

# Foreign Aid Effectiveness in the Education Sector: A Dynamic Panel Analysis

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## Abstract

In the realm of development economics, foreign aid and economic development are interconnected concepts, both in theory and practice. Education, a fundamental human right, plays a pivotal role in shaping human capital and driving economic progress. With this in mind, the primary objective of this study is to explore the relationships between education aid and the various levels of schooling, namely primary, secondary, and tertiary, in developing countries. The effect of the primary, secondary, and tertiary level education aid of fifty developing countries with 19 years of panel data was investigated to determine the relationship with Primary Completion Rate, Secondary School Net Enrolment Rate, and Tertiary Gross Enrolment Rate, respectively. The study used the system GMM (One-step GMM and Two-step GMM). The findings suggest that a statistically significant relationship exists between education aid and various levels of education, and education aid effectively enhances the education outcome in developing countries. The findings also underline the importance of establishing sound economic foundations, addressing corruption, maintaining optimal Pupil-Teacher Ratio, and emphasizing female teachers. These factors collectively contribute to fostering an enabling environment for enhancing education outcomes in developing countries.

**Keywords:** aid effectiveness, developing countries, education aid, foreign aid, primary completion rate, secondary net enrolment rate, tertiary gross enrolment rate

## 1. Introduction

The modern root of foreign aid has been traced to the aftermath of World War II, and foreign aid policy has been changed through several mechanisms from the start to the present. Foreign aid, including bilateral and multilateral grants, concessional loans, and technical assistance, grew from an annual flow of under US\$ 5 billion in 1960 to US\$ 50 billion in 2002 to over US\$ 153 billion in 2018 (Todaro & Smith, 2020). However, despite the high value, noble aim, and tremendous efforts, studies show that foreign aid has mixed success in development outcomes, particularly in achieving sustainable economic growth, balanced and inclusive development, and poverty alleviation (Asra et al., 2005). Foreign aid targeting the education sector since 1960 because education enhances human capital (Lucas, 1988; Rebelo, 1991; Romer, 1994) and facilitates the process of innovation and knowledge creation, ultimately affecting the long-run economic development and development patterns of the country (Barro, 1991; Benhabib & Spiegel, 1994). Various empirical studies have confirmed the positive impact of education on an individual's income (Schultz, 1961; Arrow, 1973; Mincer, 1974; Card, 1999; and Ammermueller et al., 2006).

The education aid focused on the productivity approach during the 1960s, 1970s, and 1980s, and it was concentrated mainly on infrastructure, equipment, technical assistance, and secondary, vocational, and post-secondary education (Editorial/IJED, 2016). In addition, education aid at that time focused on the supply-side concept. However, from the early 1990s, education aid began the developmental approach and started focusing on the demand-based approach. In the 1990s and 2000s, this multidimensional perspective prioritized disadvantaged groups and strongly emphasized the poorest first approach, and from 2010 this approach focused the universal access to primary education with strongly emphasizing free access to primary education (Editorial/IJED, 2016).

Aid in the education sector has been booming sharply for the last several decades. From 1995 to 2020, total committed aid (in constant 2020, US\$) to education increased in real terms by 594 percent, from US\$ 2.8bn in

1995 to US\$ 16.42bn in 2020 (OECD/CRS, 2022, Figure 1). Over the same period, total committed education aid (in constant 2020, US\$) to the primary, secondary, and tertiary levels increased in real terms by 927, 785, and 742 percent, respectively (OECD/CRS, 2022, Figure 2). Another side, previous studies such as Michaelowa (2004), Michaelowa & Weber (2007a, 2007b), Dreher et al. (2008), Christensen et al. (2011), d’Aiglepiere & Wagner (2013), Birchler & Michaelowa (2016), Eskander & Mukherjee (2017) claimed that there is a positive relationship between education aid and education outcome and education aid enhancing education sector in the developing countries. However, despite efforts in the education sector, the current statistics paint a challenging and concerning picture. For example, in 2020, the primary completion rate in sub-Saharan Africa stood at a mere 71 percent, and the secondary net enrolment rates for South Asia and sub-Saharan Africa were recorded at 61 percent and 36 percent, respectively. Additionally, the tertiary gross enrolment rates for East Asia and the Pacific, Latin America and the Caribbean, South Asia, and sub-Saharan Africa were 49 percent, 52 percent, 26 percent, and 10 percent, respectively, in 2020 (World Bank, 2023a, b, c). Furthermore, on a global scale, an alarming 129 million girls are still deprived of education, including 32 million in primary school, 30 million in secondary education, and 67 million in upper-secondary education (UNICEF/GDC, 2023).

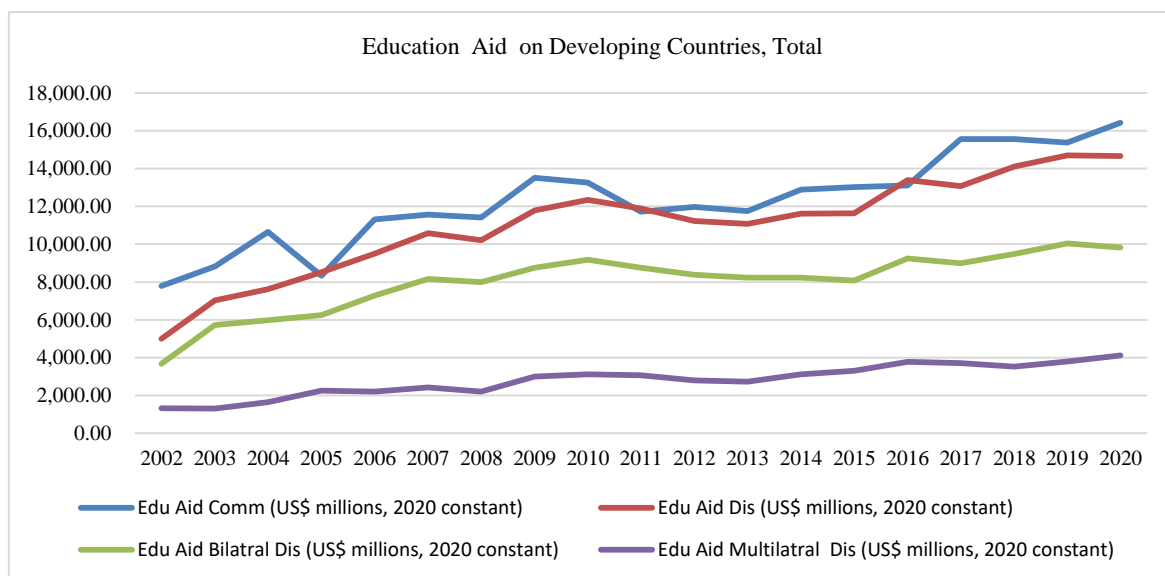


Figure 1. Education Aid in Developing Countries, Total

Source: Prepared by Author.

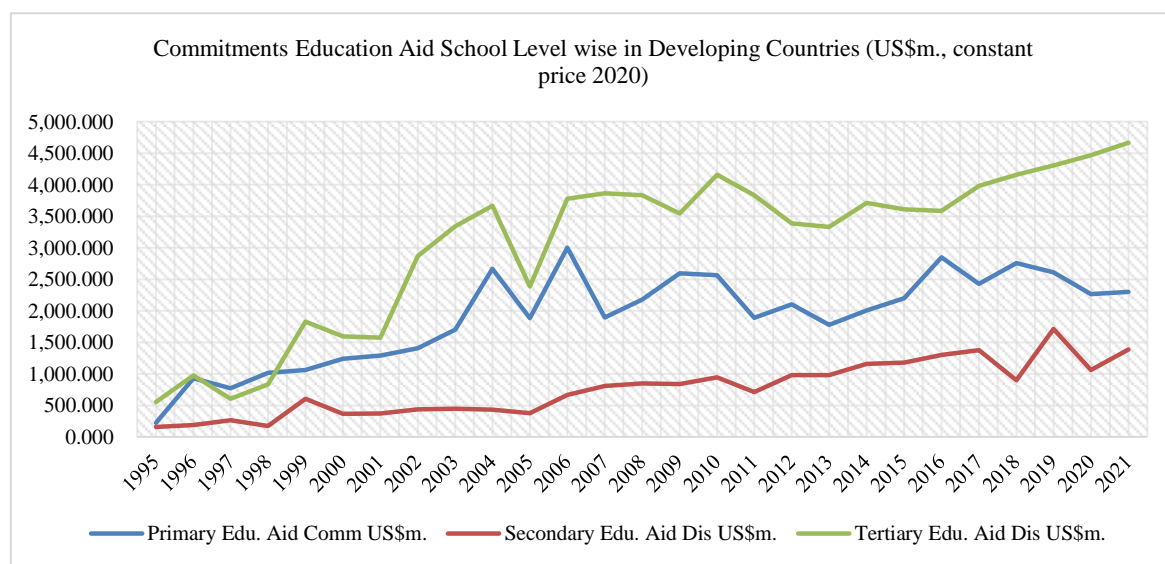


Figure 2. Commitments Education Aid in School Level wise in Developing Countries, Total

Source: Prepared by Author.

Academics study have revealed that aid directed toward education can positively impact the educational outcomes of recipient nations. However, it is imperative to acknowledge that despite the increased aid allocation, education indicators and the current state of the education sector in developing countries present some confusion regarding the efficacy of aid in this domain. It challenges academics, development partners (DPs), and recipients. Thus, due to its impact on educational outcomes, foreign aid targeting the education sector has emerged as a highly debated and significant subject of interest among DPs and scholars. This topic remains at the forefront of contemporary discussions, encompassing its effectiveness and controversies. Therefore, a noticeable surge in aid allocation towards the education sector has been subjected to academic scrutiny. This statement of problem motivates this study for further investigation in this domain. Because currently, the world is focusing on the Sustainable Development Goals (SDGs). Goal four of the SDGs, which emphasizes “ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all” (SDGs, 2020), highlights the importance of education outcomes. The timely investigation of the relationship between education aid and education results will contribute to developing new policy measures and providing comprehensive guidelines to DPs and recipients.

The study aims to investigate the effectiveness of education aid in promoting developing countries’ schooling at various levels. The following research questions address the objective: 1) Is primary education aid heightening basic education (primary education)? 2) Is there any relationship between secondary education aid and secondary school net enrolment rate in the developing world? And 3) How far is the tertiary education aid helpful to boost-up tertiary education in the developing world? Primary, secondary, and tertiary education aid is hypothesized to have a statistically significant positive relationship with enhancing education outcomes on respective levels.

This study employs the Generalized Method of Moments (GMM) to analyze the relationship between education aid and education outcomes across different levels. The study utilizes 19 years of panel data from fifty developing countries. The findings reveal that education aid is a robust contributor to enhancing primary, secondary, and tertiary education outcomes. Additionally, the study indicates that developing countries still experience challenges in various school structure characteristics, such as pupil-teacher ratio (PTR).

Subsequent sections of this study include a description of the study’s background, literature, and significance (Section 2); an explanation of the data, variables selection, methodology, and estimation strategy (Section 3); presentation of the estimation results and discussion (Section 4), and the conclusion with policy measures (Section 5).

## **2. Background, Literature, and Significance of the Study**

Foreign aid, which is one of the main mechanisms of international cooperation, contributes to developing countries fulfilling the saving-investment, knowledge, and foreign exchange gap (Harrod, 1939; Chenery, 1966; Rebelo, 1991; Bacha, 1990), ultimately helping to enhance the economic development of the developing world. Hence, foreign aid represents the phenomenon of “the art of living together” in the 21<sup>st</sup> century.

However, aid effectiveness is considered one of the most controversial topics in development economics (Asra et al., 2005). Earlier literature on aid effectiveness was divided into three waves. The first wave represents the negative relationship between foreign aid and economic growth in the developing world, led by Griffin (1970), Areskoug (1976), Mosley et al. (1987), Boone (1994), Rajan & Subramanian (2005). They concluded that it is because aid could be wasted due to corruption, used in unproductive sectors, and the limited absorptive power of recipient countries. The second wave, spanning the 1970s, 1980s, 1990s, and the first phase of the 2000s (Gupta, 1975; Bradshaw, 1985; Durbarry et al., 1998; Dalgaard & Hansen, 2000; Clemens et al., 2004; Moreira, 2005) emphasized the positive relationship between foreign aid and economic growth in the developing countries. And the third wave, which described the aid-growth relationship from a conditional perspective, concluded that foreign aid works, but the sound policies of the recipient countries are crucial factors (World Bank, 1998; Burnside & Dollar, 2000).

Regarding the education sector initially, only a handful of scholars, including Michaelowa (2004), Michaelowa & Weber (2007a, 2007b), Wolf (2007), as well as Dreher et al. (2008), made contributions to analyzing the impact of education aid on education outcomes. However, as time progressed, several academics such as Arndt et al. (2011), Christensen et al. (2011), d’Aiglepiere & Wagner (2013), Gyimah-Brempong & Aziedu (2008) enlarged this area of study.

One of the comprehensive studies by Michaelowa & Weber (2007a) examines education aid effectiveness in primary completion rate and gross enrolment rate of secondary and tertiary levels of 100 low and lower-middle-income countries. The overall results show a positive effect of education aid on all three levels.

The study of Eskander & Mukherjee (2017) examined the impact of education aid on primary schooling in developing countries. The study used committed and disbursed education aid and found a positive and statistically significant relationship between education aid and gross enrolment rate in the male and female categories at the primary level. A study by d'Aiglepieire & Wagner (2013) found a positive and significant relationship between primary-level commitment aid and primary school enrolment. Their result shows that an increase of US\$ 1 per capita of aid in primary education increases 1.4 percent of the primary net enrolment rate.

Birchler & Michaelowa (2016) and Michaelowa & Weber (2007b) focused on primary education outcomes. They found a positive relationship between education aid and education outcome at the primary level. Michaelowa & Weber's (2007b) study concluded that aid contributes to improved primary education outcomes, both in enrolment and completion rates, in developing countries; however, the effectiveness of education aid depends on the recipient countries' political and institutional backgrounds. A longitudinal study by Dreher et al. (2008) focused on the effects of education aid on primary education enrolment in 96 low and middle-income countries and found a positive relationship between education aid and primary school enrolment. Similarly, the empirical evidence of Michaelowa (2004) shows educational aid's positive impact on the gross enrolment rate of primary education. In absolute terms, the study found that a one-million increase in education aid increases 0.7 percent primary education gross enrolment rates.

The existing literature showed a positive relationship between education aid and education outcomes. Nevertheless, they are not free from shortcomings. Most of the studies, such as d'Aiglepieire & Wagner (2013), Dreher et al. (2008), Michaelowa & Weber (2007a), and Michaelowa (2004), have taken committed education aid. However, it is unclear whether the committed aid entirely translates into actual flows, as committed aid may not always be fully disbursed, leading to potential bias in findings. In addition, except for Michaelowa & Weber's (2007a) study, most earlier studies have focused on specific aspects, and a significant portion of the studies have surrounded primary education. As a result, there is a notable absence of comprehensive investigations in the existing literature.

Likewise, some studies, such as Eskander & Mukherjee (2017), have fallen short of incorporating a sufficient number of control variables that capture the structural characteristics of the education system. For instance, variables like the student-teacher ratio, the government's expenditure on the education sector, etc. Correspondingly, some studies, such as Michaelowa (2004) and Eskander & Mukherjee (2017), have taken gross primary education enrolment as one main dependent variable. Still, most academics strongly consider the net primary education enrolment rate shows an accurate enrolment position at the primary level. Significantly, the earlier studies have not conducted a comprehensive study focusing on the impact of specific education aid on particular education outcomes, i.e., primary, secondary, and tertiary levels. To address these shortcomings, this study seeks to comprehensively examine the effects of specific education aid on particular education outcomes. The study uses sound dependent and explanatory variables, focusing on a broad analysis area, and applies the system GMM method (one-step GMM and two-step GMM). By doing so, this study contributes to the existing literature on education aid effectiveness in several ways, including the use of specific disbursed aid for specific school levels and methodological soundness. Moreover, the analysis is based on a new set of recent data.

### **3. Data, Variables Selection, Methodology, and Estimation Strategy**

#### *3.1 Data and Variables Selection*

This study uses a dynamic panel data analysis to assess the impact of education aid on the different school levels. Specifically, it examines the effect of primary-level education aid, secondary-level education aid, and tertiary-level education aid on the primary completion rate (PCR), secondary net enrolment rate (Serger), and tertiary-level gross enrolment rate (Tergro), respectively. The study applied 19 years of panel data from 2002 to 2020, focusing on fifty low-income and lower-middle-income countries across regions such as Sub-Saharan Africa (24 countries), Asia (16 countries), Latin America and the Caribbean (4 countries), and the Middle East and North Africa (6 countries). Three criteria are taken to select the countries: membership in the Development Assistance Committee (DAC) aid recipient countries, belonging to the low-income and lower-middle-income categories according to the World Bank classification, and data availability.

The Primary School Completion Rate (PCR), Secondary School Net Enrolment Rate (Serger), and Tertiary Gross Enrolment Rate (Tergro) are taken as primary dependent variables for primary school, secondary school, and tertiary level, respectively. The PCR is carried out for the principal dependent variable because it is the significant outcome of primary education, and it gives a snapshot of the proportion of children who successfully complete primary school within a given timeframe. The earlier studies, Michaelowa & Weber (2007a, & 2007b), d'Aiglepieire & Wagner (2013), and Eskander & Mukherjee (2017), have taken the PCR as a primary dependent

variable.

The Secondary Net Enrolment Rate is chosen as the primary dependent variable because it provides a valuable understanding of participation and access to secondary education. It serves as an intermediate output of the PCR and helps assess the success and barriers of secondary education in terms of gender disparities, socioeconomic factors, and geographical constraints. The earlier study of Michaelowa & Weber (2007a) focused on the Secondary Enrolment Rate as the primary dependent variable. The tertiary Gross Enrolment Rate is taken because it provides valuable insights into the higher education scenario. More specifically, monitoring the gross tertiary enrolment helps to identify gaps in access and promotes equity in tertiary education opportunities; it is essential to acquire advanced knowledge and skills. The earlier study by Michaelowa & Weber (2007a) used the tertiary enrolment rate as a dependent variable.

Primary School Education Aid per capita (eAidPriP), Secondary School Education Aid Per Capita (eAidSecP), and Tertiary Education Aid Per Capita (eAidTerP) are taken as the main explanatory variables for all three levels, respectively. The aid per capita is taken because larger countries need more resources than small countries to enhance education coverage (Birchler & Michaelowa, 2016). In commitments and disbursement forms, aid statistics are reported on the Creditor Reporting System (CRS) of the Organization for Economic Co-operation and Development/Development Assistance Committee (OECD/DAC). The commitment does not mean that it will disburse fully; thus, taking committed aid may give biases on the finding, considering this the study has taken the disbursed aid to analyze the effect, and the study expects that aid has a positive and statistically significant relationship with PCR, net secondary enrolment, and tertiary gross enrolment rate. Aid variables are taken as a logarithm term for normalizing the data. The previous studies by Eskander & Mukherjee (2017) and Birchler & Michaelowa (2016) have considered disbursed aid in their research.

The study has taken structural characteristics of the education system control variables for each level. Lagged Primary School Completion Rate, Net Primary Enrolment Rate (NER, in %), Primary Pupil-Teacher Ratio (PTR), and Primary Education Female Teachers (PeduTeaF, in %) are taken for the primary level. Similarly, for the secondary level, lagged Secondary Net Enrolment Rate, PCR, Secondary Pupil-Teacher Ratio (PTRsec), and Secondary Education Female Teacher (SecEduTeaF, in %) are taken. Moreover, lagged Tertiary Gross Enrolment Rate and Tertiary Pupil-Teacher Ratio (PTRter) are included for the tertiary level. PTR is commonly used to measure educational quality. Maintaining an optimal PTR helps to enhance education outcomes because it gives a conducive environment for pupils, teachers, and schools. On the other hand, increasing PTR has a negative impact on schooling and adversely affects educational outcomes. Earlier studies such as Michaelowa (2004), Michaelowa & Weber (2007a & 2007b), Dreher et al. (2008), d'Aiglepieire & Wagner (2013), and Birchler & Michaelowa (2016) have also included PTR as a control variable in their studies. Female Teachers as a percentage of total education teachers of a particular level is taken as a control variable because female teachers may advocate more in society regarding the importance of education and the future benefits of literacy. In addition, female teachers provide a conducive classroom environment and facilitate other educational activities. Earlier research conducted by Card et al. (2022), Kirk (2006), and Wahsheh & Alhawamdeh (2015) highlighted a positive relationship between female teachers and schooling outcomes. Similarly, the World Bank (2001b), Herz et al. (1991), Rugh (2000), and Banerjee et al. (2000) emphasized hiring female teachers to increase girls' enrolment.

The previous studies conducted by Michaelowa (2004), Michaelowa & Weber (2007a & 2007b), Dreher et al. (2008), Christensen et al. (2011), d'Aiglepieire & Wagner (2013), and Birchler & Michaelowa (2016) highly emphasized the economic and governance factors in their studies and acquired as a control variable to address the economic and governance dimensions of selected countries. In the late 1990s, the World Bank started to advocate aid effectiveness from a governance point of view through its policy research report, "Assessing Aid: What Works, What Doesn't and Why (World Bank, 1998)." Soon later, several academics focused on governance issues in the aid effectiveness architecture, such as one of the well-known studies by Burnside & Dollar (2000) emphasized it. The major argument behind focusing the governance due to the fungibility of aid because in bad governance recipient may diversify the assistance to the unproductive sector, such as the purchase of arms or increasing consumption, which creates barriers to aid ineffectiveness for economic development (Michaelowa & Weber, 2007b). This study also considers good governance a highly sensitive control variable for aid effectiveness. The World Bank has published the six broad dimensions of governance of over 200 countries since 1996 (WGI, 2023). The study has decided to take two major governance indicators out of six: Government Effectiveness (GE) and Control of Corruption (CC), as suitable governance control variables. Additionally, to control the economic sector, the study has taken GDP per capita (GDPcap, constant 2015 US\$) as a logarithmic term for data normalization, Government expenditure on education (EDUCEXP, in % of GDP), and Inflation

(INF, in annual%). These economic control variables were included because they are linked to the size of the economy and depend on the country's economic activities (Michaelowa & Weber, 2007a, 2007b; Birchler & Michaelowa, 2016; Michaelowa, 2004; Dreher et al., 2008; Christensen et al., 2011, d'Aiglepieire & Wagner, 2013).

The data are collected from the World Development Indicators (World Bank, WDI, 2022) of the World Bank; The World Bank's Worldwide Governance Indicators; and the Creditor Reporting System (CRS) of the Organization for Economic Co-operation and Development/Development Assistance Committee (OECD/DAC). The summary of variables with data sources and periods is given in Appendix A.

### 3.2 Methodology and Estimation Strategy

The endogeneity issue is the main problem behind examining the aid effectiveness. Thus, earlier eminent scholars; such as Burnside & Doller (2000), Hansen & Trap (2001), and Collier & Dollar (2002); have also considered this fact in their studies. In addition, the earlier studies regarding education aid effectiveness, such as Birchler & Michaelowa (2016), Michaelowa & Weber (2007b), Dreher et al. (2008), and Michaelowa & Weber (2007a) have utilized GMM to examine the effect. This study also uses the GMM because it is a dynamic panel estimator which controls the problem of endogeneity, omitted variable bias, unobserved panel heterogeneity, and data measurement errors (Roodman, 2009). Likely it is designed for situations with "small T, large N" panels (Roodman, 2009). Under the GMM, the study applied the system GMM proposed by Arellano & Bover (1995) and Blundell & Bond (1998), which corrects endogeneity by introducing more instruments, transforming the instruments to make them uncorrelated (exogenous) with fixed effects. To get the robustness in the finding, the study has decided to apply the one-step system GMM and two-step system GMM. The study highly considered three diagnostic tests for the validity of the GMM result, including Hansen (1982) *J* test and Sargan (1958) test for over-identifying restrictions, test for autocorrelation/serial correction of the error term (mainly focusing AR (2)), and the number of instruments should be less or equal to the number of groups (i.e.,  $Z \leq N$ ).

The basic estimation equation is as follows:

$$Y_{it} = \beta_0 + \beta_1 Y_{it-1} + \beta_2 X'_{it} + \beta_3 Z'_{it} + d_t + \varepsilon_{it}$$

In the equation,  $Y_{it}$  represents the dependent variable at a time  $t$ ,  $Y_{it-1}$  represents the lagged value of the dependent variable at a time  $t-1$ ,  $X'_{it}$  represents a set of exogenous variables at a time  $t$ ,  $Z'_{it}$  represents another set of control variables at a time  $t$ ,  $d_t$  represents year dummy effects, and  $\varepsilon_{it}$  represents the error term. The coefficients  $\beta_0$ ,  $\beta_1$ ,  $\beta_2$ , and  $\beta_3$  represent the parameters to be estimated in the model.

The detailed final model for each level is given below based on the above estimation equation.

#### 1) For Primary Completion Rate

$$PCR_{it} = \beta_0 + \beta_1 PCR_{it-1} + \beta_2 \ln AidPriP_{it} + \beta_3 \ln AidPriP_{it-1} + \beta_4 \ln AidPriP_{it-2} + \beta_5 NER_{it} + \beta_6 NER_{it-1} + \beta_7 PTR_{it} + \beta_8 PTR_{it-1} + \beta_9 PTR_{it-2} + \beta_{10} PeduTeaF_{it} + \beta_{11} \ln GDPcap_{it-1} + \beta_{12} CC_{it-1} + \beta_{13} GE_{it-1} + d_t + \mu_{it}$$

#### 2) For Secondary School Net Enrolment Rate

$$Serner_{it} = \beta_0 + \beta_1 Serner_{it-1} + \beta_2 \ln AidSecP_{it} + \beta_3 \ln AidSecP_{it-1} + \beta_4 \ln AidSecP_{it-2} + \beta_5 PCR_{it-1} + \beta_6 PTRsec_{it} + \beta_7 SecEduTeaF_{it} + \beta_8 INF_{it} + \beta_9 \ln GDPcaplag_{it} + \beta_{10} CC_{it-1} + \beta_{11} GE_{it-1} + d_t + \mu_{it}$$

#### 3) For Tertiary Gross Enrolment Rate

$$Tergro_{it} = \beta_0 + \beta_1 Tergro_{it-1} + \beta_2 \ln AidTerP_{it} + \beta_3 \ln AidTerP_{it-1} + \beta_4 \ln AidTerP_{it-2} + \beta_5 PTRter_{it} + \beta_6 EDUCEXP_{it} + \beta_7 \ln GDPcaplag_{it-1} + \beta_8 CC_{it-1} + \beta_9 GE_{it-1} + d_t + \mu_{it}$$

## 4. Estimation Results and Discussion

### 4.1 Result

The study developed and analyzed six models for the primary level and five models each for the secondary and tertiary levels to assess the robustness of the findings. Model six is the primary model for the primary level, while model five is the primary model for both the secondary and tertiary levels. The study used Akaike Information Criterion (AIC) to determine the lag structure of the model. The study investigates the effects of education aid with a two-year lag at all levels. Education aid encompasses many factors, such as education policy, administrative management, training, research, and infrastructure development. Therefore, it takes considerable time to realize its impact on education outcomes. Furthermore, the study examines the effect of the PTR on educational outcomes in developing countries over a two-year lagged period. This approach aimed to assess the duration of the effect of the pupil-teacher balance on education outcomes.

Additionally, the study incorporated the lagged NER, as it accounts for the issue of pupil repetition, which

negatively affects primary education. By utilizing lagged analysis, the study captured this phenomenon effectively. The study also incorporates the lagged GDP per capita to examine its effect on a country level since it takes at least one year to manifest its impact. Similarly, the lagged CC is included because the previous year's corruption scenario significantly affects the current year's results. Correspondingly, the study employs lagged GE because government policies and strategies require at least one year to yield tangible outcomes. Finally, the study has utilized lagged PCR to investigate how the PCR from the previous academic year contributes to the improvement of the secondary net enrolment rate in the current year. The descriptive statistics of variables are presented in Appendix B.

#### 4.1.1 The Effect of Primary Education Aid on Primary Education

The result of both estimations (Table 1-2) showed that the effect of second-period lagged primary school education aid (lneAidPriPlag2) on the primary school completion rate (PCR) is positive and significant in all models. One percent increase in primary school education aid (eAidPriP) is associated with a 0.715% and 0.762% increase in primary school completion rate on the final model at the five percent level on one-step GMM and two-step GMM, respectively. This finding aligns with and reinforces existing literature, such as the works of Michaelowa & Weber (2007a, 2007b).

The lagged Primary School Completion Rate (PCR) is statistically significant. The Net Enrolment Rate (NER) is positive and statistically significant in all models of both analyses. The Pupil-Teacher Ratio (PTR) is negatively associated with PCR in all models in both estimations. However, it is negatively statistically significant under one-step GMM only. The AR (2) and Hansen Statistic result indicates no second-order serial correction and no problem with over-identifying restrictions, respectively. And the number of instruments is less than the number of groups. Based on this comprehensive analysis, both estimations indicate that primary education aid significantly enhances primary completion rates in developing countries.

Table 1. The effect of primary education aid on Primary School Completion Rate (PCR)

Dependent Variable: - Primary School Completion Rate (PCR)

VARIABLES	Sym.	Sym.	Sym.	Sym.	Sym.	Sym.
	One-step GMM (Model 1) (PCR)	One-step GMM (Model 2) (PCR)	One-step GMM (Model 3) (PCR)	One-step GMM (Model 4) (PCR)	One-step GMM (Model 5) (PCR)	One-step GMM (Model 6) (PCR)
PCRLag	<b>0.499***</b> (0.128)	<b>0.499***</b> (0.124)	<b>0.452***</b> (0.158)	<b>0.522***</b> (0.138)	<b>0.501***</b> (0.123)	<b>0.499***</b> (0.130)
lneAidPriP	-0.223 (1.107)	-0.195 (1.113)	1.271 (1.620)	-0.411 (1.088)	-0.192 (1.209)	-0.187 (1.234)
lneAidPriPlag1	0.108 (0.891)	0.096 (0.900)	-0.898 (1.158)	0.187 (0.879)	0.0838 (0.924)	0.092 (0.941)
<b>lneAidPriPlag2</b>	<b>0.710**</b> (0.309)	<b>0.713**</b> (0.302)	<b>0.764*</b> (0.422)	<b>0.628*</b> (0.356)	<b>0.703**</b> (0.302)	<b>0.715**</b> (0.309)
<b>NER</b>	<b>0.698**</b> (0.292)	<b>0.703**</b> (0.274)	<b>0.810**</b> (0.338)	<b>0.650**</b> (0.304)	<b>0.690**</b> (0.281)	<b>0.706**</b> (0.296)
NERlag1	-0.221 (0.194)	-0.223 (0.192)	-0.237 (0.204)	-0.223 (0.197)	-0.221 (0.192)	-0.224 (0.194)
<b>PTR</b>	<b>-0.674**</b> (0.299)	<b>-0.667**</b> (0.271)	<b>-0.760***</b> (0.282)	<b>-0.733**</b> (0.308)	<b>-0.666**</b> (0.293)	<b>-0.663**</b> (0.292)
PTRlag1	0.629 (0.385)	0.632* (0.370)	0.656 (0.419)	0.718* (0.424)	0.629 (0.382)	0.630 (0.387)
PTRlag2	-0.411 (0.436)	-0.426 (0.439)	-0.443 (0.473)	-0.422 (0.441)	-0.415 (0.406)	-0.429 (0.413)
PeduTeaF	-0.007 (0.087)	-0.014 (0.082)	-0.088 (0.183)	0.018 (0.088)	----	-0.017 (0.063)
lnGDPCaplag1	-0.163 (1.832)	-0.154 (1.636)	0.400 (1.936)	-0.556 (1.962)	-0.214 (1.763)	-0.135 (1.869)
CClag	0.121 (0.895)	----	----	0.017 (0.962)	0.101 (1.288)	-0.044 (1.434)
GElag	----	0.142 (0.946)	---	---	0.061 (1.500)	0.180 (1.612)

EDUCEXP	----	----	-0.090 (1.078)	0.452 (0.844)	----	----
INF	----	----	0.088 (0.081)	----	----	----
Observations	750	750	750	750	750	750
Number of Group	50	50	50	50	50	50
Number of Instruments	45	45	45	45	45	45
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
AR (1)	0.002	0.002	0.002	0.002	0.002	0.002
<b>AR (2)</b>	<b>0.111</b>	<b>0.098</b>	<b>0.153</b>	<b>0.133</b>	<b>0.059</b>	<b>0.093</b>
<b>Hansen Statistic</b>	<b>0.332</b>	<b>0.344</b>	<b>0.178</b>	<b>0.345</b>	<b>0.356</b>	<b>0.299</b>

Note. Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Source: Author's own computation using system GMM.

Table 2. The effect of primary education aid on Primary School Completion Rate (PCR)

Dependent Variable: - Primary School Completion Rate (PCR)

VARIABLES	Sym.	Sym.	Sym.	Sym.	Sym.	Sym.
	Two-step GMM (Model 1) (PCR)	Two-step GMM (Model 2) (PCR)	Two-step GMM (Model 3) (PCR)	Two-step GMM (Model 4) (PCR)	Two-step GMM (Model 5) (PCR)	Two-step GMM (Model 6) (PCR)
<b>PCRlag</b>	<b>0.366***</b> <b>(0.131)</b>	<b>0.381***</b> <b>(0.130)</b>	<b>0.301*</b> <b>(0.163)</b>	<b>0.375***</b> <b>(0.137)</b>	<b>0.381***</b> <b>(0.123)</b>	<b>0.384***</b> <b>(0.137)</b>
lneAidPriP	-0.233 (1.475)	-0.609 (1.294)	0.782 (2.090)	-0.427 (1.545)	-0.616 (1.578)	-0.665 (1.517)
lneAidPriPlag1	0.0470 (1.172)	0.195 (1.067)	-0.520 (1.414)	0.135 (1.156)	0.193 (1.182)	0.222 (1.146)
<b>lneAidPriPlag2</b>	<b>0.755*</b> <b>(0.389)</b>	<b>0.765**</b> <b>(0.378)</b>	<b>0.851*</b> <b>(0.482)</b>	<b>0.709*</b> <b>(0.416)</b>	<b>0.762**</b> <b>(0.348)</b>	<b>0.762**</b> <b>(0.372)</b>
<b>NER</b>	<b>0.960***</b> <b>(0.343)</b>	<b>0.922***</b> <b>(0.325)</b>	<b>0.901**</b> <b>(0.404)</b>	<b>0.922**</b> <b>(0.375)</b>	<b>0.918***</b> <b>(0.341)</b>	<b>0.910**</b> <b>(0.376)</b>
NERlag1	-0.311 (0.252)	-0.312 (0.252)	-0.154 (0.219)	-0.303 (0.250)	-0.309 (0.265)	-0.307 (0.271)
<b>PTR</b>	<b>-0.762</b> <b>(0.475)</b>	<b>-0.802*</b> <b>(0.433)</b>	<b>-0.892*</b> <b>(0.476)</b>	<b>-0.834</b> <b>(0.508)</b>	<b>-0.816</b> <b>(0.503)</b>	<b>-0.816</b> <b>(0.507)</b>
PTRlag1	0.299 (0.230)	0.317 (0.204)	0.294 (0.278)	0.354 (0.270)	0.324 (0.236)	0.325 (0.244)
PTRlag2	0.010 (0.184)	0.045 (0.156)	-0.043 (0.267)	0.049 (0.218)	0.050 (0.197)	0.052 (0.205)
PeduTeaF	-0.027 (0.078)	0.0006 (0.080)	-0.149 (0.170)	-0.006 (0.094)	----	0.004 (0.080)
lnGDPCaplag1	0.995 (1.337)	0.749 (1.268)	0.874 (2.039)	0.858 (1.491)	0.734 (1.342)	0.690 (1.496)
CClag	-1.000 (0.890)	----	----	-1.144 (0.941)	0.0662 (1.560)	0.136 (1.654)
GElag	----	-1.239 (0.969)	----	----	-1.292 (1.521)	-1.370 (1.642)
EDUCEXP	----	----	-0.604 (1.156)	0.364 (0.925)	----	----
INF	----	----	0.134 (0.111)	----	----	----
Observations	750	750	750	750	750	750
Number of Group	50	50	50	50	50	50
Number of Instruments	46	46	46	46	46	46
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
AR (1)	0.000	0.000	0.000	0.000	0.000	0.000
<b>AR (2)</b>	<b>0.082</b>	<b>0.091</b>	<b>0.137</b>	<b>0.142</b>	<b>0.103</b>	<b>0.106</b>
<b>Hansen Statistic</b>	<b>0.395</b>	<b>0.456</b>	<b>0.457</b>	<b>0.367</b>	<b>0.452</b>	<b>0.390</b>

Note. Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Source: Author's own computation using system GMM.



#### 4.1.2 The Effect of Secondary Education Aid on Secondary Education

The results (Table 3-4) showed a positive relationship between Secondary School Education Aid (eAidSecP) and Secondary Net Enrolment Rates (Serner). The effect of second-period lagged Secondary School Education Aid (lneAidSecPlag2) on the Secondary School Net Enrolment Rate is positive and significant in all models of two-step GMM. However, it is statistically significant only on model four and five under one-step GMM. A one percent increase in Secondary School Education Aid is associated with a 0.616% and 0.705% increase in Secondary School Net Enrolment Rate on the primary model at the ten and five percent level on both methods, respectively. This finding aligns with and reinforces existing literature, such as the works of Michaelowa and Weber (2007a).

The lagged Secondary School Net Enrolment Rate is statistically significant under one-step GMM and two-step GMM. The lagged Primary Completion Rate (PCRlag) is statistically significant in all models of both methods. It shows that PCR helps to increase the secondary net enrolment rate. A one percent increase in PCR is associated with a 0.161% and 0.158% increase in Net Secondary Enrolment Rate under both estimation methods.

The Secondary Pupil-Teacher Ratio (PTRsec) is significantly negative in all models of both analyses at a one percent level. This result shows that developing countries are encountering the problem of maintaining an optimal Pupil-Teacher Ratio (PTR), adversely harming the education outcome. This finding further supports and strengthens the previous scholarly works such as Birchler & Michaelowa (2016), Michaelowa & Weber (2007b), Dreher et al. (2008), Michaelowa & Weber (2007a), Michaelowa (2004), and d'Aiglepieire & Wagner (2013).

The impact of Secondary Education Female Teachers (SecEduTeaF) showed a statistically positive relationship with Secondary Net Enrolment Rate in both estimation methods. This finding aligns with and reinforces existing literature, as numerous studies, including Card et al. (2022), Kirk (2006), Wahsheh & Alhawamdeh (2015), World Bank (2001b), Herz et al. (1991), Rugh (2000), and Banerjee et al. (2000) have consistently emphasized the presence of a positive relationship between female teachers and schooling outcomes.

The lagged GDP per capita is positive and statistically significant in both methods. The Control of Corruption (CC) has negatively associated with both estimation methods; however, it is statistically significant under two-step GMM. The finding delivers a message regarding governance as a matter. Government Effectiveness (GE) is positively associated with the secondary school enrolment rate in both methods but is not statistically significant.

The result of AR (2) indicates no second-order serial correction. Similarly, the result of the Hansen Statistic showed no problem with over-identifying restrictions, and the number of instruments is small than the number of groups in both methods. Based on the finding, the study concluded that aid specifically targeted at secondary education yields positive outcomes and contributes to improving secondary educational systems.

Table 3. The effect of secondary education aid on Secondary School Net Enrolment Rate (Serner)

Dependent Variable: - Secondary School Net Enrolment Rate (Serner)

VARIABLES	Sym.	Sym.	Sym.	Sym.	Sym.
	One-step GMM (Model 1) (Serner)	One-step GMM (Model 2) (Serner)	One-step GMM (Model 3) (Serner)	One-step GMM (Model 4) (Serner)	One-step GMM (Model 5) (Serner)
Sernerlag	<b>0.199***</b> (0.046)	<b>0.099**</b> (0.044)	<b>0.086*</b> (0.044)	<b>0.084*</b> (0.044)	<b>0.084*</b> (0.044)
lneAidSecP	-0.202 (0.736)	-0.041 (0.525)	0.001 (0.535)	0.074 (0.574)	0.077 (0.550)
lneAidSecPlag1	-0.631 (0.541)	-0.379 (0.542)	-0.439 (0.505)	-0.390 (0.495)	-0.390 (0.494)
lneAidSecPlag2	<b>0.507</b> (0.311)	<b>0.573</b> (0.407)	<b>0.578</b> (0.387)	<b>0.615*</b> (0.366)	<b>0.616*</b> (0.365)
PCRlag	<b>0.327***</b> (0.047)	<b>0.117*</b> (0.069)	<b>0.132**</b> (0.059)	<b>0.162**</b> (0.067)	<b>0.161**</b> (0.069)
PTRsec	<b>-1.069***</b> (0.099)	<b>-0.699***</b> (0.127)	<b>-0.795***</b> (0.113)	<b>-0.875***</b> (0.143)	<b>-0.875***</b> (0.143)
SecEduTeaF	-----	<b>0.591***</b> (0.147)	<b>0.420***</b> (0.105)	<b>0.293*</b> (0.170)	<b>0.292*</b> (0.169)
INF	-----	0.192 (0.245)	0.320 (0.243)	0.304 (0.240)	0.306 (0.232)

<b>lnGDPCaplag1</b>	-----	-----	<b>2.919</b>	<b>4.386**</b>	<b>4.375*</b>
			<b>(1.954)</b>	<b>(2.172)</b>	<b>(2.190)</b>
CClag	-----	-----	-----	-2.066	-2.144
				(1.807)	(2.780)
GElag	-----	-----	-----	-----	0.111
					(3.336)
Observations	800	800	800	800	800
Number of Group	50	50	50	50	50
Number of Instruments	49	49	49	49	49
Year Dummies	Yes	Yes	Yes	Yes	Yes
AR (1)	0.000	0.000	0.000	0.000	0.000
AR (2)	<b>0.888</b>	<b>0.132</b>	<b>0.090</b>	<b>0.100</b>	<b>0.100</b>
<b>Hansen Statistic</b>	<b>0.090</b>	<b>0.131</b>	<b>0.129</b>	<b>0.145</b>	<b>0.115</b>

Note. Standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Source: Author's own computation using system GMM.

Table 4. The effect of secondary education aid on Secondary School Net Enrolment Rate (Serner)

VARIABLES	Dependent Variable: - Secondary School Net Enrolment Rate (Serner)				
	Sym.	Sym.	Sym.	Sym.	Sym.
	Two-step GMM (Model 1) (Serner)	Two-step GMM (Model 2) (Serner)	Two-step GMM (Model 3) (Serner)	Two-step GMM (Model 4) (Serner)	Two-step GMM (Model 5) (Serner)
<b>Sernerlag</b>	<b>0.183***</b>	<b>0.100***</b>	<b>0.085***</b>	<b>0.093***</b>	<b>0.090***</b>
	<b>(0.024)</b>	<b>(0.026)</b>	<b>(0.028)</b>	<b>(0.027)</b>	<b>(0.028)</b>
lneAidSecP	-0.546	-0.0156	-0.164	-0.178	-0.202
	(0.457)	(0.339)	(0.363)	(0.375)	(0.379)
lneAidSecPlag1	-0.402	-0.586	-0.489	-0.225	-0.171
	(0.367)	(0.357)	(0.351)	(0.358)	(0.363)
<b>lneAidSecPlag2</b>	<b>0.576***</b>	<b>0.824***</b>	<b>0.821***</b>	<b>0.754***</b>	<b>0.705**</b>
	<b>(0.171)</b>	<b>(0.268)</b>	<b>(0.257)</b>	<b>(0.248)</b>	<b>(0.266)</b>
<b>PCRlag</b>	<b>0.322***</b>	<b>0.137***</b>	<b>0.134***</b>	<b>0.168***</b>	<b>0.158***</b>
	<b>(0.033)</b>	<b>(0.032)</b>	<b>(0.033)</b>	<b>(0.038)</b>	<b>(0.042)</b>
<b>PTRsec</b>	<b>-1.035***</b>	<b>-0.755***</b>	<b>-0.809***</b>	<b>-0.897***</b>	<b>-0.906***</b>
	<b>(0.061)</b>	<b>(0.073)</b>	<b>(0.061)</b>	<b>(0.070)</b>	<b>(0.071)</b>
<b>SecEduTeaF</b>	-----	<b>0.549***</b>	<b>0.433***</b>	<b>0.302***</b>	<b>0.299***</b>
		<b>(0.067)</b>	<b>(0.062)</b>	<b>(0.084)</b>	<b>(0.084)</b>
INF	-----	0.047	0.189	0.169	0.154
		(0.152)	(0.167)	(0.168)	(0.173)
<b>lnGDPCaplag1</b>	-----	-----	<b>2.568*</b>	<b>3.517**</b>	<b>3.421**</b>
			<b>(1.357)</b>	<b>(1.326)</b>	<b>(1.325)</b>
<b>CClag</b>	-----	-----	-----	<b>-2.507**</b>	<b>-3.733*</b>
				<b>(0.973)</b>	<b>(1.905)</b>
GElag	-----	-----	-----	-----	1.872
					(2.555)
Observations	800	800	800	800	800
Number of Group	50	50	50	50	50
Number of Instruments	49	49	49	49	49
Year Dummies	Yes	Yes	Yes	Yes	Yes
AR (1)	0.000	0.000	0.000	0.000	0.000
AR (2)	<b>0.799</b>	<b>0.140</b>	<b>0.097</b>	<b>0.110</b>	<b>0.105</b>
<b>Hansen Statistic</b>	<b>0.086</b>	<b>0.145</b>	<b>0.121</b>	<b>0.129</b>	<b>0.107</b>

Note. Standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Source: Author's own computation using system GMM.

#### 4.1.3 The Effect of Tertiary Education Aid on Tertiary Education

Both estimation results (Table 5-6) suggested that the relationship between Tertiary Education Aid (eAidTerP) on the Tertiary Gross Enrolment Rate (Tergro) is positive and statistically significant. It is statistically significant in two-step GMM in all models but statistically significant in models three, four, and five in one-step GMM. The

finding indicates that a one percent increase in Tertiary Level Education Aid is associated with a 1.272% and 0.729% increase in Tertiary Gross Enrolment Rate on the primary model at the ten percent level on both methods, respectively. This finding aligns with the existing literature, such as the works of Michaelowa & Weber (2007a).

The lagged Tertiary Gross Enrolment Rate (Terger) is statistically significant in all models of both estimation methods. Similarly, the Tertiary Pupil-Teacher ratio (PTRter) is negatively statistically significant in all models of one-step GMM and two-step GMM. It illustrates a distressing picture of the higher education landscape and highlights the considerable resource gap that challenges the higher education system in developing nations. Moreover, the lagged GDP per capita (GDPCaplag) is positive and statistically significant at the one percent level in all analyzed models. The finding aligns with consistent results reported in previous studies (Christensen et al., 2011; Birchler & Michaelowa, 2016; Michaelowa & Weber, 2007a; Michaelowa & Weber, 2007b; Michaelowa, 2004).

Correspondingly, the negatively statistically significant result of control of corruption suggests that the governance factor is a matter. The result of AR (2) and Hansen statistics gives a clear direction that there is no second-order serial correction and the problem of over-identifying restrictions in the calculation. In conclusion, the study concluded a positive relationship between tertiary education aid and the gross enrolment rate in developing countries.

Table 5. The effect of education aid on Tertiary School Gross Enrolment Rate (Tergro)

Dependent Variable: - Tertiary School Gross Enrolment Rate (Tergro)

VARIABLES	Sym.	Sym.	Sym.	Sym.	Sym.
	One-step GMM (Model 1) (Terger)	One-step GMM (Model 2) (Terger)	One-step GMM (Model 3) (Terger)	One-step GMM (Model 4) (Terger)	One-step GMM (Model 5) (Terger)
<b>Tergrolag</b>	<b>0.638***</b> (0.097)	<b>0.639***</b> (0.098)	<b>0.313**</b> (0.127)	<b>0.198*</b> (0.116)	<b>0.172*</b> (0.118)
<b>lneAidTerP</b>	<b>0.883</b> (0.717)	<b>0.883</b> (0.717)	<b>1.284*</b> (0.675)	<b>1.152*</b> (0.668)	<b>1.272*</b> (0.667)
lneAidTerPlag1	-0.317 (0.731)	-0.317 (0.731)	-0.030 (0.729)	-0.402 (0.634)	-0.421 (0.624)
lneAidTerPlag2	-0.141 (0.394)	-0.142 (0.395)	-0.954 (0.811)	-0.095 (0.427)	-0.094 (0.428)
<b>PTRter</b>	<b>-0.104***</b> (0.031)	<b>-0.105***</b> (0.033)	<b>-0.074*</b> (0.042)	<b>-0.069</b> (0.044)	<b>-0.077*</b> (0.047)
<b>lnGDPCaplag</b>	-----	-----	<b>6.672***</b> (1.532)	<b>8.454***</b> (1.665)	<b>8.077***</b> (1.685)
EDUCEXP	-----	0.003 (0.168)	-0.195 (0.269)	-0.059 (0.310)	0.046 (0.355)
<b>CClag</b>	-----	-----	-----	<b>-4.062**</b> (1.626)	<b>-6.395**</b> (2.951)
<b>GElag</b>	-----	-----	-----	-----	<b>3.169</b> (2.525)
Observations	800	800	750	800	800
Number of Group	50	50	50	50	50
Number of Instruments	49	49	49	49	49
Year Dummies	Yes	Yes	Yes	Yes	Yes
AR (1)	0.000	0.000	0.000	0.000	0.000
<b>AR (2)</b>	<b>0.045</b>	<b>0.045</b>	<b>0.061</b>	<b>0.080</b>	<b>0.097</b>
<b>Hansen Statistic</b>	<b>0.118</b>	<b>0.095</b>	<b>0.329</b>	<b>0.248</b>	<b>0.251</b>

Note. Standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Source: Author's own computation using system GMM.

Table 6. The effect of education aid on Tertiary School Gross Enrolment Rate (Tergro)

Dependent Variable: - Tertiary School Gross Enrolment Rate (Tergro)

VARIABLES	Sym.	Sym.	Sym.	Sym.	Sym.
	Two-step GMM	Two-step GMM	Two-step GMM	Two-step GMM	Two-step GMM
	(Model 1) (Tergro)	(Model 2) (Tergro)	(Model 3) (Tergro)	(Model 4) (Tergro)	(Model 5) (Tergro)
<b>Tergrolag</b>	<b>0.637***</b> (0.026)	<b>0.638***</b> (0.027)	<b>0.322***</b> (0.032)	<b>0.219***</b> (0.026)	<b>0.187***</b> (0.027)
<b>lneAidTerP</b>	<b>0.533*</b> (0.286)	<b>0.534*</b> (0.286)	<b>0.820**</b> (0.337)	<b>0.681*</b> (0.347)	<b>0.729*</b> (0.363)
lneAidTerPlag1	-0.209 (0.248)	-0.192 (0.266)	0.278 (0.178)	-0.478 (0.311)	-0.437 (0.352)
lneAidTerPlag2	-0.101 (0.203)	-0.112 (0.214)	-1.027 (0.385)	-0.046 (0.198)	-0.084 (0.200)
<b>PTRter</b>	<b>-0.101***</b> (0.015)	<b>-0.101***</b> (0.015)	<b>-0.061***</b> (0.019)	<b>-0.068***</b> (0.022)	<b>-0.069***</b> (0.022)
<b>lnGDPCaplag</b>	----	----	<b>6.325***</b> (0.762)	<b>7.694***</b> (0.856)	<b>7.839***</b> (0.941)
EDUCEXP	----	0.012 (0.094)	-0.073 (0.135)	-0.025 (0.136)	0.020 (0.145)
<b>CClag</b>	----	----	----	<b>-3.764***</b> (0.874)	<b>-4.960***</b> (1.365)
<b>GElag</b>	----	----	----	----	<b>1.466</b> (1.571)
Observations	800	800	750	800	800
Number of Group	50	50	50	50	50
Number of Instruments	49	49	49	49	49
Year Dummies	Yes	Yes	Yes	Yes	Yes
AR (1)	0.002	0.002	0.002	0.002	0.002
<b>AR (2)</b>	<b>0.065</b>	<b>0.065</b>	<b>0.102</b>	<b>0.117</b>	<b>0.133</b>
<b>Hansen Statistic</b>	<b>0.118</b>	<b>0.095</b>	<b>0.329</b>	<b>0.248</b>	<b>0.251</b>

Note. Standard errors in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Source: Author's own computation using system GMM.

#### 4.2 Discussion

Findings showed that education aid has a significant positive relationship with primary, secondary, and tertiary education outcomes. The finding of this study supports the conclusion of Michaelowa & Weber (2007a), who have concluded the same result. The positive and significant relationship of education aid across all three levels suggests that the education aid architecture policy, which moves from a 'productivist' approach to a 'developmental' approach, is heading in the right direction (Editorial/IJED, 2016). Furthermore, previous and ongoing approaches taken by development partners, multilateral and bilateral, regarding enhancing the education outcome, such as the World Declaration on Education for All (EFA); Dakar Framework for Action; Millennium Development Goals (MDGs), in particular, Goal 2; Sustainable Development Goals (SDGs), more particularly Goal 4, contribute to the effectiveness on education aid in developing countries (Editorial/IJED, 2016). Due to these efforts, developing regions have made notable achievements in their education systems. For instance, between 1990 and 2018, Sub-Saharan Africa and South Asia experienced substantial increases in primary enrolment rates from 53 to 78 percent and 73 to 88 percent from 1990 to 2018, respectively. Correspondingly, in the same period, both regions witnessed significant progress in PCR from 54 to 71 percent and 64 to 92 percent, respectively (World Bank, WDI-2022). This progress is evident when comparing historical data, as approximately 50 percent of primary school-aged children worldwide were out of school in the early 1950s. Still, by 2021, this figure had decreased to 11 percent (UNICEF, 2021).

In contrast, to aid effect for primary and secondary education, the impact of tertiary education aid shows a statistically significant relationship at the initial stage. This distinction can be attributed to the distinct characteristics of the aid mechanism employed, such as a notable portion of tertiary education aid concentrates

on budget support, policy consultation, teaching capacity enhancement, research, and scholarship funding. This mechanism yields faster outcomes compared to mechanisms implemented at other education levels (UNESCO, 2022). Another possible reason is that tertiary education aid targeted advanced research, specialized training, and skill-building program, which may have a more immediate contribution to the overall development of recipients. Furthermore, the impact of aid depends upon the aid modality; over 9 of every 10 US dollars (92%) of tertiary education aid is provided as grants, and around half (51%) of the tertiary education aid funds are delivered through the government budget (UNESCO, 2022).

The positive and statistically significant relationship between the Net Primary Enrolment Rate (NER) to the Primary Completion Rate (PCR) and PCR to the secondary net enrolment rate indicates that the previous program and actions undertaken by DPs and recipients' governments have been effective in enhancing education outcomes in developing countries. The initiative included different measures such as free and universal access to primary education; focused on improving schooling infrastructure and resources; highly emphasized teacher training and recruitment, more especially female teachers; community engagement in school management; more stressed on addressing the gender disparities; implanting government policy reform and adopting investment strategies in the education sector.

Maintaining an optimal Pupil-Teacher Ratio (PTR) is essential because it helps teachers differentiate material according to each student's zone of proximal development, provides frequent constructive feedback, and fosters close relationships, which makes students likelier to excel in their learning (Connor et al., 2013; Hattie & Timperley, 2007; Cadima et al., 2010; Curby, Rimm-Kaufman, & Ponitz, 2009). The previous studies conducted by Urquiola (2006), Urquiola & Verhoogen (2009), and Battaglia & Lebedinski (2015) found that maintaining an optimal PTR has a significant positive effect on educational outcomes, such as improved exam scores. Additionally, the study of Angrist & Lavy (1997) found that small class sizes help to improve the score as well as students from disadvantaged backgrounds benefit more from this phenomenon. The finding of this study showed a negative and statistically significant effect of PTR on educational outcomes across three levels, primary, secondary, and tertiary, in developing countries. This finding associates with and reinforces existing literature, as numerous studies, including Birchler & Michaelowa (2016), Michaelowa & Weber (2007b), Dreher et al. (2008), Michaelowa & Weber (2007a), Michaelowa (2004), and d'Aiglepierre & Wagner (2013). There are several reasons why developing countries face the problem of high PTR. One of the leading causes is the need for more financial resources. Financial constraints create barriers in developing countries, leading to insufficient investment in school infrastructure and retaining an adequate number of teachers.

The positive and statistically significant relationship between GDP per capita and education outcomes indicates that the country's economic situation is a matter of enhancing educational outcomes. The finding aligns with consistent results reported by Christensen et al. (2011), Birchler & Michaelowa (2016), Michaelowa & Weber (2007a), Michaelowa & Weber (2007b), and Michaelowa (2004). The importance of GDP per capita in enhancing education outcomes becomes apparent when considering various factors. For instance, according to UNESCO, achieving the SDG-4 goal necessitates developing countries to allocate a minimum of 4 to 6 percent of their GDP and 15 to 20 percent of their national expenditure in the education sector (UNESCO, 2022a). Moreover, education outcomes are influenced by household expenditures on education. Such as, in Nepal, between 2016 to 2020, public expenditure covered nearly 73 percent to 95 percent of education costs, while households bore the remaining expenses (UNESCO, 2022a). This indicates the relevance of household income in determining education outcomes in the developing world. The study of Zhao & Glewwe (2010) also found that household income has a strong significant positive influence on years of schooling, and this finding was further corroborated by Deme & Mahmoud (2020), who established a positive and statistically significant relationship between per capita real GDP and primary and secondary school enrolments rate.

The positive and statistically significant relationship between female teachers and education outcomes strongly suggests that female teachers are instrumental in enhancing education outcomes in developing countries. Previous studies by Muralidharan et al. (2016), Gong et al. (2018), Xu & Li (2018), Eble & Hu (2020), Lee et al. (2019), and Paredes (2014) have consistently found that female teachers are more helpful in improving the female education outcome in developing countries and having a litter or no adverse impacts on male pupils. Similarly, the finding of Card et al. (2022), Kirk (2006), Wahsheh & Alhawamdeh (2015), World Bank (2001b), Herz et al. (1991), Rugh (2000), and Banerjee et al. (2000) also reach the same conclusion, whereas the finding of this study also adds some blocks on existing literature. There are several reasons why female teachers are more particularly beneficial in enhancing education outcomes (Kirk, 2006). They serve as role models and support and encourage pupils, especially girls, to complete their studies. Similarly, female teachers advocate

more for gender-friendly management at the school level, such as clean and separate toilets and washing facilities.

The adverse and statistically significant effect of corruption on education outcomes highlights the role of governance in enhancing education outcomes in developing countries. Corruption has adversely impacted education outcomes in several ways, such as misallocating educational resources and undermining the effective implementation of education policies. Corruption also influences the perception of developing partners when allocating aid in the education sector. For example, one of the seminal studies by Christensen et al. (2011) found that bilateral donors pay more attention to recipients' corruption level when allocating educational foreign aid.

## 5. Conclusion, Policy Measures, Limitations, and Suggestions for Future Research

Based on the study's findings, it can be concluded that a statistically significant relationship exists between education aid and the outcomes of different school levels. The study further indicates that education aid effectively enhances the education outcome in developing countries. Similarly, the study shows a positive association between a recipient country's GDP and education outcomes, highlighting the importance of a sound economic foundation. In contrast, finding shows corruption hurts the education outcome, emphasizing the detrimental effects of corrupt practices in the education sector. The finding strongly suggested that developing countries face challenges from school-related variables—for instance, the negative impact of the Pupil-Teacher Ratio on education outcomes across all three levels. Furthermore, the finding strongly supports the significant role played by female teachers in enhancing education outcomes in developing countries. These findings have important implications for policy measures aimed at improving education outcomes in the developing world and ensuring the effectiveness of aid.

From the recipient point of view, developing countries focus on enhancing school infrastructures, targeting quality education, addressing socio-culture barriers, and targeting marginalized groups. Similarly, they have to focus on economic growth by implementing sound fiscal and monetary policies, which is essential for fostering conducive economic growth and contributing to a sustained increase in GDP per capita. Besides, addressing corruption in the education sector the developing countries requires robust anti-corruption measures such as emphasizing accountability, responsibility, and transparency and, similarly, enhancing public participation and fostering a culture of integrity.

Correspondingly, developing countries must maintain optimal pupil-teacher ratio by adopting comprehensive approaches such as enhancing teacher quality and, carrying out more motivation plans for teachers, recruiting the teacher according to demand base. Furthermore, regarding female teacher enhancement, the government of developing countries has to take some specific strategies such as recruitment strategies; they have to take a policy like 'One Female Teacher Essential in Every Primary School'; apply quota targets for female teachers; give high priority to hire local female as a teacher. From the DPs' point of view, the DPs need to prioritize aid harmonization and focus on the recipients' priorities for allocating aid. The study believed these policy measures are crucial for improving education outcomes and education aid effectiveness in developing countries.

However, the study is not free from limitations due to the lack of long-term data on education aid disbursement. The study only used 19 years of disbursed education aid data, a significant limitation. For future research in this sector, it is strongly recommended to conduct further research from a gender perspective, focusing on an inclusive and equitable quality education system that aligns with the central theme of SDGs4. The study should examine the impact of primary, secondary, and tertiary education aid on female education outcomes at these levels and compare them with male education outcomes. Such an approach would provide interesting scenarios to understand the position of developing countries in achieving inclusive and equitable quality education. Moreover, it would offer significant policy implications for fulfilling SDGs4 and education aid effectiveness in the developing world.

## References

- Ammermueller, A., Kuckulenz, A., & Zwick, T. (2006). Aggregate Unemployment Decreases Individual Returns to Education. *Economics of Education Review*, 28, 217-226. <https://doi.org/10.1016/j.econedurev.2008.07.001>
- Angrist, J. D., & Lavy, V. (1997). Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement. National Bureau of Economic Research (NBER), *Working Paper No. 5888*. <https://doi.org/10.3386/w5888>
- Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68, 29-51.

[https://doi.org/10.1016/0304-4076\(94\)01642-D](https://doi.org/10.1016/0304-4076(94)01642-D)

- Areskoug, K. (1976). Private Foreign Investment and Capital Formation in Developing Countries. *Economic Development and Cultural Change*, 24(3). <https://doi.org/10.1086/450896>
- Arndt, C., Jones, S., & Tarp, F. (2011). *Aid effectiveness: Opening the black box*. Working Paper, United Nations University (UNU), World Institute for Development Economic Research.
- Arrow, K. (1973). Higher education as a filter. *Journal of Public Economics*, 2, 193-216. [https://doi.org/10.1016/0047-2727\(73\)90013-3](https://doi.org/10.1016/0047-2727(73)90013-3)
- Asra, Estrada, Kim, & Quibria. (2005). Poverty and Foreign Aid: Evidence from Cross-Country Data. Asian Development Bank, *ERD (Economics and Research Department) Working Paper No. 65*.
- Bacha, E. L. (1990). A Three-Gap Model of Foreign Transfers and the GDP Growth Rate in Developing Countries. *Journal of Development Economics*, 32(2), 279-296. [https://doi.org/10.1016/0304-3878\(90\)90039-E](https://doi.org/10.1016/0304-3878(90)90039-E)
- Banerjee, A., Jacob, S., Kremer, M., Lanjouw, J., & Lanjouw, P. (2000). *Promoting School Participation in Rural Rajasthan: Results from Some Prospective Trials*. Mimeographed document, Massachusetts Institute of Technology (MIT).
- Barro, R. (1991). Economic Growth in a Cross-Section of Countries. *Quarterly Journal of Economics*, 106, 407-444. <https://doi.org/10.2307/2937943>
- Battaglia, M., & Lebedinski, L. (2015). Equal Access to Education: An Evaluation of the Roma Teaching Assistant Program in Serbia. *World Development*, 76, 62-81. <https://doi.org/10.1016/j.worlddev.2015.06.009>
- Benhabib, J., & Spiegel, M. M. (1994). The Role of Human Capital in Economic Development: Evidence from Aggregate Cross-Country Data. *Journal of Monetary Economics*, 34, 143-173. [https://doi.org/10.1016/0304-3932\(94\)90047-7](https://doi.org/10.1016/0304-3932(94)90047-7)
- 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>
- Blundell, R., & Bond, S. (1998). Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics*, 87, 115-143. [https://doi.org/10.1016/S0304-4076\(98\)00009-8](https://doi.org/10.1016/S0304-4076(98)00009-8)
- Boone, P. (1994). The Impact of Foreign Aid on Savings and Growth. *Centre for Economic Performance Working Paper No. 677*, London School of Economics.
- Bradshaw, Y. W. (1985). Dependent Development in Black Africa: A Cross-National Study. *American Sociological Review*, 50. <https://doi.org/10.2307/2095409>
- Burnside, C., & Dollar, D. (2000). Aid, Policies, and Growth. *The American Economic Review*, 90, 847-868. <https://doi.org/10.1257/aer.90.4.847>
- Cadima, J., Leal, T., & Burchinal, M. (2010). The quality of teacher-student interactions: Associations with first graders' academic and behavioral outcomes. *Journal of School Psychology*, 48(6), 457-482. <https://doi.org/10.1016/j.jsp.2010.09.001>
- Card, D., Domnisoru, C., Sanders, S. G., Taylor, L., & Udalova, V. (2022). The impact of female teachers on female students' lifetime well-being. *NBER working paper series 30430*. <https://doi.org/10.3386/w30430>
- Chenery, H., & Strout, A. M. (1966). Foreign assistance and economic development. *The American Economic Review*, 56(4), 679-733. <https://www.jstor.org/stable/1813524>
- Christensen, Z., Homer, D., & Nielson, D. (2011). Dodging adverse selection: How donor type and governance condition aid's effects on school enrolment. *World Development*, 39, 2044-2053. <https://doi.org/10.1016/j.worlddev.2011.07.018>
- Clemens, M. A., Radelet, S., & Bhavnani, R. (2004). Counting chickens when they hatch: The short-term effect of aid on growth. *Center for Global Development Working Paper No. 44*. Washington, D.C. <https://doi.org/10.2139/ssrn.567241>
- Collier, P., & Dollar, D. (2002). Aid allocation and poverty reduction. *European Economic Review*, 46, 1475-1500. [https://doi.org/10.1016/S0014-2921\(01\)00187-8](https://doi.org/10.1016/S0014-2921(01)00187-8)
- Connor, C. M., McDonald-Mann, D., Morrison, F. J., Fishman, B., Crowe, E. C., Al Otaiba, S., & Schatschneider, C. (2013). A longitudinal cluster-randomized controlled study on the accumulating effects of individualized

- literacy instruction on students' reading from first through third grade. *Psychological Science*, 24(8), 1408-1419. <https://doi.org/10.1177/0956797612472204>.
- Curby, T. W., Rimm-Kaufman, S. E., & Ponitz, C. C. (2009). Teacher-child interactions and children's achievement trajectories across kindergarten and first grade. *Journal of Educational Psychology*, 101(4), 912-925. <https://doi.org/10.1037/a0016647>.
- d'Aiglepierre, R., Rohen, R., & Wagner, L. (2013). Aid and universal primary education. *Economics of Education Review*, 37, 95-112. <https://doi.org/10.1016/j.econedurev.2013.09.001>
- Dalgaard, C. J., & Hansen, H. (2000). On aid, growth, and good policies. *CREDIT Research Paper, No. 00/17*, The University of Nottingham, Centre for Research in Economic Development and International Trade (CREDIT), Nottingham. <https://doi.org/10.4324/9781315827834-2>
- Deme, M., & Mahmoud, A. M. (2020). Effect of quantity and quality of education on per capita real-GDP growth: Evidence from low- and middle-income African countries. *Applied Economics*, 52(57), 6248-6264. <https://doi.org/10.1080/00036846.2020.1789058>
- Dreher, A., Nunnenkamp, P., & Thiele, R. (2008). Does aid for education educate children? Evidence from panel data. *The World Bank Economic Review*, 22, 291-314. <https://doi.org/10.1093/wber/lhn003>
- Durbarry, R., Gemmill, N., & Greenaway, D. (1998). New evidence on the impact of foreign aid on economic growth. *CREDIT Research Paper No. 98/8*. Center for Research in Economic Development and International Trade, University of Nottingham.
- Eble, A., & Hu, F. (2020). Child beliefs, societal beliefs, and teacher-student identity match. *Economics of Education Review*, 77, 101994. <https://doi.org/10.1016/j.econedurev.2020.101994>
- Editorial/IJED. (2016). Aid, education policy, and development. *International Journal of Educational Development*, 48. <https://doi.org/10.1016/j.ijedudev.2015.12.002>
- Eskander, A., & Mukherjee, D. (2017). The effects of education aid on primary schooling in developing countries. In *Handbook on the Economics of Foreign Aid* (pp. 414-424). Cheltenham, UK: Edward Elgar Publishing.
- Gong, J., Lu, Y., & Song, H. (2018). The effect of teacher gender on students' academic and noncognitive outcomes. *Journal of Labor Economics*, 36(3), 743-778. <https://doi.org/10.1086/696203>
- Griffin, K. B. (1970). Foreign capital, domestic savings, and economic development. *Bulletin of the Oxford University Institute of Economics and Statistics*, 32(2). <https://doi.org/10.1111/j.1468-0084.1970.mp32002002.x>
- Gupta, K. L. (1975). Foreign capital inflows, dependency burden, and saving rates in developing countries. A simultaneous equation model. *KYKLOS*, 28(2), 358-374. <https://doi.org/10.1111/j.1467-6435.1975.tb01950.x>
- Gyimah-Brempong, K., & Asiedu, E. (2008). Aid and human capital formation: Some evidence. Paper presented at the *Conference on Globalization, Institutions and Economic Development in Africa, Tunis, Tunisia*. Retrieved from <http://www.afdb.org/fileadmin/uploads/afdb/Documents/Knowledge/30754268-EN-1.3.4-GYIMAH-AID-HUMANCAP4.PDF>
- Hansen, H., & Trap, F. (2001). Aid effectiveness disputed. *Journal of International Development*, 12, 375-398. [https://doi.org/10.1002/\(SICI\)1099-1328\(200004\)12:3<375::AID-JID657>3.0.CO;2-M](https://doi.org/10.1002/(SICI)1099-1328(200004)12:3<375::AID-JID657>3.0.CO;2-M)
- Hansen, L. P. (1982). Large sample properties of generalized method of moments estimators. *Econometrica*, 50(4), 1029-1054. <https://doi.org/10.2307/1912775>
- Harrod, R. F. (1939). An essay in dynamic theory. *The Economic Journal*, 49(193), 14-33. <https://doi.org/10.2307/2225181>
- Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, 77(1), 81-112. <https://doi.org/10.3102/003465430298487>.
- Herz, B., Subbarao, K., Habib, M., & Raney, L. (1991). Letting girls learn: Promising approaches in primary and secondary education. *World Bank Discussion Paper No. 133*. <https://doi.org/10.1596/0-8213-1937-X>
- Kirk, J. (2006). *The impact of women teachers on girls' education*. UNESCO Asia and Pacific Regional Bureau for Education Mom Luang Pin Malakul Centenary Building 920 Sukhumvit Road, Prakanong, Klongtoey Bangkok 10110, Thailand.



- Lee, J., Rhee, D., & Rudolf, R. (2019). Teacher gender, student gender, and primary school achievement: Evidence from ten Francophone African countries. *The Journal of Development Studies*, 55(4), 661-679. <https://doi.org/10.1080/00220388.2018.1453604>
- Lucas, R. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22, 3-42. [https://doi.org/10.1016/0304-3932\(88\)90168-7](https://doi.org/10.1016/0304-3932(88)90168-7)
- Michaelowa, K. (2004). Aid effectiveness reconsidered: Panel data evidence for the education sector. *HWWA Discussion Paper, No. 264*, Hamburg Institute of International Economics (HWWA), Hamburg. <https://doi.org/10.2139/ssrn.508382>
- Michaelowa, K., & Weber, A. (2007a). *Aid effectiveness in primary, secondary, and tertiary education*. Background paper prepared for the Education for All Monitoring Report.
- Michaelowa, K., & Weber, A. (2007b). *Aid effectiveness in the education sector: A dynamic panel analysis*. In *Theory and practice of foreign aid* (pp. 357-386). Amsterdam: Emerald Group Publishing Limited. [https://doi.org/10.1016/S1574-8715\(06\)01018-9](https://doi.org/10.1016/S1574-8715(06)01018-9)
- Mincer, J. (1974). *Schooling, experience and earnings*. National Bureau of Economic Research, Columbia University Press, New York.
- Moreira, S. B. (2005). Evaluating the impact of foreign aid on economic growth. *Journal of Economic Development*, 30(2), 25-48.
- Mosley, P. (1987). Overseas aid: Its defence and reform. *Studies in Political Economy*, 243-257.
- Muralidharan, K., & Sheth, K. (2016). Bridging education gender gaps in developing countries: The role of female teachers. *Journal of Human Resources*, 51(2), 269-297. <https://doi.org/10.3368/jhr.51.2.0813-5901R1>
- OECD/CRS. (2022). *Creditor Reporting System*. Retrieved from <https://stats.oecd.org/Index.aspx?DataSetCode=crs1>
- Paredes, V. (2014). A teacher like me or a student like me? Role model versus teacher bias effect. *Economics of Education Review*, 39, 38-49. <https://doi.org/10.1016/j.econedurev.2013.12.001>
- Rajan, R. G., & Subramanian, A. (2005). Aid and growth: What does the cross-country evidence really show? *IMF Working Paper No. 05/127*. <https://doi.org/10.5089/9781451861464.001>
- Rebelo, S. (1991). Long-run policy analysis and long-run growth. *Journal of Political Economy*, 99, 500-521. <https://doi.org/10.1086/261764>
- Romer, P. (1994). The origins of endogenous growth. *Journal of Economic Perspectives*, 8(3), 3-22. <https://doi.org/10.1257/jep.8.1.3>
- Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal*, 9(1), 86-136. <https://doi.org/10.1177/1536867X0900900106>
- Rugh, A. (2000). *Starting now: Strategies for helping girls complete primary*. Academy for Educational Development, SAGE Project, Washington, DC.
- Sargan, J. D. (1958). The estimation of economic relationships using instrumental variables. *Econometrica*, 26, 393-415. <https://doi.org/10.2307/1907619>
- Schultz, T. (1961). Investment in human capital. *American Economic Review*, 51, 1-17.
- SDGs. (2020). *United Nations Statistics Division*. Retrieved from <https://unstats.un.org/sdgs/report/2020/goal-04/>
- Todaro, M. P., & Smith, S. C. (2020). *Economic development* (13th ed.). Pearson Education Limited, Kao Park, Harlow CM17 9SR, United Kingdom.
- UNESCO. (2022). *Exploring International Aid for Tertiary Education: Recent Development and Current Trends*. Published by UNESCO and the UNESCO International Institute for Higher Education in Latin America and the Caribbean (IESALC). 7, place de Fontenoy, 75352 Paris 07 SP, France.
- UNESCO. (2022a). *Education Financing in Asia-Pacific*. Published by the United Nations Educational, Scientific and Cultural Organization, 7, place de Fontenoy, 75352 Paris 07 SP, France, UNESCO Bangkok Office and UNESCO Institute for Statistics (UIS).
- UNICEF. (2021). *Primary Education*. Retrieved September 2021, from <https://www.unicef.org/education/primary-education>
- UNICEF/GDC. (2023). *Girls' Education*. Retrieved May 19, 2023, from

<https://gdc.unicef.org/resource/girls-education#:~:text=According%20to%20UNESCO%20estimates%2C%20around,male%2C%2089%25%20female>

- Urquiola, M. (2006). Identifying class size effects in developing countries: Evidence from rural Bolivia. *Review of Economics and Statistics*, 88(1), 171-177. <https://doi.org/10.1162/rest.2006.88.1.171>
- Urquiola, M., & Verhoogen, E. (2009). Class-size caps, sorting, and the regression-discontinuity design. *The American Economic Review*, 99(1), 179-215. <https://doi.org/10.1257/aer.99.1.179>
- Wahsheh, R., & Alhawamdeh, H. (2015). The role of female teachers in activating effective teaching skills and methods among high school students from the teachers' perspective – Najran, KSA. *Journal of Education and Practice*, 6(36), 162-174.
- WGI. (2023). *Worldwide Governance Indicators*. The World Bank. Retrieved June 5, 2023, from <https://info.worldbank.org/governance/wgi/>
- Wolf, S. (2007). Does aid improve public service delivery? *WIDER Research Paper, No. 2007/71*. The United Nations University World Institute for Development Economics Research (UNU-WIDER), Helsinki.
- World Bank, WDI. (2022). *World Development Indicators*. Retrieved from <https://databank.worldbank.org/source/world-development-indicators>
- World Bank. (1998). *Assessing Aid: A World Bank Policy Research Report*. Washington, D.C.: World Bank, Oxford University Press.
- World Bank. (2001). *Engendering Development: World Bank Policy Research Report*. World Bank and Oxford University Press.
- World Bank. (2023a). Retrieved June 5, 2023, from <https://data.worldbank.org/indicator/SE.PRM.CMPT.ZS?locations=ZG-8S-4E-7E-XJ>
- World Bank. (2023b). Retrieved June 5, 2023, from <https://data.worldbank.org/indicator/SE.SEC.NENR?locations=ZG-8S-4E-7E-XJ>
- World Bank. (2023c). Retrieved June 5, 2023, from <https://data.worldbank.org/indicator/SE.TER.ENRR?locations=ZG-8S-4E-7E-XJ>
- Xu, D., & Li, Q. (2018). Gender achievement gaps among Chinese middle school students and the role of teachers' gender. *Economics of Education Review*, 67, 82-93. <https://doi.org/10.1016/j.econedurev.2018.10.002>
- Zhao, M., & Glewwe, P. (2010). What determines basic school attainment in developing countries? Evidence from rural China. *Economics of Education Review*, 29, 451-460. <https://doi.org/10.1016/j.econedurev.2009.10.008>

## Appendix A. Summary of Variables, Data Sources, and Time Period

Variable	Explanation	Source and Time Period
<b>Dependent Variables</b>		
Primary School Completion Rate (PCR, in %)	The number of students successfully completing the last year of (or graduating from) primary school in a given year is divided by the number of children of official graduation age in the population.	WDI, The World Bank, 2022, (2002-2020)
Secondary School Net Enrolment Rate (Serner, in %)	The secondary school net enrollment rate is the ratio of children of official school age who are enrolled in school to the population of the corresponding official school age.	WDI, The World Bank, 2022, (2002-2020)
Tertiary School Gross Enrolment Rate (Terger, in %)	The tertiary gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of tertiary education shown.	WDI, The World Bank, 2022, (2002-2020)
<b>Explanatory Variables</b>		
Primary School Education Aid Per Capita (eAidPriP)	Primary School Education Aid per capita is a gross foreign aid disbursement into the primary education sector. Per capita is calculated as the total gross disbursement of primary education sector foreign aid provided by the Official Donors to individual countries divided by the total population of the recipient country. All gross disbursement of primary education sector foreign aid is in constant 2020 US\$.	OECD/DAC (CRS) , (2002-2020)

Secondary School Education Aid Per Capita (eAidSecP)	Secondary School Education Aid per capita is a gross foreign aid disbursement into the secondary education sector. Per capita is calculated as the total gross disbursement of secondary education sector foreign aid provided by the Official Donors to individual countries divided by the total population of the recipient country. All gross disbursement of secondary education sector foreign aid is in constant 2020 US\$.	OECD/DAC (CRS) , (2002-2020)
Tertiary School Education Aid Per Capita (eAidTerP)	Tertiary School Education Aid per capita is a gross foreign aid disbursement into the tertiary education sector. Per capita is calculated as the total gross disbursement of tertiary education sector foreign aid provided by the Official Donors to individual countries divided by the total population of the recipient country. All gross disbursement of tertiary education sector foreign aid is in constant 2020 US\$.	OECD/DAC (CRS) , (2002-2020)
<b>Control Variables</b>		
GDP per capita (GDPcap, constant 2015 US\$)	GDP per capita is gross domestic product divided by midyear population. It reflects the size of the economy.	WDI, The World Bank, 2022, (2002-2020)
Government expenditure on education, total (EDUCEXP, in % of GDP)	The government expenditure on education, both current and capital, on the percentage of GDP.	WDI, The World Bank, 2022, (2002-2020)
Inflation, Consumer Prices (INF, in annual %)	The annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	WDI, The World Bank, 2022, (2002-2020)
Control of Corruption (CC)	“Control of corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption.”	The World Bank’s Worldwide Governance Indicators. (2002-2020)
Government Effectiveness (GE)	Government Effectiveness (GE) captures: the quality of public service, the quality of civil service and how far it is independent of political pressures, the process and quality of policy formulation and implementation, the government’s credibility and commitment to such policies.	The World Bank’s Worldwide Governance Indicators. (2002-2020)
Primary Net Enrolment Rate (NER, in %)	Primary net enrollment rate is the ratio of children of official school age who are enrolled in school to the population of the corresponding official school age.	WDI, The World Bank, 2022, (2002-2020)
Primary Pupil-Teacher Ratio (PTR)	Primary school pupil-teacher ratio is the average number of pupils per teacher in primary school.	WDI, The World Bank, 2022, (2002-2020)
Primary Education Female Teachers (PeduTeaF, in %)	Female teachers as a percentage of total primary education teachers includes full-time and part-time teachers.	WDI, The World Bank, 2022, (2002-2020)
Secondary Pupil-Teacher Ratio (PTRsec)	Secondary school pupil-teacher ratio is the average number of pupils per teacher in secondary school.	WDI, The World Bank, 2022, (2002-2020)
Secondary Education Female Teachers (SecEduTeaF, in %)	Female teachers as a percentage of total secondary education teachers includes full-time and part-time teachers.	WDI, The World Bank, 2022, (2002-2020)
Tertiary Pupil-Teacher Ratio (PTRter)	Tertiary pupil-teacher ratio is the average number of pupils per teacher in tertiary school.	WDI, The World Bank, 2022, (2002-2020)

Source: - Prepared by the Author.

## Appendix B. Descriptive Statistic

Variable	Obs	Mean	Std. dev.	Min	Max
lneAidPriP	950	13.13	1.93	0	16.70
lneAidSecP	950	12.62	1.88	0	17.21
lneAidTerP	950	13.61	1.424	8.13	17.97
NER	950	82.83	14.45	31.02	99.92
PCR	950	77.94	21.09	21.11	121.7223
PTR	950	35.27	12.83	13.97	69.28
lnGDPCap	950	21.03	.70	19.41	22.44
INF	950	15.66	7.31	9.24	51.86

CC	950	1.10	.563	-2.5	3.32
GE	950	1.71	0.51	-2.5	3.42
PeduTeaF	950	52.94	21.29	9.428	98.78
Sernet	950	45.43	21.66	28.48	98.36
Tregro	950	15.69	13.52	23.08	72.96
PTRsec	950	24.30	8.25	28.14	54.39
SecEduTeaf	950	37.33	20.78	13.11	122.89
EDUCEXP	950	4.43	2.11	0.62	12.90

Source: Author's own computation.

### Appendix C. Name of Selected Countries

Belize, Benin, Bhutan, Bolivia, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Chad, Côte d'Ivoire, Djibouti, Egypt, El Salvador, Eritrea, Eswatini, Ethiopia, Gambia, Ghana, Guinea, Honduras, India, Indonesia, Iran, Kyrgyzstan, Lao, Lesotho, Mali, Mauritania, Mongolia, Morocco, Mozambique, Myanmar, Nepal, Niger, Pakistan, Philippines, Rwanda, Senegal, Sri Lanka, Tajikistan, Tanzania, Timor-Leste, Togo, Tunisia, Uzbekistan, Viet Nam, Yemen, Zambia, Zimbabwe.

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