DOES FOREIGN AID DRIVE GDP GROWTH IN DEVELOPING NATIONS? INVESTIGATING THE ROLE OF AID: *AN ECONOMETRIC STUDY*

by

Zeinah Abdelsalam

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West Virginia Wesleyan College
59 College Avenue, Buckhannon,
West Virginia, 26201

Abstract

This study investigates the relationship between foreign aid and real GDP growth in developing nations using cross-sectional data from 2022. Drawing on a sample of Least Developed Countries (LDCs) as defined by the United Nations and Lower-Middle-Income Countries (LMICs) per the World Bank, the analysis employs multiple linear regressions to evaluate how foreign aid per capita and various economic and institutional factors relate to growth. Across all models, foreign aid per capita displayed a statistically significant negative relationship with GDP growth, suggesting that increased aid may not always support economic performance. These findings contribute to ongoing debates about aid effectiveness and underscore the need for more nuanced policy approaches.

Introduction

The relationship between foreign aid and economic growth is one of significance due to its policy implications for donor countries and economic implications for recipient countries, but also the substantial monetary value of aid – which is frequently questioned. In 2023, the United States was the top provider of government aid worldwide, but Norway was the most generous relative to its national income, contributing 1.09% of its GNI to aid efforts. The United Nations (UN) advocates for wealthier countries to spend at least 0.7% of their gross national income (GNI) on international aid. However, only a few countries – like Norway, Luxembourg, Sweden, Germany, and Denmark – actually meet or exceed this goal. On average, member nations only contribute about 0.37% of their GNI, which is much lower than the UN's target (Kenton, 2024).

Foreign aid is often a passionately debated topic. Supporters argue that it helps countries develop, reduces poverty, and improves the recipient country's public living standards. On the other hand, critics point out that foreign aid can be costly for donor countries and their citizens, hard to manage and regulate effectively, and may even lead to dependency instead of self-reliance for recipient nations (Kenton, 2024). Ultimately, the main dilemma around the topic of international aid is that it is "probably needed most in countries in which it is least effective." (Tarp, 2000, p. 4, 5)

Literature

Foreign aid refers to assistance provided by one country to another, which can be in the form of grants, loans, or other support. Some broader definitions also include assistance provided across borders by religious groups, non-governmental organizations (NGOs), and private foundations. In the U.S., foreign aid usually means the military and economic help the federal government provides to other nations. Typically, this kind of aid flows from developed countries to developing ones. According to the Organization for Economic Co-operation and Development (OECD), development aid – a category of foreign aid – is referred to as Official Development Assistance (ODA) in their reporting. It includes aid from donor governments to developing countries, typically for projects aimed at reducing poverty and promoting sustainable economic growth; and is generally divided into two main types: bilateral aid, which is direct support from one government to another, and multilateral aid, where multiple governments contribute funding to international organizations, such as United Nations agencies, which then allocate the funds to aid programs and projects (OECD, 2022).

Optimists tend to believe that a large increase in foreign aid will be used as economic models predict, without considering the possibility that governments may misuse the funds for their own interests. On the other hand, pessimists argue that donors should bypass the governments of recipient countries and give aid directly to the poor, but they overlook the practical and political challenges of doing so. Neither of these views fully address the role of government and political institutions. Many economists in the foreign aid and economic growth debate focus mainly on aid without considering the political realities, such as how aid often ends up in the hands of corrupt or poorly governed regimes (Wright & Winters, 2009). Therefore, once data are analyzed, it will be important to understand the political context of the countries

studied, as this will help explain how effective foreign aid is in those nations. While the study may show foreign aid as statistically significant or insignificant in relation to GDP growth, the true effectiveness of aid will likely depend on the political environment and governance of the recipient countries (Burnside & Dollar, 2000) – also highlighting a limitation of econometric models.

Among foreign aid or ODA, several other macroeconomic, political, institutional, demographic, and geographic variables could influence economic growth, measured by GDP. While this study focuses on the impact of foreign aid, it is essential to contextualize and construct a predictive model that considers other variables with a possible influence on GDP. In macroeconomic terms, GDP is a function of consumption, investments, government purchases, and net exports, which are all important variables to include. More specifically, trade openness (total trade as a percentage of GDP), inflation rates, and government spending levels are commonly associated with economic performance (World Bank, n.d.). Investment levels, particularly foreign direct investment (FDI), are also crucial indicators of economic growth, as they often complement foreign aid in stimulating productivity (UNCTAD, n.d.).

As mentioned previously, the quality of governance and institutions in recipient countries often determine the extent to which aid is effective. Political stability, certain laws, and corruption are likely significant, but can be difficult to measure. Poor governance can limit the impact of aid by diverting funds or fostering dependency rather than self-sufficiency (Burnside & Dollar, 2000). This would negatively influence underlying macroeconomic drivers of GDP growth such as public spending. Inefficient or misallocated government spending can reduce the potential positive effects on economic growth, particularly in developing countries where corruption and weak institutions may undermine public sector efficiency (Mauro, 1995).

Social and demographic factors like population and levels of education also play critical roles in economic growth. For instance, countries with higher levels of human capital, as measured by the Human Capital Index, tend to experience faster economic development (World Bank, n.d.). While studies highlight the impact of educational attainment on economic growth, emphasizing its role as a proxy of human capital (Barro & Lee, 2013), this may differ in developing nations. The brain drain phenomenon, where educated individuals migrate for better opportunities, can reduce the economic benefits of educational investment, limiting the ability of developing nations to capitalize on education and leading to negative returns in the form of reduced innovation and skilled labor shortages (Beine, et al., 2001). Also, in these nations, the quality of education and job availability may not translate into productivity gains, with higher unemployment or underemployment rates among highly educated individuals, and a mismatch between education and job market needs (Psacharopoulos & Patrinos, 2018). Thus, the typical positive link between education and GDP growth may not hold for all, if any, developing countries.

Moreover, geographic location can come with resource advantages that can influence economic growth in nations. More resources do not necessarily have a positive relationship with economic growth due to what is known as the "resource curse," where reliance on natural resources undermines economic diversification (Sachs & Warner, 2001). Technological advancements are likely to positively influence economic growth as well. While all these variables have theoretical relevance to GDP growth, practical considerations limit this study to those with robust and accessible data sources, especially for developing nations. This research will prioritize ODA among readily available data from secondary sources.

This study will focus on a sample of low-income to low-middle-income countries, specifically those classified as Least Developed Countries (LDCs) by the United Nations, and Lower-Middle-Income Countries (LMICs) by the World Bank. LDCs are nations identified as having the lowest levels of development, facing challenges such as low income, limited education and healthcare systems, and high vulnerability to economic and environmental shocks. The majority of LDCs are located in sub-Saharan Africa, Asia, and the Pacific, and they receive prioritized international support for development (United Nations, n.d.). LMICs are economies "with a GNI per capita between $1,086 and $4,255" (European Public Health Conference, n.d.).

Expanding the sample to include LMICs with LDCs allows for a broader analysis of how foreign aid functions across different levels of economic development. While LDCs face structural challenges that often limit aid effectiveness, LMICs typically have stronger institutions, higher levels of foreign direct investment (FDI), and better infrastructure, which may influence the effectiveness of aid and ultimately its relationship with economic growth. Empirical studies in the past have yielded results that indicate a positive correlation between institutional quality and FDI in nations (Sabir, Rafique, & Abbas, 2019).

Given these considerations, this study hypothesizes that foreign aid has a statistically significant impact on real GDP growth in developing nations, though the extent of its effectiveness may vary based on macroeconomic conditions, demographic factors, quality of governance, and institutional strength.

Model Specification

The model will utilize data from 2022, as it is the most recent year with comprehensive and updated information. The analysis will first focus on nations classified as LDCs by the United Nations, including Afghanistan, Angola, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, South Sudan, Sudan, Timor-Leste, Togo, Tuvalu, Uganda, United Republic of Tanzania, Yemen, and Zambia (United Nations, n.d.).

Economic growth will be defined as the real GDP growth rate for each nation, borrowed from the International Monetary Fund (IMF)'s real GDP growth (annual percentage change) dataset from 2022 (International Monetary Fund, 2022). This is a beneficial measure of GDP compared to those from other sources since it is adjusted for inflation. However, it does not account for population. Eritrea will be excluded from the list of forty-five LDCs as there was no GDP growth data for that nation.

Foreign aid will be defined as foreign aid received per capita and is the net official development assistance (ODA) divided by population. This data will be expressed in U.S. dollars and adjusted for inflation – borrowed from Our World in Data's 2022 data set (Our World in Data, 2022). Foreign aid per capita is expected to influence real GDP growth rates positively or negatively by either providing resources that support investments in infrastructure, health, education, and economic reforms in recipient nations or further perpetuating corruption. This is

particularly relevant in LDCs, where domestic savings and capital are insufficient to drive significant economic growth (Tarp, 2000).

Final consumption expenditure, a measure (in dollars) of household consumption, represents the total spending by households on goods and services. This variable is expected to have an impact on economic performance by reflecting a share of GDP in a traditional macroeconomic equation. Final consumption expenditure is hypothesized to have a positive relationship with the real GDP growth rate. High levels of consumption indicate high household purchasing power that drives demand for goods and services, stimulating economic activity and thus contributing to GDP growth. This would apply to LDCs, and data is derived from the World Bank Group's Prosperity Data 360 online database.

Missing data for thirteen countries was split into two categories: nations that were not on the World Bank's list to begin with or nations that were on the list but had missing values from the year 2022. The observations of nations that were not on the World Bank list – Liberia, Malawi, Mozambique, Myanmar, Sao Tome and Principe, and Tuvalu – were eliminated from the sample size entirely. The second category included listed countries but with missing 2022 data, further divided based on the availability of data from 2020 and 2021. If a country had no data for any of the three years (2020, 2021, or 2022), such as Lao People's Democratic Republic, South Sudan, and Yemen, its observation was excluded. However, countries with data for both 2020 and 2021 had their final consumption expenditure for 2022 estimated as the average of those two years. Nations like Guinea-Bissau and Solomon Islands, which only had 2020 data, were also excluded from the sample.

The World Bank defines foreign direct investment (FDI) as the net inflows of investment in an economy, and in this study, FDI measured as a percentage of GDP will be utilized in

analysis. “It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments,” (World Bank, n.d.) and is hypothesized to have a positive relationship with the real GDP growth rate. Data for the year 2022 was found for all nations in the data point up to this point except for Afghanistan. In order to proxy Afghanistan’s 2022 FDI value, the average of the five years before it was taken (since the three years before all had the same value of 0.1, offering no variance thus a lack of reliability).

Government purchases, also defined as government final consumption expenditure (GFCE) by the World Bank and measured as a percentage of GDP, are expected to have a positive or negative relationship with real GDP growth rates because increased government spending can directly stimulate economic activity, unless it is mismanaged or misused. In countries with weaker institutions, government spending can be prone to corruption, which could undermine its potential economic benefits. Thus, the typical positive relationship between GFCE and GDP growth may not apply universally, particularly where public expenditure is inefficient or fails to target key growth drivers. Niger did not have GCFE values available for the year 2022, and Kiribati did not have any GCFE values for not only the year 2022, but the five years before it, so its observation was eliminated from the data set due to the lack of a base to estimate a 2022 value from. To proxy a 2022 GCFE value for Niger, the average of the five years before it was taken.

Net trade in goods and services – borrowed from the World Bank database – will be the variable used to measure each nation’s net exports. It is hypothesized to have a positive relationship with real GDP rate growth. Somalia, the Central African Republic, and Chad did not just lack data for the year of 2022, but also the five years before it. Therefore, they were removed from the sample. Senegal and the Democratic Republic of Congo lacked data for the year of

2022 but had data for the five years before it – "net trade in goods and services" for the year of 2022 was proxied, for both countries, based on an average of those five values. Togo and Afghanistan lacked data for the years 2022 and 2021, but had data for the four years prior to 2021, which was averaged to proxy a value for 2022 net trade in both countries.

Education and human capital are fundamentally linked, as the attainment of at least a secondary education level, equivalent to a high school diploma, serves as a crucial foundation for developing the human capital needed to drive economic growth in developing nations. This study will examine the percentage of the population in each nation with at least the equivalent of a high school diploma in 2022. It is hypothesized that this variable will either positively or negatively correlate with real GDP growth rates, as higher educational attainment enhances the human capital necessary for fostering economic development, but only if and when the circumstances allow so. The World Bank database defines this variable as "Educational attainment, at least completed upper secondary," pertaining to the entire population of those 25+ and measures it as a total percentage of the population – male and female (World Bank, 2022).

Data for this variable in the year of 2022 was unavailable for several countries including Angola, Burundi, Cambodia, the Democratic Republic of Congo, Djibouti, Ethiopia, Gambia, Guinea, Haiti, Lesotho, Madagascar, Mauritania, Nepal, Sierra Leone, and Uganda. Proxying values for the missing data proved challenging due to inconsistencies in the dataset across the five years prior to 2022. To address this, the most recent available value prior to 2022 was used, acknowledging that this approach may reduce the reliability of the variable. The most recent values utilized for each country are as follows: Angola – 2022; Burundi – 2017; Cambodia – 2021; the Democratic Republic of Congo – 2020; Djibouti – 2017; Ethiopia – 2021; Gambia –

2020; Guinea – 2019; Haiti – 2017; Lesotho – 2019; Madagascar – 2018; Mauritania – 2019; Nepal – 2021; Sierra Leone – 2019; Uganda – 2021.

Next, the sample will be expanded to include nations classified as Low-and Middle-Income Countries (LMICs) by the World Bank. The list of LMICs is Angola, Algeria, Bangladesh, Benin, Bhutan, Bolivia, Cabo/Cape Verde, Cambodia, Cameroon, Comoros, Republic of Congo, Côte d'Ivoire, Djibouti, Egypt, El Salvador, Eswatini, Ghana, Haiti, Honduras, India, Indonesia, Iran, Kenya, Kiribati, Kyrgyz Republic, Lao PDR, Lebanon, Lesotho, Mauritania, Micronesia (Federated States of), Mongolia, Morocco, Myanmar, Nepal, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Philippines, Samoa, São Tomé and Príncipe, Senegal, Solomon Islands, Sri Lanka, Tanzania, Tajikistan, Timor-Leste, Tunisia, Ukraine, Uzbekistan, Vanuatu, Vietnam, Palestine (West Bank and Gaza), and Zimbabwe (European Public Health Conference, n.d.). However, the whole list will not be added to the sample size.

Rather, only the following nations will be incorporated into the dataset along with the final LDC list (post-exclusion of countries with missing data), with the foreign aid data and other relevant variables sourced from the same databases as used for the LDCs: Algeria, Bhutan, Bolivia, Cabo/Cape Verde, Cameroon, Republic of Congo, Côte d'Ivoire, Egypt, El Salvador, Eswatini, Ghana, Honduras, India, Indonesia, Iran, Kenya, Kyrgyz Republic, Lebanon, Micronesia (Federated States of), Mongolia, Morocco, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Philippines, Samoa, Sri Lanka, Tajikistan, Tunisia, Ukraine, Uzbekistan, Vanuatu, Vietnam, Palestine (West Bank and Gaza), and Zimbabwe. The hope is that these additional countries will provide a broader perspective on the relationship between foreign aid and economic growth.

Since the nations already included in the original LDC list are being retained in the analysis, no countries from the LMIC list that overlap with the existing LDC sample (19) will be reintroduced. Furthermore, countries that were previously excluded from the LDC list (15) due to missing or incomplete data will also not be added back into the sample. This includes nations that were eliminated earlier, such as those with substantial gaps in key variables or those unable to provide reliable data for the year 2022 or any other year(s) utilized to proxy missing data.

Similar to the LDC sample, any missing data points for the newly added LMIC countries will be handled in line with the established methodology for the LDCs. Where necessary, missing data will be proxied using available data from the most recent years, typically using averages of the preceding years. If significant data gaps remain, further justification and appropriate proxies will be outlined in the analysis. The newly added LMIC countries will undergo similar checks for data consistency, and adjustments will be made where appropriate.

Bhutan and Lebanon were missing a final consumption expenditure value for the year 2022, and so like the method used in cleaning up the LDC sample, 2020 and 2021 values were averaged to proxy a 2022 value. Nigeria was missing from the data set entirely, so its observation was eliminated. Attempts were made to locate Nigeria's final consumption expenditure 2022 data through other data sets but were unsuccessful. Kyrgyz Republic, Micronesia (Federated States of), and Papua New Guinea had no data to proxy from for all three years (2020, 2021, and 2022), therefore were excluded from the sample.

Eswatini did not have a GCFE value for 2022 nor the five years before that and was therefore eliminated from the sample. Vanuatu did not have GCFE values for 2022, 2021, and 2020, but had available data for the years 2019, 2018, and 2017 – an average of those three GCFE values was used to proxy a value for 2022.

For the “Net trade in goods and services” variable, the Republic of Congo was missing 2022 data. In an attempt to average values from the five years prior to 2022, only values from 2021, 2020, and 2019 were found. They were averaged to proxy a value for 2022. Iran not only lacked data for the year 2022, but the five years prior, too. Therefore, its observation was fully eliminated.

Data for the variable “Educational attainment, at least completed upper secondary,” in the year of 2022 was unavailable for several countries including Algeria, Bhutan, Cabo/Cape Verde, Cameroon, the Republic of Congo, Lebanon, Morocco, Nicaragua, Pakistan, Tajikistan, Ukraine, and Vanuatu. Similar to countries from the LDC list, proxying values for the missing data was challenging due to inconsistencies in the dataset across the five years prior to 2022. The most recent available values prior to 2022 (respective to each country) were used and are as follows: Algeria – 2019; Bhutan – 2017; Cameroon – 2018; Lebanon – 2019; Nicaragua – 2021; Pakistan – 2021; Tajikistan – 2017; Ukraine – 2021; Vanuatu – 2020. Cabo/Cape Verde, the Republic of Congo, and Morocco had no data for this variable for the five years prior to 2022 – and were therefore eliminated to avoid using exceedingly outdated data.

Methodology

The combination of LDCs and LMICs and exclusion of countries with missing data yielded a sample of 56 countries. The anticipated unavailability of secondary data poses a limitation that is discussed further in the paper. Statistical analysis, specifically regression, was conducted using Excel.

Data Analysis & Findings

The initial regression model factored in foreign aid received per capita, final consumption expenditure, foreign direct investment, government final consumption expenditure, net trade in goods and services, and educational attainment as predictors of real GDP growth rate, expressed as the following equation:

$$y_{GDP} = \beta_0 + \beta_1 x_{Aid} + \beta_2 x_{FCE} + \beta_3 x_{FDI} + \beta_4 x_{GFCE} + \beta_5 x_{Trade} + \beta_6 x_{Edu} + \in$$

TABLE 1: Initial Regression Model

	Real GDP Growth Rate		
	β	SE β	Significance
Foreign Aid Received per capita	-.0201	.00516	.0003****
Final Consumption Expenditure	.0000000000000349	.00000000000262	.989
Foreign Direct Investment	.107	.14	.448
Government Final Consumption Expenditure	-.187	.0951	.0543*
Net Trade in Goods and Services	-.00000000000153	.0000000000397	.969
Educational Attainment (H.S. equivalent)	-.0317	.0278	0.26
Constant	8.876	1.726	.000005****
Observations (N) = 56 Adjusted R^2 = .412 *f* = 7.426, p = .00001****			
Note:		**** p < .001, *** p < .01, ** p < .05, * p < .1	

These results could be expressed as the following equation:

$$y_{GDP} = 8.876 - .0201x_{Aid} + .0000000000000349x_{FCE} + .107x_{FDI} - .187x_{GFCE} - .00000000000153x_{Trade} - .0317x_{Edu} + \in$$

This first regression model revealed that foreign aid received per capita was the only statistically significant variable, exhibiting a negative relationship with real GDP growth rate at a .001 significance level. The constant term was also highly significant. However, all other independent variables – including final consumption expenditure, foreign direct investment, net trade in goods and services, and educational attainment – failed to reach significance. Government financial consumption expenditure was slightly above .05 significance.

The model's adjusted R^2 value of 0.476 suggests a moderate explanatory power, and the *f* statistic indicates high model significance < .001. However, the lack of significance in most variables and the unexpected negative coefficients of net trade in goods and services raises concerns about potential econometric issues. One likely issue is omitted variable bias, as key economic and institutional factors influencing GDP growth, such as corruption, government effectiveness and regulation, and political stability are not accounted for in this initial model.

This necessitated a second regression model that incorporates corruption, government effectiveness, political stability, and regulatory quality as additional key factors influencing real GDP growth rates. The inclusion of these variables is based on their established relevance in the literature, with an understanding that the overall economic environment is influenced through factors such as institutional quality, stability, and regulatory frameworks. The relevant details for these additional variables can be found in the updated model specification section below.

Updated Model Specification

As an attempt to address econometric issues, variables attempting to capture corruption, government effectiveness, political stability, and regulatory quality are added to the initial data set for analyses beyond the initial model.

Transparency International conceptualizes corruption using the Corruption Perceptions Index (CPI), which assesses perceived public sector corruption in 180 countries and territories. The index assigns scores on a scale from 0 (highly corrupt) to 100 (very clean), with lower scores indicating higher corruption (Transparency International, 2022). It is hypothesized to have a positive relationship with real GDP growth, as less corrupt countries tend to have higher CPI scores, which may correspond to stronger economic growth. Samoa and the West Bank and Gaza are not present in CPI data, regardless of the year. Difficulty in proxying missing values for the two observations resulted in elimination from the second sample size.

Next, institutional variables are derived from the World Bank's World Governance Indicators database. The World Bank defines "Government Effectiveness" as capturing perceptions of the quality of public services, the civil service's independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to these policies. An "estimate" provides a country's score on the aggregate indicator, ranging from approximately -2.5 to 2.5, based on a standard normal distribution (World Bank, 2022). It is hypothesized to have a positive relationship with real GDP growth, as more effective governments are likely to provide a more conducive environment for economic growth.

Political Stability and Absence of Violence/Terrorism aims to capture perceptions of the likelihood of political instability and politically motivated violence, including terrorism.

Similarly, it is an "estimate," providing a country's score on the aggregate indicator (World Bank, 2022). It is hypothesized to have a positive relationship with real GDP growth, as greater political stability and absence of violence or terrorism would likely promote economic growth.

Lastly, from these three indicators, "Regulatory Quality" aims to capture perceptions of the government's ability to formulate and implement sound policies and regulations that promote private sector development. It is also measured as an estimate (World Bank, 2022), and is hypothesized to have a positive relationship with real GDP growth, as governments with higher regulatory quality are better positioned to foster economic development through effective policy formulation and regulation.

Updated Methodology

Excluding Samoa and West Bank and Gaza resulted in an updated sample size of 54.

Data Analysis & Findings

The modified regression equation, incorporating the variables used in the initial regression with the addition of corruption perceptions, government effectiveness, political stability, and regulatory quality, would be expressed as the following:

$$y_{GDP} = \beta_0 + \beta_1 x_{Aid} + \beta_2 x_{FCE} + \beta_3 x_{FDI} + \beta_4 x_{GFCE} + \beta_5 x_{Trade} + \beta_6 x_{Edu} + \beta_7 x_{Corrupt} + \beta_8 x_{GovEff} + \beta_9 x_{PolStab} + \beta_{10} x_{RegQual} + \in$$

TABLE 2: Second Regression Model

	Real GDP Growth Rate		
	β	SE β	Significance
Foreign Aid Received per capita	-.0285	.00592	.0000184****
Final Consumption Expenditure	-.000000000002	.00000000000246	.42
Foreign Direct Investment	.0325	.128	.801
Government Final Consumption Expenditure	-.157	.0815	.0605*
Net Trade in Goods and Services	-.0000000000332	.0000000000343	.338
Educational Attainment (H.S. equivalent)	-.0539	.0283	.0632*
Corruption Perceptions	-.0432	.101	.671
Government Effectiveness	2.12	2.22	.343
Political Stability	2.4	.797	.00432***
Regulatory Quality	-1.35	2.21	.546
Constant	13.3	4.94	.0098***
Observations (N) = 54 Adjusted R^2 = .582 *f* = 8.38, p = .00000023****			
Note:			**** p < .001, *** p < .01, ** p < .05, * p < .1

These results could be expressed as the following equation:

$$y_{GDP} = 13.3 - .0285x_{Aid} - .000000000002x_{FCE} + .0325x_{FDI} - .157x_{GFCE} - .0000000000332x_{Trade} - .0539x_{Edu} - .0432x_{Corrupt} + 2.12x_{GovEff} + 2.4x_{PolStab} - 1.35x_{RegQual} + \in$$

The second regression analysis yielded an adjusted R^2 of 66.1%, indicating that the model explains a substantial portion of the variation in real GDP growth. The *f*-statistic was highly significant (p = 0.00000023), confirming the overall strength of the model. Among the independent variables, foreign aid received (p = 0.0000184), political stability (p = 0.00432), government final consumption expenditure (p = .0605), and educational attainment (p = .0632) were significant predictors, aligning with their hypothesized relationships with GDP growth. The constant term was also significant at the 0.01 level.

However, several variables – final consumption expenditure, net trade in goods and services, corruption perceptions, and regulatory quality – had unexpected coefficient signs, suggesting potential model specification issues. Potential concerns include omitted variable bias and multicollinearity; a correlation matrix (*Appendix A*) revealed that regulatory quality was highly collinear with both corruption

perceptions and government effectiveness. To mitigate this issue, regulatory quality will be excluded from the third regression analysis. The equation from the updated model specification will be simplified to the following:

$$y_{GDP} = \beta_0 + \beta_1 x_{Aid} + \beta_2 x_{FCE} + \beta_3 x_{FDI} + \beta_4 x_{GFCE} + \beta_5 x_{Trade} + \beta_6 x_{Edu} + \beta_7 x_{Corrupt} + \beta_8 x_{GovEff} + \beta_9 x_{PolStab} + \in$$

TABLE 3: Third Regression Model

	Real GDP Growth Rate		
	β	SE β	Significance
Foreign Aid Received per capita	-.0296	.00559	.00000364****
Final Consumption Expenditure	-.00000000000205	.00000000000244	.407
Foreign Direct Investment	.0452	.125	.72
Government Final Consumption Expenditure	-.155	.081	.0613*
Net Trade in Goods and Services	-.0000000000336	.000000000034	.33
Educational Attainment (H.S. equivalent)	-.0489	.0269	0.0754*
Corruption Perceptions	-.0381	.0999	.705
Government Effectiveness	1.26	1.7	.46
Political Stability	2.37	.79	.00445***
Constant	13.4	4.9	.009***
Observations (N) = 54 Adjusted R^2 = .588 f = 9.4, p = .0000000847****			
Note:			**** p < .001, *** p < .01, ** p < .05, * p < .1

These results could be expressed as the following equation:

$$y_{GDP} = 13.4 - .0296x_{Aid} - .00000000000205x_{FCE} + .0452x_{FDI} - .155x_{GFCE} - .0000000000336x_{Trade} - .0489x_{Edu} - .0381x_{Corrupt} + 1.26x_{GovEff} + 2.37x_{PolStab} + \in$$

The results of the third regression model closely align with the findings from the second model. Foreign aid received remains highly significant at the 0.001 level (p = 0.00000364). Political stability (p = .00445), government final consumption expenditure (p = .0613), and educational attainment (p = .0754) also retain their same significance levels.

The model explains approximately 65.8% of the variation in real GDP growth (Adjusted $R^2 = 0.658$), and the overall regression remains highly significant, with the *f*-statistic reaching significance at the 0.001 level. However, final consumption expenditure, net trade in goods and services, and corruption perceptions continue to exhibit unexpected coefficient signs. This suggests that removing regulatory quality, which was collinear with other governance indicators, did not meaningfully alter the results.

Discussion & Limitations

The regression analyses revealed that foreign aid per capita consistently had a negative and statistically significant relationship with real GDP growth, suggesting that foreign aid may be associated with adverse effects on economic growth in developing nations. Regardless of a positive or negative relationship, the hypothesis of this study was supported by the findings, given foreign aid's statistical significance regardless of its effectiveness. Additionally, political stability was positively significant, highlighting its importance in fostering a favorable environment for economic growth. Despite these findings, the analysis encountered issues with other variables, such as final consumption expenditure, net trade, and corruption perceptions, which exhibited unexpected coefficient signs. These results suggest potential model specification problems, including omitted variable bias and multicollinearity among governance indicators.

A key limitation of this analysis is the relatively small sample size of 56 countries, which, while appropriate for an initial study, may not fully capture the complexity of the relationships between foreign aid and GDP growth. This issue was particularly apparent when considering the large number of independent variables included in the model relative to the sample size. The addition of further variables, such as net migration, could be an interesting avenue for future research, as the brain drain theory suggests that migration can significantly impact GDP growth by either enhancing or depleting human capital. However, in this study, the decision was made to avoid introducing too many independent variables relative to the sample size, as this could potentially lead to overfitting independent variables. Moreover, future research could also broaden the scope beyond just developing nations to include foreign aid's impact on additional country categories, which would help increase the sample size and allow for more robust analysis.

Conclusion

This study highlighted the complex relationship between foreign aid and economic growth in developing nations. While the regression analyses found a statistically significant negative relationship between foreign aid per capita and real GDP growth, the broader takeaway is that the effectiveness of aid is far from straightforward. Collecting reliable data for developing nations proved difficult and underscored the limitations in drawing firm conclusions from any single model. Nonetheless, research like this can inform donor countries' policy decisions by questioning the assumptions that foreign aid universally promotes growth. It also contributes to ongoing theoretical debates surrounding aid's role in development. Finally, this research raises important questions about how governments and institutions function in the aid allocation process – particularly whether more direct pathways to those in need might improve outcomes.

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Appendix

Appendix A

	Foregin Aid	*FCE*	*FDI*	*GFCE*	*Net Trade*	*Education*	*Corruption*	*GovEffectiveness*	*PolStability*	*RegQuality*
Foreign Aid	1									
FCE	-0.148272	1								
FDI	-0.065385	-0.066599	1							
GFCE	0.4844432	-0.157912	-0.242333	1						
Net Trade	-0.025275	-0.73844	0.0109328	0.0315627	1					
Education	0.1747584	0.1115211	0.0389985	-0.050474	-0.092091	1				
Corruption	0.1762747	0.1017772	-0.094746	0.145359	-0.015773	-0.132706	1			
GovEffectiveness	-0.012437	0.3778883	0.1200653	-0.033368	-0.181467	0.1880016	0.7223458	1		
PolStability	0.0776325	-0.039468	0.0938573	-0.013929	0.131206	0.1211994	0.5145242	0.513155085	1	
RegQuality	0.1508864	0.2982618	0.0025554	0.0680541	-0.149316	0.0261508	0.6525086	0.807052392	0.4443358	1