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Foreign Aid and Economic Growth in Nepal

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Abstract

This study focuses on conducting an empirical investigation to analyze the nature, trend, and structure of foreign aid and its impact on Nepal's economic growth. To achieve this, the study adopts descriptive and quantitative research design and utilizes an Autoregressive Distributed Lag model within the Barro regression framework. Data for the analysis, spanning from 1975 to 2021, are sourced from the Nepal Rastra Bank, Central Bureau of Statistics, and Ministry of Finance. The nature and trend analysis indicate that foreign aid follows a non-linear pattern, with an overall upward fluctuating trend across diverse sectors. The estimated results show that a 1 percent positive increase in foreign aid leads to a 0.22 percent rise in GDP in the long run, and a 0.09 percent increase in GDP in the short run, both at the 1 percent significance level. These findings indicate that foreign aid has a positive impact on Nepal's economic growth, contributing capital for investment in developing countries, and being more effective when macroeconomic indicators improve, leading to a more favorable economic situation. In the short run, foreign aid positively affects GDP due to effective monitoring, improved aid management, and focus on need-based sectors for development. The study concludes that Nepal needs to review its policies to address the growing trade deficit and closely monitor foreign aid for achieving higher economic growth.

Keywords: foreign aid, GDP growth, nature, ARDL model.

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Introduction

Foreign aid has long been considered a vital source of external financing for developing countries. It serves as an essential tool to bridge the saving-investment gap, facilitate capital formation, and promote economic growth. According to Moreira (2005), foreign aid can contribute significantly to productivity enhancement, employment generation, technology transfer, and poverty reduction in aid-recipient nations. Despite these potential benefits, the empirical literature on the effectiveness of foreign aid presents mixed findings.

On one hand, proponents such as Burnside and Dollar (1997), Dalgaard et al. (2004), Moreira (2005), and Minoiu and Reddy (2009) argue that foreign aid can positively influence economic growth by supplementing capital requirements and enhancing macroeconomic performance. On the other hand, critics like Griffin and Enos (1970), Boone (1996), Lensink and White (2001), Easterly (2003), and Mallik (2008) contend that foreign aid may foster dependency, encourage inefficient allocation of resources, and reduce incentives for domestic resource mobilization due to weak governance, poor policy implementation, and corruption. Furthermore, much of the aid is often diverted to consumption rather than productive investment.

In Nepal, foreign aid has played a significant role in the country's development journey since the 1950s. Following the end of the autocratic Rana regime in 1951, Nepal opened its doors to international cooperation, initiating its first foreign aid agreement with the United States. Over time, other countries such as India, China, and the former USSR joined as key development partners (Khadka, 1997). The country's formal development planning began with the First Five-Year Plan (1956–1961), and foreign aid has since remained a major contributor to Nepal's development expenditure. Despite political upheavals, shifts in economic regimes, and structural changes in governance—including the transition from monarchy to a federal democratic republic in 2008—the importance of foreign aid in Nepal's planning process has continued (Khanal, 2017; Poudyal, 2023).

Throughout different development plans, foreign aid has financed a significant portion of Nepal's capital expenditure. For example, in the Sixth Plan, aid financing reached 63.7 percent, and in several subsequent plans, the share remained above 50 percent, despite some fluctuations. The Fifteenth Plan reported foreign aid financing at 42.7 percent of capital expenditure (Poudyal, 2023). This consistent reliance underscores Nepal's ongoing resource gaps in saving-investment, export-import, and government revenue-expenditure balances.

In addition to foreign aid, Nepal relies heavily on remittances and foreign direct investment (FDI), although both face challenges. Remittance inflows, while significant,

result from labor migration and expose the economy to external vulnerabilities. On the other hand, FDI remains limited due to infrastructural bottlenecks and political uncertainties. Domestic revenue generation also suffers from poor fiscal management, administrative inefficiencies, and corruption (Pant, 2006). Given these constraints, foreign aid remains an important instrument to support the country's development and progress towards achieving the Sustainable Development Goals (SDGs) by 2030 (MOF, 2018).

Despite over seven decades of aid-financed development efforts, Nepal remains one of the least developed countries, with a per capita income of around US\$1191 and nearly 21.6 percent of its population living below the poverty line (MOF, 2021). This raises critical questions about the actual impact of foreign aid on economic growth. While some argue that aid has played a crucial role in improving social indicators and reducing poverty, others criticize its limited impact due to governance issues and inefficient allocation (Khanal, 2017). The debate over aid effectiveness is further complicated by the "micro-macro paradox," which reflects discrepancies between positive project-level outcomes and weak macroeconomic effects of aid. High levels of aid inflows can also result in macroeconomic distortions such as real exchange rate appreciation, undermining external competitiveness (Moreira, 2005).

Existing studies on Nepal's aid-growth nexus reveal methodological limitations and contradictory conclusions. While some descriptive analyses (Mihaly, 1965; Singh, 1985; Khadka, 1996) suggest limited impact of aid, other econometric studies (Poudyal, 1988; Sharma and Bhattarai, 2013; Pradhan and Phuyal, 2020) have found positive relationships. Conversely, some researchers (Bhattarai, 2005; Karki, 2019) report negative impacts. Many of these studies either excluded multilateral aid data or failed to incorporate relevant policy variables, leading to inconclusive results. Therefore, a comprehensive and methodologically sound investigation is necessary to assess the actual impact of foreign aid on Nepal's economic growth. In this context, the present study aims to analyze the nature, trend, and structure of foreign aid in Nepal and to investigate its relationship with economic growth over the period 1975 to 2021. The findings are expected to provide meaningful insights for evidence-based policy formulation and contribute to the broader discourse on aid effectiveness in developing economies like Nepal.

Review of Literature

The relationship between foreign aid and economic growth has remained a contested topic in development economics since the 1970s. A significant body of research highlights the limitations of aid in achieving sustained economic performance, while others suggest its effectiveness is context-dependent.

Griffin and Enos (1970) were among the earliest scholars to express skepticism toward aid, using panel data from 33 countries between 1957 and 1964. They found a negative relationship between foreign aid and growth, arguing that aid displaced domestic savings and distorted investment incentives. However, their findings were constrained by a small sample size, lack of control variables, and absence of diagnostic testing, which limits the robustness and generalizability of their conclusions. Boone (1996) extended this skepticism by analyzing data from 96 countries over two decades (1971–1990). Using an OLS framework, he found no significant impact of aid on investment or growth, noting that aid often expanded government consumption without improving welfare for the poor. Boone's model, however, assumed linear relationships and ignored dynamic effects such as time lags and technological progress, reducing its explanatory power.

The limitations of linear models led Lensink and White (2001) to propose the concept of an aid Laffer curve, suggesting that aid may only be effective up to a certain threshold, after which returns diminish or become negative. Using 2SLS on data from 111 developing countries (1975–1992), they found diminishing returns to aid, though their results were highly sensitive to model specification and potentially distorted by outliers. Similarly, Easterly (2003) re-evaluated Burnside and Dollar's (2000) influential aid-policy hypothesis, arguing that policy quality and measurement methods significantly affect aid's effectiveness. His mixed findings—ranging from weak positive effects to outright negative correlations—underscore the contextual complexity of aid outcomes. Yet, Easterly's models suffered from statistical flaws including autocorrelation, misspecification, and low explanatory power.

Studies focusing on African and Middle Eastern economies provide further nuance. Mallik (2008) used a VECM to assess aid's effects in six of Africa's poorest countries, finding conflicting short-term results and negative long-term impacts on per capita income. Despite the comprehensive model, issues such as non-stationary variables and poor fit compromised its reliability. Ali (2013) focused on Egypt (1970–2010), applying Johansen cointegration and VECM, and found consistently negative aid effects in both the short and long run. He recommended shifting policy focus from aid dependency to domestic resource mobilization, though his econometric approach lacked tests for structural breaks and autocorrelation.

More recent empirical research offers mixed outcomes. Ekanayake and Chatrna (2010) assessed 83 countries (1980–2007) using panel least squares and found income-based variation: aid had a positive but statistically insignificant effect in low- and upper-middle-income countries, while its effect was negative in lower-middle-income countries. Their findings suggested diminishing returns to aid, yet model limitations—such as endogeneity, omitted policy variables, and ignored time dynamics—hindered definitive conclusions. Tadesse (2011), studying Ethiopia (1970–2009), found that foreign aid had a significant

positive long-term effect on growth, but was ineffective in the short run without complementary policies. While informative, the study lacked key diagnostic tests and addressed limited exogenous factors. In contrast, Sultana (2019) found no significant effects of bilateral aid (from the US and UK) on Pakistan's growth, though multilateral and Japanese aid had short-term bi-directional effects, highlighting the importance of aid source and structure. However, weak model specifications and neglect of lagged effects limit the policy relevance of these findings.

Turning to Nepal, the literature reveals a historically underexplored and often inconclusive aid-growth relationship. Mihaly (1965) and Stiller and Yadav (1979) raised early concerns about the country's limited absorptive capacity and political instability, which they argued undermined aid effectiveness. Singh (1985) added that aid disproportionately benefited elite classes and exacerbated inequality. Empirical investigations into Nepal's aid-growth dynamics began with Poudyal (1988), who used OLS regression to show that foreign aid had a positive long-run impact on GDP. However, his simple two-variable model lacked controls for short-term dynamics and omitted variables such as policy environment and institutional quality. Dhakal et al. (1996) employed a Granger causality approach and found a negative association between aid and growth, attributing this to corruption and aid misallocation. Yet, the analysis was largely qualitative and lacked empirical depth.

Khadka (1996, 1997) found weak positive correlations between aid and GDP, but concluded that aid had limited influence on economic indicators like investment and income. His focus on donor motivations over aid effectiveness, along with descriptive methodologies, limited the policy relevance of his findings. Revisiting Nepal's aid history, Mihaly (2002) claimed that foreign assistance may have damaged Nepal's development trajectory due to poor governance and donor-driven agendas. These historical studies, though rich in qualitative insight, largely lacked rigorous econometric analysis.

More recent studies offer greater methodological sophistication. Bhattarai (2005) used cointegration and error correction models and found that aid positively influenced long-run RGDP per capita, savings, and investment, though short-run effects were negative due to volatility and absorptive constraints. Sharma and Bhattarai (2013), employing ARDL techniques (1965–2008), found positive short- and long-term effects of aid on GDP, especially under sound macroeconomic policy regimes, though political regime effects were found to be insignificant.

At a regional level, Basnet (2013) analyzed five South Asian countries using a simultaneous equations model and found that while aid had positive growth effects, it also crowded out domestic savings—a critical component of sustained growth. Karki (2019), using VAR and Johansen cointegration, reported that aid had negative short-term and positive long-term effects on real GDP per capita in Nepal, contingent upon the broader

economic environment. However, the study's credibility was weakened by a lack of diagnostic testing. Pradhan and Phuyal (2020) employed a partial adjustment model and found an insignificant relationship between aid and GDP (1975–2016), attributing this to the fact that much of the aid was allocated to non-productive, social welfare sectors.

Research Methodology

Research Design

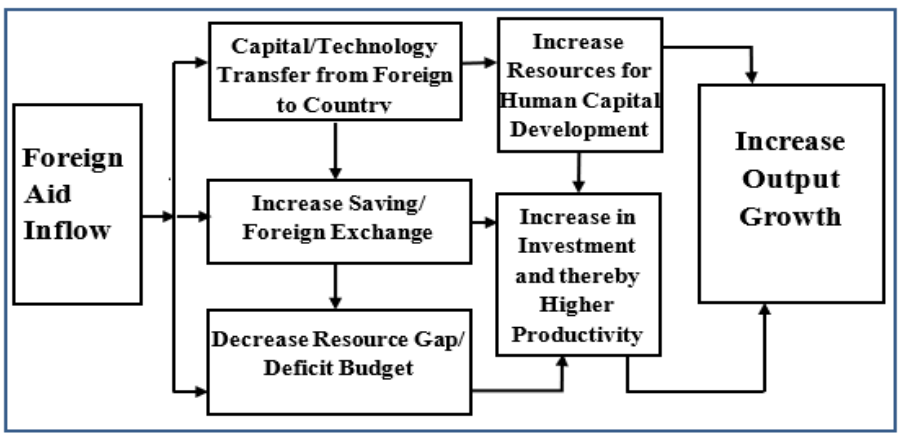
This study adopts a descriptive and quantitative research design, using both descriptive and inferential statistics within an econometric framework to test the hypothesis that foreign aid has no positive impact on economic growth. A time-series analysis was conducted using annual secondary data from 1975 to 2021 for a single-country case. The model is based on the neoclassical growth framework, incorporating determinants such as foreign aid, export-import to GDP ratio, and CPI, following Keynes (1936), Barro (1991), and Sala-i-Martin (1997).

Data were obtained from MOF, NRB, and CBS. Structural breaks and unit roots were tested, and first differences were applied where necessary. The ARDL model was used for analysis, with robustness checks including tests for autocorrelation, heteroskedasticity, normality, Ramsey RESET, CUSUM, and CUSUM-squares, consistent with Barro's approach. Results are presented in tables and figures, confirming the relationship between foreign aid, other determinants, and economic growth.

Conceptual Framework

Figure 1

The Transmission Channel through Foreign Aid to GDP Growth



Source: Researcher's construction, 2023

A key challenge in studying the link between foreign aid and economic growth is the lack of a strong theoretical framework (Easterly et al., 2003). The neoclassical growth model, as used by Barro and Sala-I-Martin (1992, 1997), explains how variables like GDP, capital formation, CPI, exports, and imports interact. According to this model, foreign aid can boost domestic savings and investment, attract private capital, and promote long-term growth (Levy, 1987). Aid also helps improve trade balance, reduce budget deficits, and supports technological progress and human capital development, all of which enhance productivity and exports (Islam, 2003; Marvotas, 2002).

In Nepal, technical assistance made up over 40% of total aid in the mid-1990s (HMG/N, 2002), highlighting its role in promoting technological capacity. Such aid, through capital imports and expert training, can strengthen local institutions and enable sustained GDP growth.

Sources and Types of Data

This study relies primarily on secondary data from sources such as the Economic Survey, Development Cooperation Report, Foreign Aid Policies, and Profiles of Development Partners (MOF) for data on GDP, foreign aid, and capital formation; Government Financial Statistics (NRB) for CPI, trade, and exchange rates; and National Income Accounts (CBS). It covers data from 1975 to 2021. Additionally, relevant books, journals, reports, and research papers—both published and unpublished—from national and international institutions are used for the literature review. Some data from ADB, WB, IMF, and UN agencies are included for comparative purposes to contextualize Nepal's current economic scenario.

Econometric Model: Co-integration Analysis by ARDL Model

Pesaran et al. (1996, 1999, 2001) developed the Autoregressive Distributed Lag (ARDL) model for cointegration analysis, which is more flexible and reliable than traditional methods like Johansen (1988, 1991). Unlike Johansen's technique, which requires all variables to be integrated of the same order and large samples, ARDL can handle variables integrated of order zero (I(0)) or one (I(1)), works well with small samples, and allows different lag lengths for each variable. It also provides unbiased long-run estimates and valid t-statistics even with endogenous regressors, using a single equation rather than a system.

This study applies the ARDL cointegration method because it avoids pre-testing for unit roots, handles non-stationary data efficiently, and estimates long-term relationships accurately, making it well-suited for time series analysis in economics.

$$\Delta lnGDP_t = \gamma_0 + \sum_{j=1}^{p} \gamma_{1j}\Delta lnGDP_{(t-j)} + \sum_{j=i}^{p} \gamma_{2j}\Delta lnFAID_{(t-j)} + \sum_{j=i}^{p} \gamma_{3j}\Delta lnGCF_{(t-j)} + \sum_{j=i}^{p} \gamma_{4j}\Delta lnEXPORT_{(t-j)} + \sum_{j=i}^{p} \gamma_{5j}\Delta lnMYRATIO_{(t-j)} + \sum_{j=i}^{p} \gamma_{6j}\Delta lnCPI_{(t-j)} + +\delta_1 lnGDP_{(t-1)} + \delta_2 lnFAID_{(t-1)} + \delta_3 lnGCF_{(t-1)} + \delta_4 lnEXPORT_{(t-1)} + \delta_5 lnMYRATIO_{(t-1)} + \delta_6 lnCPI_{(t-1)} + \xi_t$$

Where, γ_0 is the drift component and Δ is the first difference operator. The coefficients: δ_1, δ_2, δ_3, δ_4, δ_5, and δ_6, represent the long-run relationship and γ_1, γ_2, γ_3, γ_4, γ_5, and γ_6 represent the short-run dynamics of the model, and ξ_t is usual white noise error term which captures the effects that cannot be explained.

The co-integration equation of ARDL model is;

$$lnGDP_t = \varphi_1 \text{lnFAID}_t + \varphi_2 lnGCF_t + \varphi_3 lnEXPORT_t + \varphi_4 lnMYRATIO_t + \varphi_5 lnCPI_t + \xi_t$$

Where, $\varphi_1 = -(\frac{\delta_2}{\delta_1})$, $\varphi_2 = -(\frac{\delta_3}{\delta_1})$, $\varphi_3 = -(\frac{\delta_4}{\delta_1})$, $\varphi_4 = -(\frac{\delta_5}{\delta_1})$,and $\varphi_5 = -(\frac{\delta_6}{\delta_1})$ are the OLS estimators are obtained from equation (3.4).

When two variables are cointegrated, they exhibit a long-term equilibrium relationship. However, short-term deviations from this equilibrium can occur. The ARDL approach captures these deviations through an error correction term (ECM). This term reflects the speed at which the dependent variable adjusts back towards its long-run equilibrium in response to these short-term imbalances. The error correction representation of ARDL equation is;

$$\Delta lnGDP_t = \gamma_0 + \sum_{j=1}^{p} \gamma_{1j}\Delta lnGDP_{(t-1)} + \sum_{j=1}^{p} \gamma_{2j}\Delta lnFAID_{(t-1)} + \sum_{j=1}^{p} \gamma_{3j}\Delta lnGCF_{(t-1)} + \sum_{j=1}^{p} \gamma_{4j}\Delta lnEXPORT_{(t-1)} + \sum_{j=1}^{p} \gamma_{5j}\Delta lnMYRATIO_{(t-1)} + \sum_{j=1}^{p} \gamma_{6j}\Delta lnCPI_{(t-1)} + \lambda ECM_{t-1} + \xi_t$$

The short-run relationship between the variables is given by $\gamma_1, \gamma_2, \gamma_3, \gamma_4, \gamma_5$ and γ_6. The speed of adjustment parameter of the ECM is shown by the value of λ, which also shows whether there is divergence or convergence towards the long-run equilibrium. A positive value for λ indicates divergence, while a negative number indicates convergence to the system's equilibrium (equation). The residual that comes from the calculated co-integration model of equation (3.5) is known as the ECM. Thus, ECM is defined as:

$$ECM_t = \varphi_1 lnFAID_t + \varphi_2 lnGCF_t + \varphi_3 lnEXPORT_t + \varphi_4 lnMYRATIO_t + \varphi_5 lnCPI_t + \xi_t$$

Where, $\varphi_1, \varphi_2, \varphi_3, \varphi_4, and\ \varphi_5$, are OLS estimators same as above.

Results

This section deals with the results according to the objectives of the study.

Table 1

Trend of Foreign Aid as a Share of GDP, Government's Total Expenditure and Government's Total Capital Expenditure (Periodic Average, 1975-2021)

Period	Foreign Aid as a share of GDP	Foreign Aid as a share of Government's Expenditure	Foreign Aid as a share of Government's Capital Expenditure
1975-80	3.7	30.7	45.5
1981-85	6.0	33.2	48.6
1986-90	6.1	32.9	50.1
1991-95	5.3	29.6	48.7
1996-00	5.2	28.7	62.0
2001-05	3.6	20.9	72.8
2006-10	3.7	18.6	73.4
2011-15	3.0	14.8	94.4
2016-21	3.8	13.3	63.5

Source: Economic Survey, 2009/10 and 2020/21

Table 1 shows the trend of foreign aid as a share of GDP, government's total expenditure, and government's total capital expenditure for various periods. The periods are defined by five-year intervals from 1975 to 2021. The trend of foreign aid as a share of GDP has been declining over the years. The period of 1986-90 had the highest foreign aid as a share of GDP at 6.1 percent, and this has been declining since then, reaching a low of 3.0 percent in 2011-15. However, it slightly increased to 3.8 percent in the period of 2016-21.

Similarly, the trend of foreign aid as a share of government's total expenditure has also been declining, starting from 30.7 percent in 1975-80 to 13.3 percent in 2016-21. In terms of the percentage of overall government spending, foreign aid peaked between 1981 and 1986 at 33.2 percent. In contrast, there has been variability in the trend of foreign aid as

a percentage of the government's overall capital expenditure during the years. From 45.5 percent in 1975–1980 to 94.4 percent in 2011–15, it had a decline to 63.5 percent in 2016–21.

As a result, the trend of foreign aid as a percentage of GDP and total government expenditures has been downward, suggesting a reduction in the dependency on foreign aid. Foreign aid, however, continues to be a significant source of capital expenditure for Nepal's federal government.

Table 2

Total Foreign aid Commitment and Disbursement

(Periodic Sum Rs in Millions and Percentage, 1975-2021)

Period	Total foreign aid Commitment	Total Foreign Aid Disbursement	Disbursement as % of Commitment
1975-80	10050.00	4627.90	46.05
1981-85	20860.50	11952.70	57.30
1986-90	146905.70	26654.80	18.14
1991-95	99155.40	52259.30	52.70
1996-00	136880.00	90739.90	66.29
2001-05	190056.00	109161.30	57.44
2006-10	289409.00	187035.67	64.63
2011-15	775305.50	330965.90	42.69
2016-21	1231351.20	800570.30	65.02

Source: Economic Survey, 2009/10 and 2020/21

Aid commitment refers to the expression of the donors to provide financial support of specified amount under agreed terms and conditions for the specific purpose to the recipient country whereas disbursement is the time lag because aid for many projects are committed in one year and the committed aid is disbursed in subsequent years. Besides, failure in receiving the committed amount may be the political instability and lack of commitment on the part of the recipient government.

Most of the projects and programs which received foreign aid have been unable to utilize the total committed aid or indicating a very low absorptive capacity. Due to the delay in timely implementation of the projects, they are inefficient to disburse the committed amounts of foreign aid. The main cause of the short-falls in disbursement is the time lag because aid for the projects is committed in one year, and the amount is disbursed in subsequent years. A typical characteristic of foreign aid to Nepal is the constant shortfall in disbursement against commitments. There is considerable gap between commitment and disbursement of foreign aid. Table 2 shows the status of foreign aid commitment and disbursement in Nepal from 1975 to 2021 in five years intervals.

Table 3

Total Foreign aid Commitment and Disbursement

(Periodic Sum Rs in Millions and Percentage, 1975-2021)

Period	Total foreign aid Commitment	Total Foreign Aid Disbursement	Disbursement as % of Commitment
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2006-10	289409.00	187035.67	64.63
2011-15	775305.50	330965.90	42.69
2016-21	1231351.20	800570.30	65.02

Source: Economic Survey, 2009/10 and 2020/21

Table 3 presents data on total foreign aid commitments and disbursements in millions of rupees over eight five-year periods from 1975 to 2021. The table also includes the percentage of disbursement as compared to the commitment for each period. Looking at the total foreign aid commitments, it can be observed that there is a general increasing trend in the figures across the eight periods, except for a dip in commitment during the period 1986-1990. The commitment started at Rs.10,050 million in 1975-1980 and has grown to Rs.1,231,351.20 million in the most recent period 2016-2021.

In terms of total foreign aid disbursement, there is a similar upward trend, with a few fluctuations in between. The disbursement figures range from a low of Rs.4, 627.90 million in 1975-1980 to a high of Rs.800, 570.30 million in 2016-2021.

It is also important to note the percentage of disbursement as compared to commitment for each period. This reveals how much of the committed aid was actually disbursed. The percentage of disbursement has varied widely over the years, with a low of 18.14 percent in the period of 1986-1990 and a high of 66.29 percent in 1996-2000. The most recent period, 2016-2021, had a disbursement percentage of 65.02 percent, indicating that a significant portion of the committed aid was disbursed. Thus, the Table 3 suggests that foreign aid commitments and disbursements to the country have been increasing over time, with some fluctuations, and that the percentage of disbursement has varied widely across periods.

The ADF test results presented in Table 4 indicate that all variables (lnGDP, lnFAID, lnGCF, lnEXPORT, lnMYRATIO, and lnCPI) are likely integrated of order one, I(1). This characteristic, where variables have a trend but constant variance over time, makes the

ARDL model, a suitable choice for further analysis. As noted by Pesaran and Shin (1997), the ARDL approach is particularly applicable in situations where the variables are I(0) or I(1).

Table 4

ADF Test (Unit Root Test)

Variables	Intercept (C)	Intercept &Trend (C & T)	Decision
lnGDP	-4.57*	-4.55*	I(1)
lnFAID	-7.20*	-7.19**	I(1)
lnGCF	-7.56*	-7.56*	I(1)
lnEXPORT	-5.64*	5.59*	I(1)
lnMYRATIO	-5.89*	-5.99*	I(1)
lnCPI	-3.53**	-4.19*	I(1)

Source: Researcher‘s computation using Eviews environment

Note: * and ** indicate 1 percent, and 5 percent level of significance respectively.

Lag Selection Criteria

Table 5 shows the results of various lag length criteria tests. These criteria help determine the maximum lag order included in the model without over fitting. The Akaike Information Criterion (AIC) presented in Table 5, suggests that a lag length of 3 is optimal for the model in this study.

Table 5

Lag Selection Criteria

Lag	Log L	LR	FPE	AIC	SC	HQ
0	71.77482	NA	$1.89e^{-09}$	-3.059294	-2.813545	-2.968669
1	333.6360	438.4653*	$5.27\ e^{-14*}$	-13.56447	-11.84422*	-12.93009*
2	360.3204	37.23397	$8.98\ e^{-14}$	-13.13118	-9.936445	-11.95306
3	389.0999	32.12594	$1.65\ e^{-13}$	-13.89534*	-8.126114	-11.07348
4	447.4554	48.85578	$1.07\ e^{-13}$	-13.83513	-7.691413	-11.56952

* represents optimum lag selection for the given variable in ARDL model

Source: Computation Based on Secondary Data using Eviews 12

While other information criteria (SBC, HQC, FPE, and LR) suggested a lag length of 1 for each variable of the model, the Akaike Information Criterion (AIC) indicates that a higher lag length of up to 3 might be beneficial. This suggests that AIC might be capturing a more complex relationship in the data.

Bounds Test for the Long Run Cointegration

To test the existence of long-run relationship between the variables included in the growth equation, the study follows the ARDL approach. Building on the work of Pesaran et al. (2001), this study utilizes the bounds test to assess the presence of a long-term relationship within the growth model. The results of the calculated F-statistics for selecting an ARDL (1, 1, 1, 2, 1, 2) lag order of the model are shown in Table 6. If the statistics value lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level relationship is rejected. If it is below the lower bound, the null hypothesis of no level relationship can't be rejected. The bounds test result for long run co-integration is presented in Table 6.

Table 6

Bounds Test Result for Co-integration

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Significance level	I(0)	I(1)
			Finite Sample: n=47	
F-statistic	7.3299	10%	2.08	3.00
k	5	05%	2.39	3.38
Actual Sample Size	45	01%	3.06	4.15

Source: Computation based on secondary data using Eviews 12

The critical value of bounds test is computed by using stochastic simulations. The result of Table 6 shows that the calculated F-Statistics i.e. 7.3299 for the model is higher than the upper bound critical values at 1 percent, 5 percent and 10 percent levels of significance. Therefore, the null hypothesis of no co-integration is rejected, suggesting that the long-run relationships among the variables are existed.

Estimated Long and Short Run Relationship with Error Correction Mechanism

Having established the presence of long-run cointegration among the variables, the ARDL model is estimated. To effectively capture the model's dynamics with the limited sample of 47 annual observations, lag selection criteria are employed. Following Pesaran and Shin (1999), a maximum lag length of 2 is set, restricting the analysis to the adjusted sample period of 1977-2021. EViews' and Henry's general-to-specific approach identify the optimal lag structure using various criteria. The chosen ARDL model follows a lag structure of (1, 1, 1, 2, 1, 2) based on the Akaike Information Criterion (AIC). While adjusted R-squared, Schwarz Bayesian Criterion (SBC), and Hannan-Quinn Criterion are also considered, AIC and SBC are generally preferred for small samples, with SBC offering a slight advantage (Pesaran and Shin, 1999).

To achieve a parsimonious model, the Akaike Information Criterion (AIC) is chosen for lag selection in this cointegration analysis. Both AIC and Schwarz Bayesian Criterion (SBC), favour models with fewer lags, preventing unnecessary loss of degrees of freedom. Following this principle, AIC is used to determine the optimal lag structure for each variable in the system. Once the lag orders are established, the ARDL equation is re-estimated. The long-run coefficients are obtained by normalizing the error correction term (ECT) coefficient on lnGDP. This involves dividing all other coefficients by the coefficient on the lagged dependent variable (lnGDP(-1)). The results of such estimation with long run dynamics along with the short run dynamics are shown in Tables 7 and 8.

Table 7

Estimated Long Run Coefficients using the ARDL Approach

(Dependent variable is lnGDP)

Variable (in Log Form)	Coefficient	Std. Error	T-Ratio [Probability]
Foreign Aid	0.22	0.08	2.81 [0.008]
Gross Capital Formation	0.58	0.06	9.07 [0.000]
Export	0.12	0.03	3.24 [0.002]
Import to GDP ratio	-0.54	0.10	-5.41 [0.000]
Consumer Price Index	0.16	0.22	0.71 [0.478]
Constant (C)	1.41	0.81	1.73 [0.092]

Source: Researcher‘s computation at Eviews environment

The long-run model of the corresponding ARDL (1, 1, 1, 2, 1, 2) for the growth equation is as follows:

$$lnGDP = 0.22lnFAID + 0.58lnGCF + 0.12\ lnEXPORT - 0.54\ lnMYRATIO + 0.16\ lnCPI + 1.41$$

The error correction term by using long run dynamics is presented in the equation as:

$$ECM = lnGDP - (0.22lnFAID + 0.58lnGCF + 0.12\ lnEXPORT - 0.54\ lnMYRATIO + 0.16lnCPI + 1.41)$$

Table 8

Estimated Short-run Coefficients and Error Correction Representation for the Selected ARDL Model

Dependent variable is D(lnGDP):

ARDL (1, 1, 1, 2, 1, 2) model

Variable	Coefficients	Std. Error	T-Ratio[Probability]
D(lnFAID)	0.094	0.024	3.943 [0.0004]
D (lnGCF)	0.201	0.030	6.650 [0.0000]
D(lnEXPORT)	0.060	0.017	3.516 [0.0014]
D(lnEXPORT(-1)	-0.054	0.018	-3.025 [0.0050]
D (lnMYRATIO)	-0.236	0.041	-5.670 [0.0000]
D(lnCPI)	0.315	0.071	4.402 [0.0001]
D(lnCPI(-1)	0.245	0.074	3.284 [0.0025]
ECM(-1)	-0.413	0.052	-7.825 [0.0000]

\ D represents first difference

Source: Researcher's computation at Eviews environment

Table 9

Statistical Tools and Model Forecast

Statistical Tools			
R-squared	0.8629	D-W Statistics	1.8878
Adjusted R-squared	0.8370	AIC	-4.8071
S.E. of regression	0.0201	SBC	-4.6874
Model Forecast from ARDL Estimation			
RMSE	0.018	*MAPE*	0.1103
MAE	0.016	*SMAPE*	0.1104

Source: Researcher's computation at Eviews environment

Regarding the foreign aid-growth relationship, the estimated results shown in Table 7 indicate that the coefficient of foreign aid is 0.22. It suggests that GDP rises by the 0.22 percent for the 1 percent positive increase in foreign aid at 1 percent level of significance in the long run. Similarly, the estimated results shown in Table 8 indicate that the total foreign aid also affects economic growth positively in the short run. The 1 percent increase in total foreign aid upturns 0.094 percent GDP at 1 percent level significance. Thus the estimated result shows that foreign aid has positively contributed to economic growth in Nepal. Its implication is that the foreign aid positively contributes to economic growth of developing countries through provision of capital for investment. The result is consistence with those of Poudyal (1988), Khadka (1997), Sharma and Bhattarai (2013), Basnet (2013), Karki (2019), Pradhan and Phuyal (2020) in the context of Nepal, and with those of Chenery and Strout

(1966), Burnside and Dollar (1997, 2000, 2004), Dalgaard et al. (2004), Moreira (2005), Minoiu and Reddy (2009), Fasanya and Onakoya (2012), and Fredrick (2022) in the international context.

Regarding the other variables used in this study, the results presented in Table 7 indicate that the coefficient of gross capital formation (GCF) i.e. 0.58 suggests that GDP rises by 0.58 percent for the 1 percent positive increase in gross capital formation at 1 percent level significance in the long run. In the short run, it is estimated that 1 percent increase in investment i.e., gross capital formation increases GDP by 0.2 percent at 1 percent level of significance as shown in Table 8. The sign of the growth rate of gross capital formation variable supports the theoretical conclusion that capital contributes positively to growth of GDP. It is because, the coefficient of gross capital formation, both in the long run and short run, is positive and significant in growth equation. This positive relationship between gross capital formation (capital stock) and economic growth is consistent with the expectation of the classical economic theory. The Harrod-Domar model also describes the economic mechanism by which increased investment leads to more growth. This model highlights the importance of capital accumulation, achieved by saving a portion of current income. Essentially, for a country to develop and grow, it must divert part of its resources from current consumption (or save) to invest in building its capital stock.

Regarding the export income, the results in Table 7 indicate that the positive coefficient of export i.e., 0.12. It suggests that GDP rises by 0.12 percent for the 1 percent positive increase in export at 1 percent level of significance in the long run. In the short run, it is estimated that 1 percent increase in export leads to increase in GDP by 0.06 percent at 1 percent level of significance as shown in Table 8. The positive sign of the coefficient of export variable supports the theoretical conclusion that export income contributes positively to growth of GDP. The positive coefficient of export income both in the long and in the short run shows positive and significant effect on growth. This positive relationship between export income and economic growth is also consistent with the expectation of the Keynesian economic theory.

The coefficient of import to GDP ratio is negative (i. e. -0.54), as shown in Table 7 suggests that GDP decreases by 0.54 percent for the 1 percent positive increase in import to GDP ratio at 1 percent level of significance in the long run. In the short run, the coefficient of import to GDP ratio i.e. -0.23 suggests that GDP decreases by the 0.23 percent for the 1 percent positive increase in import to GDP ratio at 1 percent level of significance. Thus, all the channels through which increase in import to GDP ratio affects growth negatively both in the long run and in the short run. This negative relationship between import to GDP ratio and economic growth is consistent with the expectation of the Keynesian economic theory.

The coefficient of consumer price index i.e. 0.16, which is insignificant in the long run (as p=0.478 is greater than 0.05 and t-value 0.71 is less than 2 in Table 7). Therefore, all the channels through which change in price level affects growth insignificantly in long run. In the short run, the coefficient of consumer price index is 0.31. It shows that CPI has positive and significance effect on the GDP growth (economic growth) as shown by Table 8. In other words, a 1 percent changes in CPI changes the GDP growth by 0.31 percent at 1 percent level significance in the short run. However, price level variation may play significant role on induced decision making of common people, investors, and decision makers in developing countries, like Nepal. Thus, the price level may play accelerating role on investment, speculation, and trade. This in turn drops economic growth rate in the long run. This result is consistent with the concept of Keynesian idea.

More importantly, the error correction coefficient has the expected negative sign and highly significant (i.e. probability value of ECM<1) at 1 percent level of significance as shown by the t-statistics (i.e., absolute value of t-statistics > 2) and probability value (i.e. zero) in the Table 8. This helps to reinforce the existence of cointegration as provided by significance residual coefficient. Specifically, the estimated value of ECM (−1) is -0.4137. The absolute value of the coefficient of ECM (−1) is moderate (i.e,-0.4137). It indicates that there exists moderate speed of adjustment to equilibrium following short-run shocks. In other words, about 41.37 percent of the disequilibrium, caused by previous period shocks (SR shocks), converges back to the long-run equilibrium in one period. The short-run coefficients show the dynamic adjustment of the variables taken in the study as shown in Table 8.

The coefficient of the lagged error-correction term is negative and statistically highly significant as expected at 1 percent level of significance which displays that it would take a moderate period of time for the system to return to its equilibrium once if it is out of equilibrium. The results found from the error correction model of ARDL analysis shows that the ultimate effect of all the predictors on current values of GDP in the short-run are positive and significant except the export on first lag, and import to GDP ratio. The figure obtained from analysis for R-squared, adjusted R-squared are shown in Table 9. The value of R-square (0.8629) and adjusted R-square (0.8370) indicate that model is best fitted and robust. Model forecast from ARDL estimation from Table 9 shows that forecasting from the applied model has good forecasting behavior.

LM Serial Correlation (Autocorrelation)

Autocorrelation refers to the degree of correlation of the same variables between two successive time intervals. It measures how the lagged versions of the value of a variable are related to its original version in a time series. Autocorrelation, as a statistical concept, is also known as serial correlation. Autocorrelation can cause problems in conventional analyses

(such as ordinary least squares regression) that assume independence of observations. In a regression analysis, autocorrelation of the regression residuals can also occur if the model is incorrectly specified. Table 10 shows the results of autocorrelation in the regression used in this study.

Table 10

LM Correlation Test

Statistics	Value	P-value
F-stat	0.06	0.9398
Observed R-square	0.19	0.9083

Source: Researcher's computation at Eviews environment

If the probability value is greater than 0.05, the null hypothesis (H_0) is accepted. In the Table 10, the observed or estimated R-square statistics value is 0.19 and the probability value of observed R square is 0.9083 (i.e. 90.83 percent) which is greater than 5 percent. So, null hypothesis of no autocorrelation is accepted in this study.

Breusch-Pagan-Godfrey Heteroskedasticity Test

Heteroskedasticity data tends to follow a cone shape on a scatter graph. In statistics, heteroskedasticity (or heteroskedasticity) happens when the standard deviations of a predicted variable, monitored over different values of an independent variable or as related to prior time periods, are non-constant. Table 11 shows the results of heteroskedasticity problem of the regression model in this study.

Table 11

Heteroskedasticity Test

Statistics	Value	P-value
F-stat	1.25	0.2893
Observed R-square	15.53	0.2751

Source: Researcher‘s computation at Eviews environment

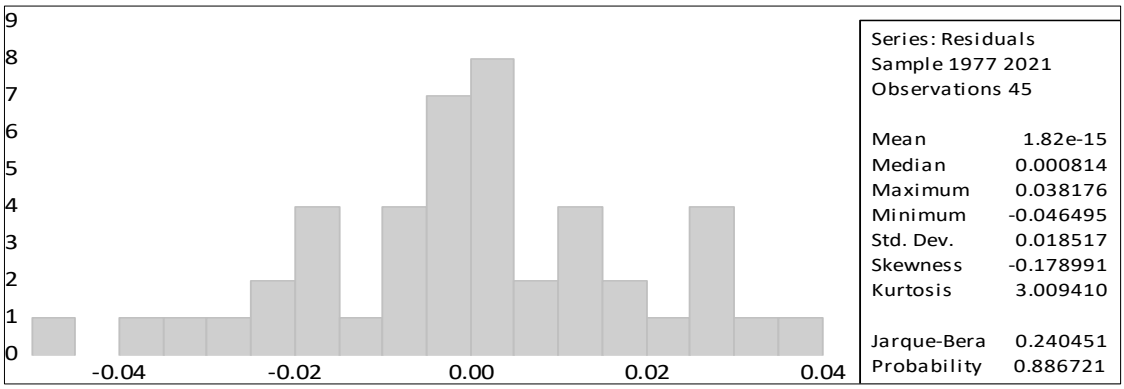
Heteroskedasticity of the residual has been tested using Breusch-Pagan-Godfrey test. In order to check heteroskedasticity in the residual observed R square and corresponding P-value is considered. Here the observed R square is 15.53 and its P-value is 27.51 percent which is greater than 5 percent. Therefore, the null hypothesis of homoscedasticity in the residual is accepted for this study.

JB Test for Normality Test

The residual is the difference between the observed value of the dependent variable GDP and the predicted value. Each data point has one residual. The histogram of the residual is to check whether the variance is normally distributed.

Figure 2

Jarque Bera Normality Test



Source: Researcher's construction at Eviews environment

For the normality test of the residual term, the Jarque-Bera and probability tests are applied. The value from Jarque-Bera test is 0.24 and its corresponding P-value is 0.8867 i.e. 88.67 percent (which is more than 5 percent), therefore null hypothesis of normality of residual is accepted.

Functional Form of Model: Ramsey RESET

In statistics, the Ramsey Regression Equation Specification Error Test (RESET) is a general specification test for the linear regression model. More specifically, it tests whether non-linear combinations of the fitted values help to explain the response variable. The RESET proposed by Ramsey (1969), is a general misspecification test, which is designed to detect both omitted variables and inappropriate functional form. The RESET is based on the Lagrange Multiplier principle and usually performed using the critical values of the F-distribution. The null hypothesis is that t=0, so it means that the powers of the fitted values have no relationship which serves to explain the dependent variable, meaning that the model has no omitted variables. The alternative hypothesis is that the model is suffering from an omitted variable problem.

Table 12

Ramsey RESET

Statistics	Value	P-value
t- Statistics	0.32	0.7497
F- Statistics	0.10	0.7497

Source: Researcher‘s computation at Eviews environment

Form the result of Table 12, null of powers of fitted value have no misspecification in the model is accepted because p-value of F-statistics is 0.7497 i.e. 74.97 percent which is greater than 5 percent meaning that there is no problem of functional form such as omitted variables.

The LM test for misspecification is generally recommended for large samples. However, the F-version of the RESET test is more suitable choice for this analysis. Fortunately, both tests lead to accepting the null hypothesis of no misspecification in the model's functional form, even at the 5 percent significance level. Thus, the chosen model structure adequately captures the relationship between the variables.

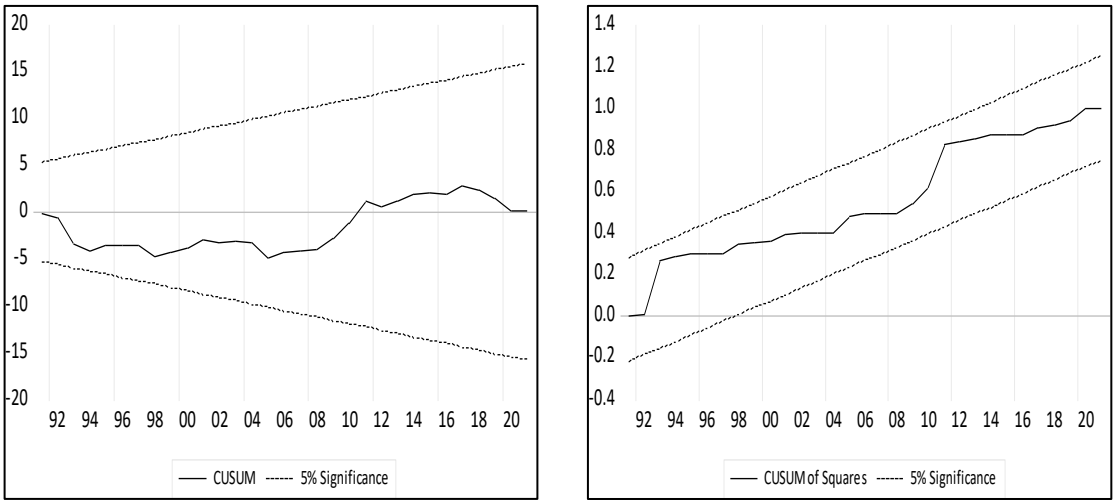
CUSUM and CUSUM Squares Test for Model Stability

The stability of the long run coefficients together with the short run dynamics is examined following Pesaran and Pesaran (1997) and the CUSUM and CUSUM square tests proposed by Brown et al. (1975). With an objective to test the stability and consistency of the parameter, stability test is applied. The cumulative sum (CUSUM) of recursive residual and cumulative sum (CUSUM) square of recursive residuals statistics are used to measure the stability in the model. CUSUM measures the systematic change in parameters over time.

On the other hand, a quick change in the parameter is measured by CUSUM square test. The CUSUM test utilizes the cumulative sum of recursive residuals based on the first set of n observations. These residuals are then updated sequentially and plotted against potential breakpoints to detect structural changes. The value of the sequence outside the range of 5 percent level of significance rejects the null hypothesis and indicates a structural change in the model over time. If either of the lines crosses, the null hypothesis of coefficient constancy is rejected at the 5 percent level of significance. A similar procedure is used to carry out the CUSUM square test, which is based on the squared recursive residuals.

Figure 3

CUSUM and CUSUM Square Test for model Stability



Source: Researcher‘s construction at Eviews environment

Figure 3 presents the CUSUM and CUSUMSQ plots for the model chosen based on the AIC criterion. Both plots remain within the critical bounds at the 5 percent significance level, signifying no statistically significant evidence of structural instability in the model. This stability is further corroborated by the fact that none of the CUSUM or CUSUMSQ statistics breach the critical bands. In conclusion, the estimated growth equation appears to be stable over the sample period.

Thus, the model passes all of the tests. The null hypothesis of Homoscedasticity and null hypothesis of no first order serial correlation are accepted at 5 percent level of significance. Normality tests confirm that the error terms are normally distributed at the 5 percent significance level. This indicates the absence of significant deviations from normality. Additionally, both the LM test and the F-version of the RESET accept the null hypothesis of no misspecification in the model's functional form at the 5 percent significance level. These results suggest that the chosen model structure adequately captures the relationships between the variables. Overall, the various statistical tests employed provide evidence of a robust growth equation using the ARDL approach proposed by Pesaran and Shin (1999). This implies a long-run cointegrating relationship exists between the GDP growth rate and the included variables.

Discussion and Conclusion

The relationship between foreign aid and economic growth has been analyzed using econometric techniques. The study employed the Autoregressive Distributed Lag (ARDL) bounds testing approach to investigate co-integration and estimate both long-run and short-run relationships. The analysis also examined the relationship between other variables (gross capital formation, exports, import to GDP ratio, consumer price index) and economic growth (proxied by GDP). The empirical investigation utilized data spanning a significant period, from 1975 to 2021. The data were mainly extracted from various sources published by NRB, CBS and MOF of Nepal.

In this study, the econometric analysis confirms a long-term co-integration between foreign aid and economic growth in Nepal. A 1 percent increase in foreign aid leads to a 0.22 percent increase in GDP in the long run and 0.09 percent in the short run, suggesting foreign aid positively impacts Nepal's economic growth, potentially by providing capital for investment. This result is consistence with those of Poudyal (1988), Khadka (1997), Sharma and Bhattarai (2013), Basnet (2013), Karki (2019), Pradhan and Phuyal (2020) in the context of Nepal, and with those of Chenery and Strout (1966), Burnside and Dollar (1997, 2000, 2004), Dalgaard et al. (2004), Moreira (2005), Minoiu and Reddy (2009), Fasanya and Onakoya (2012), and Fredrick (2022) in the international context.

Some studies in the literature have found results that contradict the positive relationship between foreign aid and economic growth observed in this study. These studies established a negative relationship between foreign aid and economic growth. The negative or insignificant effects of aid on economic growth reported in earlier empirical studies raise skepticism about the importance of recipient countries' absorptive capacity, which is a key concept in aid effectiveness research. The estimated result contradicts with the findings of Mihaly (1965), Stiller and Yadav (1979), Mihaly (2002), Khadka (1996), Bhattarai (2005) in the context of Nepal as well as Griffin and Enos (1970), Boone (1996), Lensink and White (2001), Easterly (2003) and Mallik (2008) in the international context.

The issue of the aid-growth relationship is, however, complex in the empirical field. Studies have yielded mixed findings (Dhakal et al., 1996; Ekanayake & Chatrna, 2010; Tadesse, 2011; Ali, 2013; Sultana, 2019). This variation extends beyond the results themselves, as there are also differences in how researchers model the relationship (linear vs. non-linear). The role of aid in economic growth is heavily influenced by institutional quality (Hussen & Lee, 2012) and macroeconomic policies (Burnside & Dollar, 2000). This highlights that simply providing foreign capital is insufficient to guarantee positive economic growth. Therefore, to channel foreign capital effectively and achieve economic growth, the recipient country's absorptive capacity is crucial.

The contradictory findings of previous studies on the impact of foreign aid on economic growth can be attributed to several factors. One key factor is the choice of research methods. Researchers employ different techniques to analyze data, and these choices can influence the outcome. For example, some studies examine broad trends across many countries, while others focus on specific regions or types of aid. According to Sharma (2011) the impact of aid on growth can vary depending on the sample size, the countries included, and the variables considered. Case studies can address these limitations by examining the specific factors within a particular country that influence the relationship between aid and growth.

Furthermore, the impact of foreign aid might depend heavily on the recipient country's context. Countries with strong institutions and good governance might see aid translate well into growth, while those with corruption or political instability might not. Additionally, the type of aid itself matters. Infrastructure projects or aid targeted towards education might have a more positive impact on growth compared to humanitarian aid or budget support. Finally, economic growth is a complex phenomenon influenced by many factors, making it challenging to isolate the specific impact of foreign aid. Other economic variables, political climate, and even natural disasters can all play a role.

In conclusion, foreign aid can contribute positively to economic growth in developing countries, potentially by providing capital for investment and addressing revenue shortfalls. However, the effectiveness of aid depends on various factors, including recipient country context and the type of aid provided. Further research is needed to isolate the specific impact of aid and improve its utilization for sustainable development.

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