inverse relationship between GDP per capita and poverty. Similarly, the results for inequality (GINI) and inflation are significant and align with expectations, revealing a positive correlation with poverty—indicating that higher inequality and inflation exacerbate monetary poverty. Additionally, the results for gross capital formation (GCF) are significant and support the findings of Akobeng (2017), showing that increased investment in fixed assets is associated with reduced poverty. Openness to trade (TRADE) also demonstrates a negative relationship with monetary poverty, suggesting that trade liberalisation may contribute to poverty reduction.

Table 5 shows the estimation results using multidimensional poverty (MPM) as the dependent variable. It is important to note that the sample size and number of countries in this analysis are smaller, reflecting the limited availability of MPM data, which only became widely accessible from 2010 onwards. This limitation is due to the complex nature of MPM calculations, which restricts data availability for certain developing countries.

Table 5 – Impact of education funding on multidimensional poverty (MPM) – full sample (1999-2021) – Panel Data Model with period fixed effects

	Dependent Variable: MPM			
	Model I	Model II	Model III	Model IV
AIDEDUC	-0.6721 (0.7976)	-----	0.9450 (0.7166)	18.3775** (0.0380)
GOVEDUC		-0.8628*** (0.0075)	-0.8552*** (0.0084)	-0.8957** (0.0262)
LSECRATE	0.1898*** (0.0001)	0.1532*** (0.0012)	0.1517*** (0.0014)	0.0948 (0.1521)
GDPPC	-0.0004*** (0.0000)	-0.0004*** (0.0000)	-0.0004*** (0.0000)	0.0001 (0.5436)
GINI	-----			-0.0899 (0.5091)
INFLATION	-----			0.02528 (0.5575)
GCF	-----			0.1250 (0.1876)

FOM	-----			0.0465 (0.1047)
TRADE	-----			0.0109 (0.6351)
URBANPOP	-----			-0.6271** (0.0296)
CORRUPT	-----			-3.2595** (0.0311)
CONSTANT	-0.4966 (0.9069)	5.6857 (0.2312)	5.6480 (0.2357)	38.7151** (0.0286)
R-squared	0.2500	0.2687	0.2693	0.5645
F-statistic	18.2219	18.6124	13.9128	6.2452
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000
Observations	225	209	209	93
Number of countries	58	54	54	29

Notes: p-value in parenthesis; 1% (***), 5% (**) and 10% (*).

In contrast to the results for monetary poverty, aid to education (AIDEDUC) generally loses significance when explaining multidimensional poverty. It is only significant in Model IV, where it retains a positive correlation with poverty, similar to the findings in Table 4. On the other hand, government expenditure on education (GOVEDUC) remains significant across all models and is negatively correlated with multidimensional poverty (MPM), reinforcing the conclusion that government spending on education plays a critical role in reducing poverty across multiple dimensions.

We shall note that the lower secondary enrolment rate (LSECRATE) has, when explaining multidimensional poverty (MPI), a positive and a significant impact in models I, II and III, in opposite to the results obtained in the models that consider monetary poverty (HCR) as dependent variable, which may indicate that an increase in the post-primary schooling rate can create monetary gains, but does not have the capacity to structurally change the quality of life of individuals and families.

With regard to the control variables, the results are not significant, with the exception of income (GDPPC) in models I, II and III, with an expected negative relationship with multidimensional poverty, urbanisation rate (URBANPOP), which once again suggests that urbanisation contributes to a reduction in poverty, and control of corruption (CORRUPT), which, in line with Negin et al (2010), reveals a negative relationship between this indicator and poverty, with the higher the corruption, the deeper the multidimensional poverty.

4.3 Sub-Samples: Regional and Income Groups

However, the datasets for a large number of countries in cross-countries data, especially if we are analysing developing countries, are not always trustworthy. Therefore, we should not treat all the countries in the same way (Maddala, 1999). So, we now divide our sample by geographic regions and per capita income, respectively, to find possible relevant divergences. Different regions can have different context-specific factors and different policy effectiveness, and the challenges of low-income countries may not be exactly the same as those of middle-income countries. In this way, we avoid the so-called aggregation bias (Maddala, 1999).

The estimation of the results by geographic region can be found in Appendices 4 and 5 and are summarized in Table 6. It should be noted that since our database is unbalanced, model IV for the Africa & Middle East and East and South Asia & Pacific regions did not have enough observations and were omitted from this table.

When the results are broken down by geographic region, we note that the AIDEDUC variable appears to be negatively correlated with poverty in few cases: models I and III for Europe & Central Asia (ECA), which take the MPM into account; in model IV for Latin America & Caribbean, which takes the HCR into account; and in model III for Africa & Middle East, which takes the MPM into account. Therefore, we estimate that aid to education acts as reducing poverty when considering poverty as a multidimensional phenomenon and for few geographic areas, such as Europe & Central Asia and Africa & Middle East. The effect of aid to education on monetary poverty is less evident and only observed on Latin America & Caribbean. Nevertheless, it should be noted that these results are not found in the poorest regions of the sample, highlighting the difficulty of aid to education in counteracting the mass poverty experienced in Africa and the Middle East.

GOVEDUC maintains the result obtained in the regressions for the global sample, indicating that in all regions national spending in education lifts people out of poverty, both at the monetary and multidimensional level. The coefficients obtained in the reduction of multidimensional poverty are particularly massive in Africa & Middle East, a relevant result that could encourage political decision-makers to invest heavily on human capital formation in order to overcome their poverty challenges.

LSECRATE also maintains the pattern of the results observed in Tables 4 and 5, with a negative relationship with monetary poverty and a positive relationship with monetary

poverty. The income control variable, GDPPC, again corroborates with high significance what was expected from the literature.

Table 6 – Impact of education funding on headcount ratio (HCR) and multidimensional poverty (MPI) by region (1999-2021): sum up

		Europe & Central Asia				Latin America & Caribbean				Africa & Middle East			East and South Asia & Pacific		
		I	II	III	IV	I	II	III	IV	I	II	III	I	II	III
AIDEDUC	HCR	ns		ns	ns	+		+	-	ns		ns	ns		ns
	MPI	-		-	ns	+		+	+	ns		-	ns		+
GOVEDUC	HCR		ns	ns	-		-	-	ns		ns	ns		-	-
	MPI		ns	ns	ns		-	ns	ns		-	-		-	-
LSECRATE	HCR	-	-	-	ns	-	-	-	-	ns	ns	ns	-	-	-
	MPI	+	+	+	ns	+	+	ns	ns	ns	ns	ns	ns	ns	ns
GDPPC	HCR	-	-	-	-	-	-	-	-	ns	ns	ns	-	-	-
	MPI	-	-	-	ns	-	-	-	ns	-	-	-	-	-	-
GINI	HCR				+				+						
	MPI				ns				+						
INFLATION	HCR				ns				+						
	MPI				+				-						
GCF	HCR				-				ns						
	MPI				ns				+						
FOM	HCR				ns				ns						
	MPI				ns				ns						
TRADE	HCR				ns				-						
	MPI				ns				ns						
URBANPOP	HCR				ns				+						
	MPI				-				ns						
CORRUPT	HCR				ns				ns						
	MPI				-				ns						
Observations	HCR	140	124	124	60	187	160	160	70	79	54	54	58	52	52
	MPI	59	56	56	29	103	97	97	47	36	32	32	27	24	24
Number of countries	HCR	11	10	10	9	15	14	14	11	33	29	29	13	11	11
	MPI	10	9	9	6	13	13	13	9	23	22	22	12	10	10

Notes: n.s. = non-significant; '+' = positive coefficient; '-' = negative coefficient

When decomposing our results by income group (Appendices 6 and 7, summarized in Table 7), we observe that there are no significant differences between the results by income group and the results for the global sample. AIDEDUC, when significant, continues to be positively related to poverty, while GOVEDUC remains with a negative sign. LSECRATE once again diverges in sign between the independent variables HCR and MPI. The only difference to highlight is TRADE, which has a positive coefficient in the lowest income group.

Table 7 – Impact of education funding on headcount ratio (HCR) and multidimensional poverty (MPI) by income group (1999-2021): sum up

		Low and Low-middle				Upper-middle			
		I	II	III	IV	I	II	III	IV
AIDEDUC	HCR	ns		+	ns	ns		+	ns
	MPI	ns		ns	ns	ns		ns	ns
GOVEDUC	HCR		ns	-	ns		-	-	-
	MPI		ns	ns	ns		-	-	ns
LSECRATE	HCR	-	-	-	-	-	-	-	-
	MPI	ns	ns	ns	ns	+	+	+	ns
GDPPC	HCR	-	-	-	ns	-	-	-	-
	MPI	-	-	-	ns	-	-	-	ns
GINI	HCR				-				+
	MPI				ns				ns
INFLATION	HCR				ns				+
	MPI				ns				+
GCF	HCR				ns				-
	MPI				ns				ns
FOM	HCR				ns				ns
	MPI				ns				ns
TRADE	HCR				+				-
	MPI				ns				ns
URBANPOP	HCR				ns				ns
	MPI				ns				ns
CORRUPT	HCR				-				ns
	MPI				ns				ns
Observations	HCR	140	105	105	47	324	285	285	115
	MPI	70	62	62	31	155	147	147	62
Number of Countries	HCR	40	35	35	17	32	29	29	22
	MPI	29	27	27	14	27	27	27	15

Notes: n.s. = non-significant; '+' = positive coefficient; '-' = negative coefficient.

4.4 Robustness Analysis

In order to validate the results obtained above, specifically for the full sample, it is prudent to apply a robustness test to the AIDEDUC variable and the chosen education variable: LSECRATE. For AIDEDUC, we followed Collier & Dollar (2021), who introduced the quadratic aid function to test for non-linear effects of aid on poverty. With regard to LSECRATE, the use of the PRIMRATE and USECRATE variables, available in Appendices

2 and 3, is sufficient, with results for the explanatory variables very similar to those of LSECRATE.

Table 8 – Robustness analysis: Non-linear effects – full sample (1999-2021)

	HCR			MPM		
	I	III	IV	I	III	IV
AIDEDUC	17.7413*** (0.0001)	23.4903*** (0.0001)	-46.2105*** (0.0006)	0.7109 (0.8851)	4.0793 (0.4308)	2.5822 (0.9292)
AIDEDUC²	-6.3650*** (0.0019)	-6.2761** (0.0322)	163.9166*** (0.0000)	-0.5370 (0.7396)	-1.4445 (0.4833)	54.4154 (0.5695)
GOVEDUC		-1.3803*** (0.0004)	-1.3893*** (0.0003)		-0.8160** (0.0132)	-0.9242** (0.0242)
LSECRATE	-0.2396*** (0.0000)	-0.2531*** (0.0000)	-0.0588** (0.0344)	0.1860*** (0.0002)	0.1454*** (0.0027)	0.1015 (0.1341)
GDPPC	-0.0007*** (0.0000)	-0.0007*** (0.0000)	-0.0004*** (0.0008)	-0.0004*** (0.0000)	-0.0004*** (0.0000)	0.0001 (0.6627)
GINI			0.3599*** (0.0002)			-0.0480 (0.7573)
INFLATION			0.0826*** (0.0033)			0.2381 (0.5835)
GCF			-0.2321*** (0.0001)			0.1208 (0.2067)
FOM			-0.0405 (0.1212)			0.0418 (0.1628)
TRADE			-0.0277 (0.1896)			0.0107 (0.6435)
URBANPOP			-0.0520 (0.7527)			-0.6081** (0.0372)
CORRUPT			0.1193 (0.9301)			-2.9758* (0.0632)
CONSTANT	37.3959*** (0.0000)	42.3772*** (0.0000)	23.4123** (0.0334)	-0.2825 (0.9477)	5.7590 (0.2277)	36.8103** (0.0417)
R-squared	0.3030	0.3620	0.7417	0.2505	0.2717	0.5672
F-statistic	42.1773	36.4328	26.5652	13.6201	11.1918	5.6795
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	464	390	162	225	209	93

Notes: p-value in parenthesis; 1% (***), 5% (**) and 10% (*).

When considering monetary poverty (HCR), models I and III, models with a restricted number of control variables, AIDEDUC has a positive first-order effect and a negative second-order effect, suggesting that although an initial increase in aid can have negative effects on poverty, beyond a certain point, the increase in aid begins to contribute significantly to poverty reduction. However, in model IV the results tell us something different. For very low values of poverty, aid can help reduce poverty, but this robustness test reinforces that AIDEDUC contributes to an increase in monetary poverty.

No significant results were obtained for the multidimensional poverty (MPM), holding up the idea that foreign aid for education has no influence on multidimensional poverty reduction.

4.5 Discussion of results

Following our research we will discuss these results according to dependent variable.

Monetary poverty

Aid to education shows a positive and significant relationship with poverty across our estimations, implying that an increase in aid to education is associated with an increase in the poverty rate. Although the literature has shown distinct results when relating aid to education and educational results (Birchler & Michaelowa, 2016; Dreher et al., 2008; Michaelowa & Weber, 2006; Michaelowa & Weber, 2007) or aid to education and growth (Adams, 2003; Asiedu, 2014) and even when relating aggregate foreign aid to monetary poverty (Alvi & Senbeta, 2011), our results imply that this aid to education is having the opposite effect to that intended, even when controlling for other variables with impact in the dynamics of poverty and development of developing countries. This result is particularly important for the literature as it is the first to disaggregate foreign aid in education and relate it to poverty. Even the robustness test carried out showed only after a high amount of aid to education, aid is no longer positively related to monetary poverty.

This result can be explained by the factors highlighted in Chapter 2, which states that aid alone cannot achieve effective results:

- 1) **Dependency**, when project-aid, not aligned with a broader national strategy, can undermine the recipient country's ownership and long-term development goals, perpetuating dependency, where countries become reliant on external assistance for their development needs rather than building self-sufficiency (Manning, 2008);
- 2) **Poor monitoring and fungibility**, as Riddell (2007) pointed out with the inadequate monitoring and evaluation mechanisms often result in a lack of accountability and reduced impact of aid. This problem is compounded by the fungibility of aid, where resources intended for specific projects are redirected to other uses by the recipient government;

- 3) **The supremacy of project aid over budget support**, emphasizing the flexibility and alignment of the budget support over the inefficiencies that may be caused by project aid (Pritchett & Woolcock. 2004).

On the other hand, considering government expenditure in education, our results that are in line with those of Gupta et al (2002), with a negative relationship with monetary poverty, when significant, in the global sample used, which contrasts with the investment made by external donors, with bigger constraints, where the recipient countries have less decision-making power in its implementation.

Multidimensional poverty

As multidimensional poverty is a relatively recent concept, there is still not enough data to obtain meaningful results for relationships involving this variable.

The impact of foreign aid for education in multidimensional poverty was not significant in most of the regressions carried out, indicating that this aid has no influence on multidimensional poverty. In the results obtained for the different regions analysed, we obtained some significant results with a negative relationship between aid to education and MPM in the Europe & Central Asia and Africa & Middle East regions, as opposed to positive relationships in the Latin America & Caribbean and East and South Asia & Pacific regions.

The results for the government expenditure to education variable are identical to those obtained for the previous poverty variable, with a negative relationship for all significant results. This is an important result for the literature, reinforcing the idea (e.g. Gupta et al, 2002) that a significant contribution from a state budget in the education sector can reduce poverty and serve as a social lift for the most vulnerable people.

5. Conclusions

This dissertation set out to explore the role of education funding in poverty reduction in developing countries, with a particular focus on distinguishing the impacts of national government expenditure versus foreign aid directed toward education. The work is carried out with a sample of 90 countries over the period 1999-2001. After a theoretical review of main concepts inherent to the research, we explored the literature that relates aid, education and poverty. We then collected data on 90 developing countries over the period 1999-2001 and explore through econometric estimations the impact of aid to education on poverty alleviation.

One of the key findings of this research is the consistent and significant role of national government expenditure in reducing poverty. Across various model's specifications, the results indicate that increased public spending on education reduces both monetary and multidimensional poverty. This underscores the importance of sustained and well-directed government investment in education as a critical component of poverty alleviation strategies. By enhancing access to quality education, governments can empower individuals with the skills and knowledge necessary to improve their economic circumstances, thereby contributing to a broader socio-economic development.

Conversely, the impact of foreign aid to education on poverty presents a more nuanced and, at times, contradictory picture. The analysis reveals that foreign aid to education does not uniformly translate into poverty reduction. In some cases, the relationship between foreign aid and poverty is positive, suggesting that higher levels of aid may be associated with increased poverty levels. This counterintuitive finding may be attributed to several factors. First, the effectiveness of foreign aid is often contingent upon the recipient country's governance structures, policy environment, and implementation capacity. Without strong institutions and effective management, foreign aid may fail to reach its intended beneficiaries or may be used inefficiently, thus failing to contribute meaningfully to poverty reduction. Moreover, foreign aid can sometimes lead to dependency, where recipient countries rely on external assistance rather than developing their own sustainable economic and social systems. This dependency can undermine local governance and reduce the accountability of governments to their citizens, thereby exacerbating existing inequalities and perpetuating poverty. Additionally, foreign aid may be subject to political and strategic interests that do

not align with the actual needs of the recipient countries, further diminishing its potential impact on poverty alleviation.

The mixed results regarding foreign aid underscore the need for a more critical and contextualized approach to aid effectiveness. Rather than viewing aid as a one-size-fits-all solution, it is crucial to recognise the diversity of conditions across developing countries and tailor aid interventions accordingly. This includes fostering greater collaboration between donors and recipient governments to ensure that aid is aligned with national development priorities and is implemented in a way that strengthens, rather than weakens, local institutions.

The main contribution of this dissertation was to fill a gap in the literature regarding the relationship between specific funding for the education sector and poverty reduction by using disaggregated expenditure and foreign aid data for education, rather than using total foreign aid or just examining the impact of this funding on educational outcomes.

For future research, we suggest using another methodology, such as two-stage least squares (2SLS) and, if possible, using a sample with a larger period for the multidimensional poverty. A different topic for future research is to understand precisely why foreign aid in education has not achieved the desired results during its enforcement, and to identify which factors have led to the undesired lack of success.

References

- Adams, R. H. (2003). Economic growth, inequality, and poverty : findings from a new data set. *World Bank Policy Research Working Paper Series*, 2972.
- Agénor, P. R., Bayraktar, N., & El Aynaoui, K. (2008). Roads out of poverty? Assessing the links between aid, public investment, growth, and poverty reduction. *Journal of Development Economics*, 86(2), 277-295. <https://doi.org/10.1016/j.jdeveco.2007.07.001>
- Ahmad, Z., & Batul, T. (2013). Relationship among poverty, education expenditure, and education status: empirical evidence from Pakistan. *Proceedings of the World Congress on Engineering*, 1, 3-5.
- Akobeng, E. (2017). Gross capital formation, institutions and poverty in Sub-Saharan Africa. *Journal of Economic Policy Reform*, 20(2), 136-164.
- Alvi, E., & Senbeta, A. (2012). Does foreign aid reduce poverty?. *Journal of International Development*, 24(8), 955-976.
- Asadullah, M. N., & Savoia, A. (2018). Poverty reduction during 1990–2013: Did millennium development goals adoption and state capacity matter? *World Development*, 105, 70-82. <https://doi.org/10.1016/j.worlddev.2017.12.010>
- Asiedu, E. (2014). Does foreign aid in education promote economic growth? Evidence from Sub-Saharan Africa. *Journal of African Development*, 16(1), 37-59.
- Bayar, Y., & Sezgin, H. F. (2017). Trade openness, inequality and poverty in Latin American countries. *Ekonomika*, 96(1), 47-57.
- Beker, V. A. (2020). Poverty and income inequality: a complex relationship. *Real-world economics review*, 29(92), 167-185.
- Bellani, L., & Bia, M. (2019). The long-run effect of childhood poverty and the mediating role of education. *Journal of the Royal Statistical Society. Series A: Statistics in Society*, 182(1), 37-68. <https://doi.org/10.1111/rssa.12388>
- Birchler, K., & Michaelowa, K. (2016). Making aid work for education in developing countries: An analysis of aid effectiveness for primary education coverage and quality. *International Journal of Educational Development*, 48, 37-52. <https://doi.org/10.1016/j.ijedudev.2015.11.008>

Brown, A., Foster, M., Norton, A., & Naschold, F. (2001). The Status of Sector Wide Approaches. [http://lst-iiiep.iiiep-unesco.org/cgi-bin/wwwi32.exe/\[in=epidoc1.in\]/?t2000=024091/\(100\)](http://lst-iiiep.iiiep-unesco.org/cgi-bin/wwwi32.exe/[in=epidoc1.in]/?t2000=024091/(100)).

Collier, P., & Dollar, D. (2001), “Can the world cut poverty in half? How policy reform and effective aid can meet international development goals”, *World Development*, Vol. 29, No. 11, pp. 1787-1802.

Cordella, T., & Dell'Ariccia, G. (2007). Budget Support Versus Project Aid: A Theoretical Appraisal. *The Economic Journal*, 117(523), 1260-1279. <https://doi.org/10.1111/j.1468-0297.2007.02082.x>

Dollar, D., & Kray, A. (2001). *Trade, Growth, and Poverty*. *World Bank Policy Res. Working Paper*:(2615).

Dreher, A., Nunnenkamp, P., & Thiele, R. (2008). Does Aid for Education Educate Children? Evidence from Panel Data. *The World Bank Economic Review*, 22(2), 291–314. <https://www.jstor.org/stable/40282275>

Duflo, E. (2012). Women empowerment and economic development. *Journal of Economic Literature*, 50(4), 1051-1079. <https://doi.org/10.1257/jel.50.4.1051>

Easterly, W., & Fischer, S. (2001). Inflation and the Poor. *Journal of money, credit and banking*, 160-178.

European External Action. (n.d.). *EU external action: The EU's work in the world*. https://www.eeas.europa.eu/node/2982_en

Foster, M., Brown, A., & Conway, T. (2000). Sector-wide approaches for health development: a review of experience. *World Health Organization*.

George, S. (2021). The Role Of Foreign Aid In The Development Of Sub-Saharan Africa. *Public Policy in Africa Initiative*.

Glewwe, P. (1999). The Economics of School Quality Investments in Developing Countries: An Empirical Study of Ghana. *New York: St. Martin's Press*.

Glewwe, P., & Kremer, M. (2006). Schools, Teachers, and Education Outcomes in Developing Countries. *Handbook of the Economics of Education*, 2, 945-1017.

Greene, W. H. (2012). *Econometric analysis (7th ed.)*. Pearson. Harlow: Pearson.

Gupta, S., Verhoeven, M., & Tiongson, E. R. (2002). The effectiveness of government spending on education and health care in developing and transition economies. *European Journal of Political Economy*, 18(4), 717-737. [https://doi.org/10.1016/S0176-2680\(02\)00116-7](https://doi.org/10.1016/S0176-2680(02)00116-7)

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

Hofmarcher, T. (2021). The effect of education on poverty: A European perspective. *Economics of Education Review*, 83, Article 102124. <https://doi.org/10.1016/j.econedurev.2021.102124>

Jung, H. S., & Thorbecke, E. (2003). The impact of public education expenditure on human capital, growth, and poverty in Tanzania and Zambia: a general equilibrium approach. *Journal of Policy Modeling*, 25(8), 701-725.

Kabir, M. A. (2020). Foreign Aid Effectiveness: Evidence from Panel Data Analysis. *Global Journal of Emerging Market Economies*, 12(3), 283-302. <https://doi.org/10.1177/0974910120961570>

Kenny, C. (2008). What is effective aid? How would donors allocate it? *The European Journal of Development Research*, 20(2), 330-346. <https://doi.org/10.1080/09578810802078704>

Le Goff, M., & Singh, R. J. (2014). Does trade reduce poverty? A view from Africa. *Journal of African Trade*, 1(1), 5-14.

Liddle, B. (2017). Urbanization and inequality/poverty. *Urban Science*, 1(4), 35.

Lynch, K., Baker, J., & Cantillon, S. (2000). The relationship between poverty and inequality. *Combat Poverty Agency and the Equality Authority*.

Londono, J. (1996) Poverty, inequality, and human capital development in Latin America, 1950-2025. <https://doi.org/10.1596/0-8213-3630-4>

Maddala, G. S., & Wu, S. (1999). A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and statistics*, 61(S1), 631-652.

Mahembe, E., & Mbaya Odhiambo, N. (2019). Foreign aid, poverty and economic growth in developing countries: A dynamic panel data causality analysis. *Cogent Economics and Finance*, 7(1), Article 1626321. <https://doi.org/10.1080/23322039.2019.1626321>

Manning, R. (2008). *The DAC as a central actor in development policy issues: Experiences over the past four years* (Vol. 7, p. 17). DEU.

Mbaku, J. M. (2014). The rule of law and poverty eradication in Africa. *African and Asian Studies*, 13(4), 530-557.

Michaelowa, K., & Weber, A. (2006). Aid Effectiveness in the Education Sector: A Dynamic Panel Analysis. In S. Lahiri (Ed.), *Theory and Practice of Foreign Aid* (Vol. 1, pp. 357-385). Emerald Group Publishing Limited. [https://doi.org/10.1016/S1574-8715\(06\)01018-9](https://doi.org/10.1016/S1574-8715(06)01018-9)

Michaelowa, K., & Weber, A. (2007). Aid Effectiveness in Primary, Secondary and Tertiary Education (pp. 357-386). In S. Lahiri (Ed.), *Theory and Practice of Foreign Aid*. Elsevier. [https://doi.org/10.1016/S1574-8715\(06\)01018-9](https://doi.org/10.1016/S1574-8715(06)01018-9)

Muggah, R. (2012). Researching the urban dilemma: Urbanization, poverty and violence. *International Development Research Centre*.

Negin, V., Abd Rashid, Z., & Nikopour, H. (2010). The causal relationship between corruption and poverty: A panel data analysis. MPRA Papers, 24871. Munich Personal RePEc Archive.

OECD (2024). Detailed aid statistics: Official bilateral commitments by sector. *OECD International Development Statistics* (database), <https://doi.org/10.1787/data-00073-en> (accessed on 16 May 2024).

OECD (2016). Educational expenditure. in OECD Factbook 2015-2016: *Economic, Environmental and Social Statistics*. OECD Publishing.

OECD (2012). Evaluating Budget Support, Methodological Approach. *DAC Network on Development Evaluation*. OECD Publishing.

One (2024). Official Development Assistance (ODA). <https://data.one.org/topics/official-development-assistance/>

Pegg, S. (2003). Poverty reduction or poverty exacerbation. *World Bank Group support for extractive industries in Africa*.

Pritchett, L., & Woolcock, M. (2004). *Solutions when the solution is the problem: Arraying the disarray in development*. *World Development*, 32(2), 191-206

Ratcliffe, M., & Macrae, M. (1999) Sector Wide Approaches to Education - A

Strategic Analysis. UK: *Education Research Series*, 32, DFID

Ravallion, M., Chen, S., & Sangraula, P. (2007). New evidence on the urbanization of global poverty. *Population and development review*, 33(4), 667-701.

D'Aiglepierre R., & Wagner, L. (2013). Aid and Universal Primary Education. *Economics of Education Review*, 37(C), 95-112.
<https://EconPapers.repec.org/RePEc:eee:ecoedu:v:37:y:2013:i:c:p:95-112>

Riddell, R. C. (2007). *Does foreign aid really work?* Oxford University Press.

Riddell, A., & Niño-Zarazúa, M. (2016). The effectiveness of foreign aid to education: What can be learned? *International Journal of Educational Development*, 48, 23-36.
<https://doi.org/10.1016/j.ijedeudev.2015.11.013>

Sala-i-Martin, X., & Pinkovskiy, M. (2010). African poverty is falling... much faster than you think! *NBER Working Papers*, 15775. National Bureau of Economic Research.

Schabbel, C. (2007). The value chain of foreign aid: Development, poverty reduction, and regional conditions. *Contributions to Economics*, 1-335.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-77950474717&partnerID=40&md5=422e92d9f7ebfbf8a100c9a23202d4a6>

Schmitt, J., Orth, M., Krisch, F., & Oltsch, S. (2017). What we know about the effectiveness of budget support. *Evaluation Synthesis*, German Institute for Development Evaluation (DEval), Bonn.

Sen, A. (1985). *Commodities and Capabilities*. Oxford University Press India.

Sen, A., & Anand, S. (1997), "Concepts of Human Development and Poverty: A Multidimensional Perspective". *Poverty and Human Development: Human Development Papers*. United Nations Development Programme, pp. 1-20.

Schultz, T. P. (1993). Investments in the Schooling and Health of Women and Men: Quantities and Returns. *Journal of Human Resources*, 28(4), 694-734.

Song, Y. (2012). Poverty Reduction in China: The Contribution of Popularizing Primary Education. *China and World Economy*, 20(1), 105-122.
<https://doi.org/10.1111/j.1749-124X.2012.01275.x>

Tebaldi, E., & Mohan, R. (2010). Institutions and poverty. *The journal of development*

studies, 46(6), 1047-1066.

Todaro, M. P., & Smith, S. C. (2011). *Economic development* (11th ed.). Harlow: Pearson Education Limited.

Tsai, P. L., & Huang, C. H. (2007). Openness, growth and poverty: The case of Taiwan. *World Development*, 35(11), 1858-1871.

Tupy, M. L. (2005). Trade liberalization and poverty reduction in sub-Saharan Africa. *Policy Analysis*, Cato Institute, 577.

UNDP. (1997). Human Development Report 1997. UNDP (United Nations Development Programme).

UNESCO. (2021). Education for all: Global monitoring report 2021. UNESCO (United Nations Educational, Scientific and Cultural Organization) Publishing.

UNESCO. (2023, May 20). Official Development Assistance (ODA). <https://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/official-development-assistance.htm>

United Nations. (2020). Ending Poverty. <https://www.un.org/en/global-issues/ending-poverty>

United Nations. (2015). Resolution adopted by the General Assembly. Seventieth session 25 September 2015. <https://www.unfpa.org/resources/transforming-our-world-2030-agenda-sustainable-development>

Van der Berg, S. (2008). Poverty and education. *Education policy series*, 10(28), 1-28.

Wedgwood, R. (2007). Education and poverty reduction in Tanzania. *International Journal of Educational Development*, 27(4), 383-396. <https://doi.org/10.1016/j.ijedudev.2006.10.005>

World Bank. (2018). World development report 2018: Learning to realize education's promise. World Bank Group.

World Bank. (2024). World Development Indicators. Available at <https://datacatalog.worldbank.org/search/dataset/0037712>. Accessed on 18.03.2024.

Yogo, T. U. (2017). Assessing the Effectiveness of Foreign Aid in the Education Sector in Africa: The Case of Primary Education. *African Development Review*, 29(3), 389-402.

<https://doi.org/10.1111/1467-8268.12276>

Appendices

Appendix 1 – Summary table of the literature review on effectiveness of foreign aid in the education sector – Quantitative Studies

Author	Sample	Estimation Model(s)	Dependent Variable(s)	Main explanatory Variables	Main Conclusions
Michaelowa & Weber (2006)	120 low- and lower middle income countries (1975-2000)	GMM dynamic panel estimators	Primary enrolment rate Primary completion rate	Aid to education	Aid to education increases primary education in developing countries. Coefficient estimates for the impact of aid are rather small. However, under conditions of bad governance, the impact may turn negative.
Michaelowa & Weber (2007)	100 low- and lower middle income countries (1990-2004)	GMM dynamic panel estimators	Primary completion rate Secondary enrolment rate Tertiary enrolment rate	Aid to education disbursed by educational level	A positive effect of aid at all three level, but rather low.
Dreher et al. (2008)	100 low- and lower middle income countries (1970-2004)	GMM dynamic panel estimators	Primary enrolment rate	Aid to education Government expenditure to education	Higher per capita aid significantly increases primary school enrollment and domestic government spending on education does not.

D'Aiglepierre & Wagner (2013)	100 low- and lower middle income countries (1999-2009)	Panel fixed effects estimation Panel 2SLS fixed effects estimation	Primary enrolment rate	Aid to primary education	Positive and very robust impact of aid to primary education on the educational achievement of the aid recipient countries.
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Birchler & Michaelowa (2016)	110 low- and lower middle income countries (2000-2015)	GMM dynamic panel estimators	Primary enrolment rate	All aid disbursements for education	Aid has been more relevant for improved enrolment (education quantity) than for increased achievement (education quality).
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**Appendix 2 – Impact of education funding on monetary poverty (HCR) and
multidimensional poverty (MPI) using PRIMRATE – full sample (1999-2021) – Panel Data**

Model with period fixed effects

	HCR				MPI			
	I	II	III	IV	I	II	III	IV
AIDEDUC	17.7413*** (0.5183)		23.4903*** (0.4142)	5.8049 (0.4507)	-2.5324 (0.4338)		-1.6430 (0.6167)	-2.4748 (0.7083)
GOVEDUC		-1.5116*** (0.0000)	-1.3803*** (0.0000)	-1.6545*** (0.0014)		-0.9086*** (0.0097)	-0.8991** (0.0107)	-0.9398** (0.0375)
PRIMRATE	-0.2396*** (0.0000)	-0.2346*** (0.0000)	-0.2531*** (0.0000)	-0.6645*** (0.0000)	-0.2024*** (0.0056)	-0.2332*** (0.0040)	-0.2359*** (0.0037)	-0.1502 (0.1224)
GDPPC	-0.0007*** (0.0000)	-0.0007*** (0.0000)	-0.0007*** (0.0000)	-0.0000002 (0.9908)	-0.0005*** (0.0000)	-0.0005*** (0.0000)	-0.0005*** (0.0000)	0.0001 (0.4643)
GINI				0.4876*** (0.0004)				0.1520 (0.2673)
INFLATION				0.0555 (0.1348)				0.0668 (0.1333)
GCF				-0.2832*** (0.0000)				-0.2656 (0.6687)
FOM				-0.0207 (0.5073)				0.0237 (0.3930)
TRADE				-0.0064 (0.7942)				-0.0068 (0.7501)
URBANPOP				-0.8933*** (0.0000)				-0.6231** (0.0151)
CORRUPT				-3.0161 (0.0687)				-2.3527 (0.1181)
CONSTANT	64.9471*** (0.0000)	76.8730*** (0.0000)	76.5837*** (0.0000)	118.0981*** (0.0000)	37.1827*** (0.0000)	43.6184*** (0.0000)	44.1225*** (0.0000)	58.0661*** (0.0003)
R-squared	0.2708	0.3222	0.3235	0.6239	0.1988	0.2145	0.2158	0.4557
F-statistic	57.3036	58.7984	44.2634	19.1483	15.3013	14.8440	11.1418	4.3389
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	549	448	448	179	256	228	228	101
Number of countries	83	74	74	41	68	62	62	33

Notes: p-value in parenthesis; 1% (***), 5% (**) and 10% (*).

**Appendix 3 – Impact of education funding on monetary poverty (HCR) and
multidimensional poverty (MPI) using UPSECRATE – full sample (1999-2021) – Panel**

Data Model with period fixed effects

	HCR				MPI			
	I	II	III	IV	I	II	III	IV
AIDEDUC	7.0082*** (0.0006)		14.2773*** (0.0014)	9.0101 (0.1681)	0.1836 (0.9522)		1.2803 (0.6729)	12.6385 (0.2318)
GOVEDUC		-1.7068*** (0.0000)	-1.6501*** (0.0000)	-1.0696*** (0.0085)		-0.7245** (0.0387)	-0.7138** (0.0427)	-1.2376*** (0.0052)
UPSECRATE	-0.1656*** (0.0000)	-0.1577*** (0.0000)	-0.1648*** (0.0000)	-0.1281** (0.0004)	-0.0331 (0.2165)	-0.0184 (0.4695)	-0.1926 (0.4515)	-0.0267 (0.5538)
GDPPC	-0.0006*** (0.0000)	-0.0006*** (0.0000)	-0.0005*** (0.0000)	-0.0003 (0.1109)	-0.0005*** (0.0000)	-0.0005*** (0.0000)	-0.0005*** (0.0000)	0.0004* (0.0794)
GINI				0.3534*** (0.0021)				-0.0359 (0.8165)
INFLATION				0.0805*** (0.0085)				0.0174 (0.7188)
GCF				-0.3579*** (0.0000)				0.1408 (0.1468)
FOM				-0.0143 (0.6263)				0.1119** (0.0139)
TRADE				-0.0374 (0.1050)				0.0273 (0.2526)
URBANPOP				-0.1366 (0.4834)				-0.8531*** (0.0058)
CORRUPT				-2.8465** (0.0278)				-3.3123 (0.1449)
CONSTANT	27.7550*** (0.0000)	33.6651*** (0.0000)	32.1691*** (0.0000)	29.4448** (0.0237)	18.9040*** (0.0000)	20.6911*** (0.0000)	20.5178*** (0.0000)	55.1564*** (0.0022)
R-squared	0.2768	0.3325	0.3529	0.7294	0.1800	0.1871	0.1880	0.5838
F-statistic	50.4046	54.9681	44.9830	26.4706	12.9534	12.5039	9.3753	6.5030
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	471	399	399	159	239	222	222	94
Number of countries	73	65	65	40	59	56	56	32

Notes: p-value in parenthesis; 1% (***), 5% (**) and 10% (*).

Appendix 4 - Impact of education funding on monetary poverty (HCR) by geographic region (1999-2021)

	Europe & Central Asia				Latin America & Caribbean				Africa & Middle East			East and South Asia & Pacific		
	I	II	III	IV	I	II	III	IV	I	II	III	I	II	III
AIDEDUC	3.4034 (0.3472)		1.9772 (0.7771)	0.4615 (0.9506)	30.2311*** (0.0000)		20.1444*** (0.0067)	-10.8316* (0.0994)	4.2232 (0.2743)		14.8128 (0.2221)	-8.4391 (0.8162)		7.8334 (0.8080)
GOVEDUC		-0.9580 (0.1451)	-0.9501 (0.1505)	-1.3995** (0.0167)		-1.9103*** (0.0000)	-1.6902*** (0.0000)	-0.4019 (0.2910)		0.4359 (0.8459)	0.0188 (0.9933)		-1.7908** (0.0393)	-1.8472* (0.0428)
LSECRATE	-0.8395*** (0.0000)	-0.8402*** (0.0000)	-0.8436*** (0.0000)	-0.1912 (0.1747)	-0.0853*** (0.0061)	-0.0596** (0.0416)	-0.0779*** (0.0083)	-0.0222 (0.1839)	-0.2902*** (0.0108)	-0.9677** (0.0173)	-1.0510** (0.0110)	-0.7650*** (0.0001)	-0.6800** (0.0001)	-0.6740*** (0.0001)
GDPPC	-0.0003*** (0.0001)	-0.0004*** (0.0000)	-0.0004*** (0.0000)	-0.0004*** (0.0000)	-0.0008*** (0.0000)	-0.0006*** (0.0000)	-0.0006*** (0.0000)	-0.0005** (0.0402)	-0.0025** (0.0181)	0.0021 (0.1940)	-0.0013 (0.4499)	-0.0016 (0.0000)	-0.0015 (0.0000)	-0.0015 (0.0000)
GINI				0.3082** (0.0155)				1.0318*** (0.0000)						
INFLATION				0.0213 (0.5999)				0.1149*** (0.0000)						
GCF				-0.1360*** (0.0075)				0.0410 (0.6841)						
FOM				0.0113 (0.7108)				0.0215 (0.2738)						
TRADE				-0.0160 (0.4608)				0.0617** (0.0128)						
URBANPOP				0.1277 (0.6474)				0.4802* (0.0728)						
CORRUPT				0.0825 (0.9618)				-1.6133 (0.1943)						
CONSTANT	90.5745*** (0.0000)	93.0914*** (0.0000)	93.2469*** (0.0000)	19.0180 (0.4497)	22.8443*** (0.0000)	28.8688*** (0.0000)	28.4089*** (0.0000)	-65.6391*** (0.0010)	57.9599*** (0.0000)	102.2209*** (0.0006)	99.8658*** (0.0007)	92.7102*** (0.0000)	90.7102*** (0.0000)	89.7748*** (0.0000)
R-squared	0.4104	0.4569	0.4573	0.7053	0.5063	0.5477	0.5706	0.9414	0.2526	0.3491	0.3947	0.7017	0.7396	0.7400
F-statistic	29.2325	31.1330	23.1796	8.7021	57.7638	57.7298	47.1774	70.0691	4.8441	3.9325	4.2323	32.9312	35.9708	26.3257
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	140	124	124	60	187	160	160	70	79	54	54	58	52	52

Notes: p-value in parenthesis; 1% (***), 5% (**) and 10% (*).

Appendix 5 - Impact of education funding on multidimensional poverty (MPI) by region (1999-2021)

	Europe & Central Asia				Latin America & Caribbean				Africa & Middle East			East and South Asia & Pacific		
	I	II	III	IV	I	II	III	IV	I	II	III	I	II	III
AIDEDUC	-8.3974** (0.0160)		-8.6925** (0.0175)	3.2742 (0.4298)	56.0332*** (0.0000)		62.7061*** (0.0000)	43.3759** (0.0413)	-13.8668 (0.1798)		-17.9279* (0.0728)	85.2149 (0.3704)		144.6309** (0.0350)
GOVEDUC		-0.0788 (0.8701)	-0.2426 (0.5994)	0.2102 (0.6026)		-0.5617** (0.0441)	-0.0486 (0.8510)	-0.1611 (0.6323)		-6.7475* (0.0776)	-7.9159** (0.0259)		-3.5467** (0.0109)	-3.5440*** (0.0043)
LSECRATE	0.4649*** (0.0004)	0.3821*** (0.0044)	0.4673*** (0.0006)	-0.0926 (0.7466)	0.0754* (0.0504)	0.1542*** (0.0001)	-0.6101 (0.1011)	0.0225 (0.6809)	-0.0055 (0.0618)	0.0945 (0.8806)	0.2773 (0.5971)	0.2114 (0.2354)	0.0394 (0.7214)	0.1686 (0.1357)
GDPPC	-0.0002*** (0.0038)	-0.0002*** (0.0055)	-0.0002*** (0.0051)	0.0001 (0.2130)	-0.0003*** (0.0000)	-0.0004*** (0.0000)	-0.0003*** (0.0003)	-0.0002 (0.4138)	-0.0055* (0.0618)	-0.0045* (0.0598)	-0.0083** (0.0131)	-0.0011** (0.0136)	-0.0011*** (0.0014)	-0.0007** (0.0331)
GINI				-0.05237 (0.6931)				0.4147*** (0.0081)						
INFLATION				0.0772* (0.0605)				-0.1947* (0.0621)						
GCF				-0.0389 (0.4819)				0.2443** (0.0357)						
FOM				0.0144 (0.4725)				0.0282 (0.3942)						
TRADE				-0.0171 (0.2526)				0.0405 (0.1918)						
URBANPOP				-0.9703** (0.0123)				0.1987 (0.5218)						
CORRUPT				-2.3799* (0.0743)				-0.2215 (0.9036)						
CONSTANT	37.6733*** (0.0020)	-30.1350** (0.0191)	-37.1374*** (0.0036)	70.4881 (0.1267)	1.7199 (0.5994)	0.4841 (0.9049)	2.4290 (0.4935)	-34.5969 (0.1138)	15.3119 (0.6674)	85.0958 (0.1332)	104.0578** (0.0457)	-12.4703 (0.6539)	28.8884** (0.0220)	-3.0871 (0.8496)
R-squared	0.3505	0.2654	0.3567	0.9221	0.6136	0.4758	0.6092	0.8511	0.3195	0.5517	0.7491	0.5992	0.7005	0.8121
F-statistic	8.2774	5.2984	5.9609	12.9028	46.0462	25.5067	31.1829	14.0333	1.5649	2.8710	4.4779	5.9816	8.5776	10.8085
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	59	29	29	26	103	97	97	47	36	32	32	27	24	24

Notes: p-value in parenthesis; 1% (***), 5% (**) and 10% (*).

**Appendix 6 – Impact of education funding on headcount ratio (HCR) by income group
(1999-2021)**

	Low and Low-middle				Upper-middle			
	I	II	III	IV	I	II	III	IV
AIDEDUC	4.4541 (0.1406)		14.5896** (0.4017)	31.6341 (0.1565)	5.3671 (0.1166)		13.3422* (0.0625)	8.1372 (0.2832)
GOVEDUC		-1.6369 (0.1248)	1.7159* (0.1000)	-1.3687 (0.2603)		-1.3957*** (0.0000)	-1.3838*** (0.0000)	-1.0748*** (0.0056)
LSECRATE	-0.3776*** (0.0000)	-0.9073*** (0.0000)	-0.9796*** (0.0000)	-0.7986*** (0.0028)	-0.1891*** (0.0000)	-0.1629*** (0.0000)	-0.1616*** (0.0000)	-0.0425* (0.0875)
GDPPC	-0.0033*** (0.0000)	-0.0033*** (0.0000)	-0.0029*** (0.0000)	-0.0002 (0.8572)	-0.0006*** (0.0000)	-0.0006*** (0.0000)	-0.0006*** (0.0000)	-0.0005*** (0.0000)
GINI				0.7352** (0.0259)				0.3465*** (0.0006)
INFLATION				-1.1836 (0.5781)				0.1137*** (0.0000)
GCF				-0.0498 (0.8411)				-0.2503*** (0.0000)
FOM				-0.2512 (0.1253)				-0.0077 (0.7442)
TRADE				0.1339* (0.0761)				-0.0621*** (0.0059)
URBANPOP				-0.2477 (0.7306)				-0.1236 (0.4538)
CORRUPT				-13.2705** (0.0441)				1.1692 (0.3691)
CONSTANT	60.8983*** (0.0000)	109.7595*** (0.0000)	110.2300*** (0.0000)	52.0877 (0.1846)	31.7180*** (0.0000)	34.3199*** (0.0000)	33.6159*** (0.0000)	24.7894** (0.0222)
R-squared	0.4167	0.4830	0.5148	0.8184	0.4116	0.4658	0.4731	0.7566
F-statistic	23.0953	20.8710	17.5060	7.7859	67.6952	73.5222	56.5617	23.1714
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	140	105	105	47	324	285	285	115

Notes: p-value in parenthesis; 1% (***), 5% (**) and 10% (*).

**Appendix 7 – Impact of education funding on monetary poverty (MPI) by income group
(1999-2021)**

	Low and Low-middle				Upper-middle			
	I	II	III	IV	I	II	III	IV
AIDEDUC	-4.1334 (0.3220)		-1.7961 (0.6900)	9.9330 (0.9302)	5.7683 (0.3341)		5.5056 (0.3857)	8.6719 (0.1935)
GOVEDUC		-0.6840 (0.4133)	-0.6916 (0.4146)	0.4828 (0.9756)		-0.5377* (0.0640)	-0.5334* (0.0664)	-0.6212 (0.1123)
LSECRATE	0.1856 (0.1513)	0.1405 (0.3417)	0.1458 (0.3325)	-0.0658 (0.8717)	0.1396*** (0.0002)	0.1344*** (0.0004)	0.1308*** (0.0005)	-0.0425* (0.5477)
GDPPC	-0.0018*** (0.0000)	-0.0015*** (0.0022)	-0.0016*** (0.0025)	-0.0030 (0.2740)	-0.0003*** (0.0000)	-0.0003*** (0.0000)	-0.0003*** (0.0000)	-0.0001 (0.4790)
GINI				-0.6770 (0.1432)				0.2493* (0.0532)
INFLATION				-0.6607 (0.3000)				0.0940*** (0.0091)
GCF				0.5232 (0.2534)				0.1307 (0.1287)
FOM				0.1987 (0.5640)				0.0076 (0.7298)
TRADE				0.1432 (0.2264)				-0.0042 (0.8269)
URBANPOP				0.0838 (0.9442)				0.6948 (0.7991)
CORRUPT				-10.8384 (0.3117)				0.3562 (0.7777)
CONSTANT	22.0182** (0.0361)	26.4230* (0.0576)	26.7659* (0.0584)	30.8663 (0.6244)	-4.5119 (0.2978)	-1.7284 (0.6533)	-1.6969 (0.6595)	-12.9841 (0.4299)
R-squared	0.4211	0.3780	0.3813	0.8460	0.3331	0.3204	0.3254	0.6444
F-statistic	9.2155	6.4830	4.7755	2.9956	20.4781	18.3902	13.9871	5.9294
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	70	62	62	31	155	147	147	62

Notes: p-value in parenthesis; 1% (***), 5% (**) and 10% (*).