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## Debt, Trade, and Currency Dynamics: A Panel Analysis of Growth Determinants in South Asia

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### ABSTRACT

**Objective:** This study examines the relationships between external debt, trade fluctuations, and exchange rates concerning economic growth in South Asia. It aims to assess the impact of these macroeconomic variables on economic development and provide policy recommendations for sustainable growth.

**Research Gap:** While previous research has explored the impact of external debt and trade fluctuations on economic growth, limited studies have conducted a comparative analysis across South Asian economies using advanced econometric techniques. Furthermore, the short- and long-term effects of exchange rate fluctuations on economic stability remain underexplored. This study fills these gaps by employing a comprehensive econometric approach to analyze data from Pakistan, Sri Lanka, and Bangladesh.

**Design/Methodology/Approach:** The study utilizes data from the World Development Indicators (1990-2022) and applies pooled OLS, quantile regression, and PMG/ARDL models to test its hypotheses. These methods allow for a robust examination of both short- and long-term effects on economic growth.

**Theoretical / Practical Implications of the Findings:** The results support the debt overhang theory, indicating that external debt negatively impacts economic growth by diverting resources from productive investments and reducing investor confidence. Trade fluctuations positively influence long-term growth but exhibit short-term volatility due to global trade dynamics and persistent trade deficits. Exchange rate stability is found to be crucial for sustained economic growth, though short-term effects depend on various economic conditions.

**Originality/Value:** This study contributes to the literature by offering a multi-country econometric analysis of South Asia, addressing both short- and long-term economic impacts, and recommending policy interventions for sustainable growth.



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### 1. Introduction

The debt issue in developing countries, especially in South Asia, has gained a lot of attention due to its effect on overall economic stability. These countries often struggle with high external debt, low productivity, limited income, and poor savings, which weaken their financial systems. As a result, they face a shortage of national capital. Major events like the 2007–08 global financial crisis and the 2008 European debt crisis made the situation even worse. Consequently, industrialized economies have accumulated substantial debt due to the high stabilization costs. This unprecedented surge in public debt during these crises poses a serious threat

to economic growth. Developing nations are also expected to face challenges related to debt, as advanced economies focus on maintaining fiscal sustainability, with governments prioritizing debt management to ensure economic stability (Mohsin et al., 2021). Resource misuse in emerging countries is often driven by corruption and embezzlement, leading to larger budget deficits and a reliance on external borrowing to close the savings-investment gap. Securing foreign funding is crucial for supporting investment in these nations, which often face budget shortfalls.

Governments typically raise funds through taxation or borrowing to improve welfare and stimulate economic growth. However, if borrowed funds are not utilized effectively, they can increase the country's foreign debt stock, resulting in inflationary pressures. Excessive borrowing can also create difficulties in debt repayment, making it harder to secure additional funds in the future. The volatility of exchange rates in the foreign exchange market can further complicate debt repayment, as fluctuations can increase the cost due to inflation. This has led to growing concerns among monetary authorities and policymakers about the impact of rising exchange rates and public debt on inflation (Ewane & Mejame, 2023). Developing countries such as Bangladesh constantly seek foreign capital to address the lack of domestic savings and investment. Foreign capital is important for creating jobs, bringing in useful technology and equipment to make better use of local raw materials, developing natural resources, and reducing reliance on imports by building industries that focus on exports (Qambrani et al., 2024). How government actions—like taxes, public borrowing, and spending affect economic growth is still an important topic in global economic discussions. Recent financial crises in both rich and developing countries, along with differences in how fast economies grow, have renewed interest in studying how public debt influences growth. The United Nations' Sustainable Development Goals (SDGs) also aim to boost economic growth by 2030 (Halisçelik & Soytaş, 2019).

Governments are under increasing pressure as the globe moves toward the fourth industrial revolution to fund vital sectors, including artificial intelligence, machine learning, technical innovation, and human capital. The World Economic Forum underlines that if resources are diverted to conventional industrial processes, countries risk losing competitiveness, and economic development may stall without significant investment in these areas. Maintaining economic development thus depends on providing large amounts of financial resources to these important sectors (Yamin et al., 2023). Exchanges between multinational corporation's help promote foreign direct investment (FDI) instead of depending only on direct receipts from recipient nations. One of the most important outside funding sources available to help developing countries flourish is foreign debt. It shows the share of public debt of a nation owing to foreign entities. Decisions on foreign loans for development projects and investment can pay dividends provided that these initiatives are lucrative. Many times, lacking financial institutions, developing nations depend on outside debt from organizations such as the World Bank and the International Monetary Fund as their main source of money. Studies of the function of external debt in the growth of developing nations have split it into two basic points of view. The first point of view stresses the close connection between economic development and outside-source borrowing. According to the second viewpoint, diminishing domestic savings and foreign exchange profits could cause less developed nations' economic slowdown.

This study begins by closely examining the claims that China's debt policies and poor economic management are the main reasons for Sri Lanka's debt crisis. In reality, the main cause both for the current crisis and past ones is the long-standing imbalance in Sri Lanka's trade and current accounts. This has mainly been driven by high government spending and loose monetary policies (Nicholas & Nicholas, 2023). Pakistan has faced persistent challenges in managing a substantial burden of external debt. The government, particularly the recently elected cabinet, faces difficulties in repaying this costly long-term debt. Although this form of debt is typically viewed as harmful to an economy, the government perceives it as essential for attaining significant macroeconomic objectives, such as enhancing the standard of life and fostering economic growth (Khan et al., 2022). Similarly, Bangladesh has relied on borrowing funds and continues to depend on foreign debt to bridge the gap between saving and investment and to manage its fiscal imbalance. Only when a nation does not create more returns than borrowing expenses will external borrowing be detrimental to it. Nevertheless, improper and reckless management can lead to problems (Ale et al., 2023). The poor tax income of Sri Lanka and the absence of foreign direct investment (FDI) are the key causes of Sri Lanka's significant debt. To support its development during the past four decades, the nation has mostly depended on foreign loans (Senadheera & Jeganathan, 2021). Recent studies on the consequences of too much foreign debt have mostly

shown how bad it is for trade balances, inflation rates, and currency stability. Nevertheless, some research points to possible benefits, including more FDI and more economic activity. Consequently, for legislators, economists, and financial analysts as well as each other, comprehensive knowledge of the degree and nature of these interactions is essential. The relevance of these results should be emphasized. Ale et al. (2023) noted a strong and long-lasting relationship among other important factors, external debt, and economic growth.

## **1.2 Research Contribution**

New studies have also shown that both short and long term, external debt seriously impedes economic development. The necessity for repayment in foreign currencies might result in the devaluation of currencies and increased volatility of exchange rates. Awan and Qasim (2020) discover that external debt stunts economic progress. If external debt stays below 42.32% of GDP (Martín et al., 2024), we contend that it stimulates economic growth; nevertheless, if it rises above this level, it does not appreciably increase development. External debt may increase economic growth if borrowed money is intelligently invested to produce significant returns. However, too much external debt resulting from financing expansion projects and budget deficits can cause a major debt load for a nation. This empirical study aims to investigate the possible causal link between external debt and economic development in South Asian nations, determine the elements causing the recent rise in foreign debt, and provide solutions to guarantee sustainability.

## **2 Literature Review**

### **2.1 Theory of debt overhang**

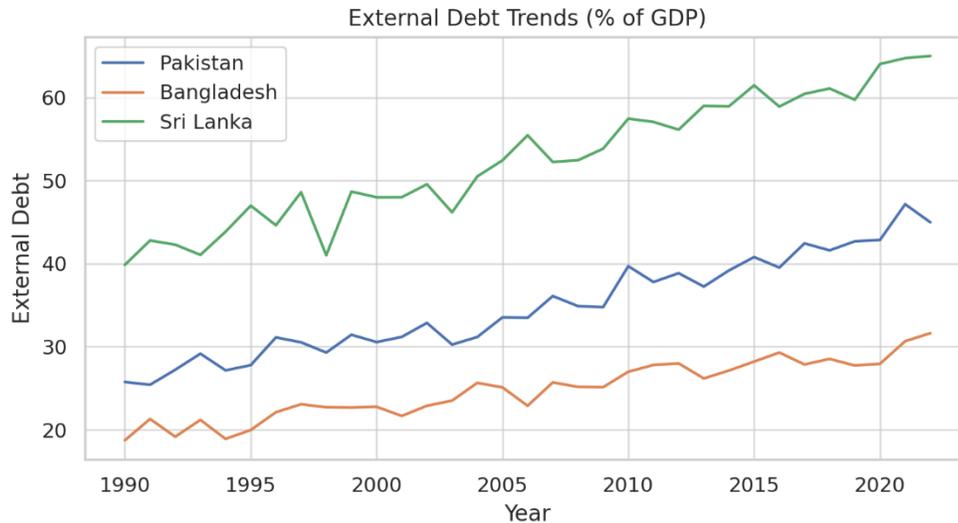
Due to the complex relationship between external debt and economic growth, the debt overhang theory has gained a lot of attention in developing countries. According to the argument, slowing down investment is mostly dependent on debt overhang. This suggests that if a nation's capacity to pay back its debt is likely to be less than the debt itself in the future, its output may not be enough to cover the anticipated debt service (Krugman, 1988). This condition can deter local as well as foreign investors since current foreign creditors could be motivated to seek some of the benefits of making investments in the local economy. Debt servicing, as noted, consists of both principal repayments by the indebted nation and interest payments (Dawood et al., 2024). Beyond physical capital investment, the scope of debt overhang covers any activity requiring upfront costs meant to boost future output, such as investments in human capital and technological advancement, which can have a more significant influence on long-term economic growth (Sala & Trivin, 2024). Debt overhang influences the way an indebted nation uses resources to finance external debt services as well as both private and governmental investment. For instance, if a government turns to capital taxes or inflation taxes, this can deter private investment. Debt overhang is essentially defined as a condition in which the expense of debt servicing causes an indebted nation to obtain few advantages from returns on any new investment. Furthermore, the necessity to service a large amount of external debt can have detrimental effects on the economy in several ways, including the crowding-out effect caused by high real interest rates, thereby aggravating the national economic condition and restricting access to global credit markets. Reduced resources available for funding investment and negative macroeconomic conditions follow from which investments decrease (Meraj et al., 2024; Osband et al., 2024).

### **2.2 Economic development in South Asia**

This section examines the current body of knowledge to examine closely how external debt influences economic development. Therefore, debt leads to investment constraints in the company, limiting its growth potential (Gnangnon, 2021). The underinvestment process is hampered by agency costs existing between loan holders and investors. Furthermore, the use of asset dilution by businesses does not help the equity of the business, thereby drawing fresh capital. As a result, investors are hesitant to commit money to such businesses; nonetheless, high debt levels support more economic growth. While foreign stock has a good impact, debt has economic growth. According to the econometric estimation model, a 1% increase in external debt stock leads to a 36% increase in national output, indicating an inappropriate connection between debt and growth. Baloch et al. (2024) explained that foreign debt significantly influences long-term GDP growth. The analysis reveals a positive correlation between elevated levels of foreign debt and fluctuations in GDP growth. This highlights the critical importance of effectively controlling foreign debt levels to ensure long-term economic growth. Foreign debt has a significant effect on GDP growth in the short term. This finding shows that there is variation. External debt levels can quickly affect the economy. This may be caused by changes in investor confidence and government spending capacity. Subrata Deb et al. (2023) argues that this

is excessive. External debt can be a burden on the economy and limit government capacity. Expenditure and diverts resources from productive investments to pay off debt. This might impede economic expansion and hinder development endeavors. Bangladesh's foreign debt has experienced a significant rise. By obtaining substantial loans to fund development initiatives and tackle budget shortfalls. The external debt reached a significant amount of \$60.15 billion, indicating a notable increase compared with previous years. Mohamed and Abdulle (2023) conducted a study that analyzed the influence of varying levels of government debt on the growth of Somalia's GDP. Researchers have utilized an asymmetric model technique for their analysis.

**Figure 1: External Debt as a percentage of GDP**



The major findings indicate that government debt has a nonlinear effect on economic growth. Low debt levels can promote development by funding vital services and infrastructure. High debt, however, stunts development because of rising debt payment expenses and possible investor anxiety. The report stresses the need to maintain sustainable debt levels to guarantee good economic results. Yamin et al. (2023) investigated how debt and economic growth correlated. While some studies indicate that public debt stunts economic growth, others point to an either positive or neutral connection. Based on their findings, they concluded that the effect of debt on economic development is uncertain and differs depending on different research, thereby suggesting that the theory of public debt being negative for economic growth is not commonly recognized.

H1: External debt significantly impacts economic development in South Asia.

### 2.3 Exchange rate fluctuations

Apart from factors like inflation and interest rates, the foreign exchange rate is a vital measure of the relative economic situation of a nation. Foreign exchange rates enable the global monetary systems to be interwoven on the international market. The foreign exchange rate is the value one nation's currency may be obtained for another (Anidiobu & Okolie, 2016). The swift devaluation of exchange rates has intensified the strain on countries that have borrowed extensively in foreign currencies and has triggered substantial outflows of capital for numerous emerging markets. These developments might put pressure on emerging market governments who have increased their total exposure to foreign exchange loans and local currency debt owned by foreign investors. In developing markets, a significant amount of debt is denominated in foreign currencies. This highlights the importance of implementing micro- and macroprudential measures to effectively manage and mitigate risks arising from unexpected events. Regulators should perform bank stress tests specifically focusing on risks associated with foreign currency and commodity prices. They should also closely and regularly check business leverage and foreign currency risks, including derivative ownership (IMF, 2015).

Over the years, the currency rate system of Pakistan has changed multiple times; first, the currency rate system has been fixed, and then the float system has been managed. Political unrest, inflation rates, and external debt levels, among other things, have shaped Pakistan's exchange value. Recurring interest rates increase inflation, thus affecting overall economic stability (Khan & Qayyum, 2011). Sundus et al. (2022) reported a country's inflation is substantially influenced by declining exchange rates. The devaluation of the Pakistani rupee resulted in higher borrowing rates and a value of external debt expressed in local currency. This therefore raised the whole debt of the nation. The study also implies that changes in exchange rates have

a double effect: they not only influence debt generation but also lower the worth of the nation, therefore increasing the borrowing expenses. The reforms implemented by policymakers are not suitable for achieving high levels of exports. Instead, these changes lead to increased imports and decreased exports, which leads to a widening current account deficit. As a result, heavy debt and significant debt destabilize the development model (Sikandar et al., 2021).

H2: The exchange rate significantly impacts economic development in South Asia.

#### **2.4 Trade Fluctuations**

Sri Lanka faces serious economic problems because of its dependence on foreign bonds and high debt. High interest rates and short repayment periods mean that this borrowing is a serious drain on Sri Lanka's financial stability (Nicholas & Nicholas, 2023). The country's attempt to transition to a commodity-based economy has led to economic imbalances and a shortage of available funds. Sri Lanka has relied on foreign loans to address these problems. Nath (2023) further noted that a balance of payment crisis results from ongoing fiscal deficits caused by high government expenditures and inadequate income creation, depleting foreign exchange reserves, and therefore stranding the economy. Increasing export income might be a workable way for Pakistan to address its significant debt crisis. Policies supporting both large exporters and small exporters should be carried out by the government to increase their capacity for worldwide trade and manufacturing. However, political unrest and other disturbances have damaged trust in both home companies and foreign companies. Policies meant to solve Pakistan's trade and current account deficits have to be created to draw a wide spectrum of investors (Baig et al., 2024). The negative association between the trade balance and the exchange rate highlights problems with Pakistan's currency management. Rising exchange rates translate into higher interest rates, lower savings, and more imports, thus aggravating the negative trade balance (Asghar et al., 2020). Although they differ from Pakistan's and Sri Lanka's experiences, Bangladesh likewise faces trade-related difficulties.

H3: Trade fluctuations significantly impact economic development in South Asia.

Despite adequate literature to discover the individual effects of external debt, trade imbalance, and exchange rate on economic growth, most current studies focus on single-country analysis or apply limited economical techniques that fail to distinguish short-run from long-run effects. Additionally, empirical research integrating these three macroeconomic factors simultaneously within a multi-country South Asian context remains sparse. Notably, few studies utilize advanced techniques such as quantile regression and PMG/ARDL models, which offer greater robustness in accounting for heterogeneous dynamics across countries and time. This study aims to fill this gap by empirically examining the combined impact of external debt, trade fluctuations, and exchange rate volatility on economic growth using a panel dataset from Pakistan, Bangladesh, and Sri Lanka, thereby contributing both regionally and methodologically to the macroeconomic growth literature.

### **3 Materials and Methods**

#### **3.1 Data and Source**

A dataset comprising South Asian nations (Pakistan, Sri Lanka, and Bangladesh) from 1990–2022 is thoroughly examined. The study makes use of World Bank supplied World Economic Indicators. The foreign debt proportion of the GNI, the exchange rate, and trade fluctuations, that is, the difference between exports and imports, are the analytical explanatory variables. Conversely, the rate of growth in real GDP is a variable affected by other elements (Khan et al., 2022).

#### **3.2 Research Design**

For the datasets the study uses the panel unit root technique and a pooled mean group (PMG) estimation method. Both methods are very effective (O'Sullivan & Papavassiliou, 2020). This approach also follows the autoregressive distribution lag (ARDL) model. Additionally, dynamic panel data analysis ensures the consistency of coefficients obtained from the PMG estimation technique by considering short-term differences. This study also examined the long-term correlation between variables via error correction factors (Alam et al., 2025).

#### **3.3 Econometric Model**

Economic growth in South Asia is generally affected by the interplay of external debt, exchange rates, and economic reforms. These factors, whether positive or negative, should be related to GDP growth (Pesaran et al., 2001). According to economic theory, foreign debt can be used to support projects needed to stimulate a

country's economy. However, as the concept of "debt overhang" suggests, if there is too much debt, it can hinder economic growth. This point of view acknowledges that, particularly in cases when the debt exceeds a nation's capacity to pay back, too much debt can have a detrimental impact on investment and economic growth of that nation. This causes people to be uncertain about future laws and taxes. In addition, economic development should be understood in terms of factors such as trade fluctuations and currency rates. Trade openness can promote economic development by improving access to markets, thus increasing competition and promoting efficiency in resource allocation. However, changes in values can create changes that distort the economy and affect investment decisions (Baloch et al., 2024). To examine the impact of trade reforms, external debt, and foreign exchange on South Asia's GDP growth, the following model is proposed using panel data from 1990—2022 (Zellner, 1979).

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon_t$$

This economic model examines how external debt affects economic development, with particular emphasis on understanding how this relationship affects other important businesses. In this model, the variable  $Y_t$  represents GDP growth (i.e., economic development) at time  $t$ . External debt at time  $t$  is essentially independent of interest. Examining its effect on economic development depends on the model including external debt, particularly in terms of the “debt overhang” hypothesis. The assumption is that excessive debt can impede growth by creating uncertainty about a country’s ability to repay its debts and future fiscal policies. Market volatility is calculated by managing variables with external debt. Because exports can support economic development through access to production and services, exports are often thought to support gross domestic product (GDP) growth (Pochea & Nițoi, 2021).

An important variable in the model is the exchange rate. By passing on the benefits of one country to another, it has a great impact on the growth of the economy. The trade balance, investment decisions, and overall stability of the economy are strongly affected by the exchange rate. Usually, a steady and competitive exchange rate relates to economic development because it can increase exports by expanding foreign customers, thus measuring value, reducing risks, and encouraging foreign investment. Conversely, excessive exchange rate volatility can undermine confidence, discourage investments, and disrupt financial plans. Therefore, evaluating the impact of the economy on GDP growth depends on understanding its importance in this model, especially for economies that are dependent on foreign capital (Mohamed & Abdulle, 2023; Qambrani et al., 2024).

$$GDP\_Growth_{i,t} = \alpha + \beta_1 External\_Debt_{i,t} + \beta_2 Trade\_Fluctuation_{i,t} + \beta_3 Exchange\_Rate_{i,t} + \epsilon_t$$

### 3.4 Descriptive statistics of the measures

The statistics described in Table 1 provide an overview of four key economic indicators: GDP growth, external debt, trade volatility, and exchange rates. The table presents the primary statistical measures for each variable. Understanding the economic situation and conducting further statistical analysis relies on a fundamental understanding of the distribution, central tendency, and variability of the data, which are provided by these descriptive statistics (Abdelsalam, 2020).

**Table 1: Descriptive Statistics**

Variable	Obs	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
GDP_GROWTH	71	4.9405	5.2933	8.6695	-4.6245	2.3764	-1.4471	6.1909
EXTERNAL_DEBT	71	35.3699	29.4650	69.2232	14.9711	14.9437	0.6936	2.2463
TRADE_FLUCTUATION	71	-6.1915	-6.5348	0.0000	-13.6861	2.9895	0.3553	3.1943
EXCHANGE_RATE	71	95.9839	85.0838	204.8672	49.0854	37.5855	1.1035	3.6032

Table 2 displays the correlation matrix, which reveals the connections between the variables. The matrix displays the relationships among the variables, with each value representing the correlation coefficient between two variables. These connections demonstrate significant relationships between the factors that can impact future studies and provide a perceptive understanding of the interactions among them.

**Table 2: Correlation Matrix**

	1	2	3	4
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GDP_GROWTH	1			
EXTERNAL_DEBT	-0.5730**	1		
TRADE_FLUCTUATION	0.1758*	0.2700*	1	
EXCHANGE_RATE	-0.0463***	0.4616**	-0.0778***	1

Significance Level \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

#### 4 Results

Table 3 explains the causal relationship of external debt and current account deficit (CAD) with economic growth for three South Asian countries, Pakistan, Bangladesh, and Sri Lanka, over the period from 1990 to 2022. Pakistan is revealed to have an average external debt constituting 30.68% of GDP against an average CAD of -6.45%, hence harbored a persistent current account deficit. Having had a CAD of -5.89% also representing continued deficit with a lower average of external debt of 22.63%, Bangladesh recorded CAD similar to that of Pakistan. With an average CAD of -6.12% and a 54.70% average foreign debt over GDP, Sri Lanka, however, held the largest sustained deficit. As indicated by 'Yes' in the last column, the current account deficit does get confirmed for all three countries. When averaged over these three countries, the figures yield an overall average external debt of 36.00% and CAD of -6.15%. The primary and persistent effect on the economic development of South Asia over this period is emphasized by current account deficits and external debt. These results validate the debt overhang theory, which states that intensive levels of external debt inhibit investments and hence long-run economic growth (Krugman, 1988). The persistent current account deficits observed corroborate the claims of Mohsin et al. (2021) and Ewane and Mejame (2023), who assert the destabilizing nature of prolonged external imbalances with respect to macroeconomic stability in developing economies. Further, in South Asia, Awan and Qasim (2020) note that debt and CAD limits frequently restrict fiscal space and development financing, thus aggravating vulnerability in economic terms.

**Table 3: Impact of External Debt and Current Account Deficit on Economic Growth**

South Asia Country	Year	External Debt Average	CAD	CAD
Pakistan – Average	1990 - 2022	30.68173	-6.45478	Yes
Bangladesh – Average	1990 - 2022	22.62582	-5.88806	Yes
Sri Lanka – Average	1990 - 2022	54.70320	-6.12177	Yes
All Countries Average	1990 - 2022	36.00359	-6.15487	Yes

Table 4 shows the variance inflation factor (VIF) statistics, which, in a regression model, help to identify multicollinearity among the independent variables. When two or more variables are strongly linked, a condition known as multicollinearity leads to distortion of the regression analysis findings. There is no appreciable multicollinearity among the variables in the model since all the VIF values are much below the generally used threshold. This implies that multicollinearity does not cause inflation of the regression coefficients; rather, they are dependable (Jou et al., 2014).

**Table 4: VIF Statistics**

Variable	VIF	1/VIF
EXTERNAL_DEBT	1.327	0.7536
TRADE_FLUCTUATION	1.001	0.9990
EXCHANGE_RATE	1.107	0.9033

Table 5 provides a concise overview of the panel unit root test findings for GDP growth, external debt, trade fluctuation, and the exchange rate. An analysis was conducted via the IPS and CIPS methods. These tests assess the stability of these variables over time by analyzing their statistical properties. Based on the IPS test results, it is evident that GDP growth is stagnant at its current level. However, it is worth noting that External Debt, Trade Fluctuation, and Exchange Rate exhibit non-stationarity at the level, but they achieve stationarity after undergoing differencing. Based on the CIPS test, GDP growth, and external debt exhibit a mild level of

stationarity, whereas the trade fluctuation and exchange rate achieve stationarity after undergoing differencing. The findings indicate that most of the variables are not stationary at the initial level. Nevertheless, once the first difference is taken, these variables become stationary, rendering them suitable for further time series analysis (Choi, 2001; Lee et al., 2016; Pesaran et al., 2013).

**Table 5: Panel Unit Root Test**

Variables	IPS unit root test		CIPS unit root test	
	Level	First Difference	level	First Difference
GDP_GROWTH	-1.9937**	-10.0710***	-0.4728*	-5.2936***
EXTERNAL_DEBT	0.591	-7.2163***	-1.5282*	-4.0901***
TRADE_FLUCTUATION	-0.8419	-5.7115***	-1.5786*	-4.6239***
EXCHANGE_RATE	4.5664	-1.7666**	-2.6258***	-3.7396***

Significance level at the \*\*\* 1% and \*\* 5% and \* 10%

Table 6 presents outcomes based on both pooled ordinary least squares (OLS) regressions and quantile regressions for three different models. Throughout all models, external debt is found to exert a significant negative impact on the dependent variable, with coefficients for external debt equal to -0.0880 in Model 1, -0.0886 in Model 2 and -0.0540 in Model 3. These results are significant at the 1% level for Models 1 and 2, while in Model 3 it is at the 5% level, suggesting a negative relationship of the dependent variable with external debt. This confirms the debt overhang theory stating that undue external debt would reduce private investment and inhibit economic growth (Krugman, 1988), and conversely strengthens the empirical application of Qambrani et al. (2024) and Awan and Qasim (2020), who found evidence for a strong inverse linkage between debt burden and growth indicators in South Asian economies. Trade fluctuations enhance growth but not significantly in Models 1 and 2, thus not strong for those particular models. Such outcome gives credence to O’Sullivan and Papavassiliou (2020) who maintained that the growth-propelling effects of trade are contingent on institutional and structural factors. In Model 3, the exchange rate turned out with a -0.0067 coefficient, being statistically valid only at the 5% level for this particular model. Mohsin et al. (2021) and Ewane and Mejame (2023) provided similar conclusions that exchange rate volatility tends to negatively impact macroeconomic stability and growth in their research for developing countries.

In terms of quantile regression, external debt has an ongoing negative effect across Models 1, 2, and 3, with respective coefficients of -0.0523, -0.0567, and -0.0478. The results obtained are statistically significant at the 5% level, thus signifying robust negative effects of external debt across varying points of the dependent variable distribution. Quantile regression captures different heterogeneous effects across different quantiles, thus rendering itself extremely useful for growth studies, adding an extra layer of insight on OLS. This trend, which has run consistently through the three models, lends strength to the conclusion that external debt is a major constraint on the country’s economic performance. Trade fluctuations show negative effects in Models 1 and 2; however, as they were not statistically significant, the extent of their impact remains questionable. The exchange rate has little affect in the others and is also insignificant. Overall, across all quantile regressions, the constant term is significant, thus revealing a consistent baseline effect. Conversely, external debt affects the dependent variable strongly and consistently, supported in both OLS and quantile regression results. However, trade fluctuations and exchange rate effects are conflicting. Trade fluctuations have not been significant, while the exchange rate is significant in a few models; that would mean that the effects of these two on growth are conditional and rather inconsistent.

**Table 6: Pooled OLS and Quantile Regression**

	Pooled OLS			Quantile Regression		
	Model-1	Model-2	Model-3	Model-1	Model-2	Model-3
EXTERNAL_DEBT	-0.0880*** (-4.7820)	-0.0886*** (-4.7827)	-0.0540** (-2.5154)	-0.0523** (-2.1883)	-0.0567** (-2.4591)	-0.0478** (-2.0848)
TRADE_FLUCTUATION		0.0548 -0.5599	0.0658 -0.7048		-0.0467 (-0.3452)	-0.0483 (-0.2920)

EXCHANGE_RATE			-0.0067**			-0.0022
			-0.7585			(-0.1779)
Constant	7.9310***	8.2898	7.8992**	7.0616***	7.0139***	6.8274***
	-10.9776	-8.5601	-8.7015	-8.8051	-6.3551	-6.2002
Observations	71	71	71	71	71	71

t statistics in parentheses \*\*\*, \*\*, \* denotes significance level 1%, 5%, 10%.

Figure 2: Relationship between External Debt and GDP growth

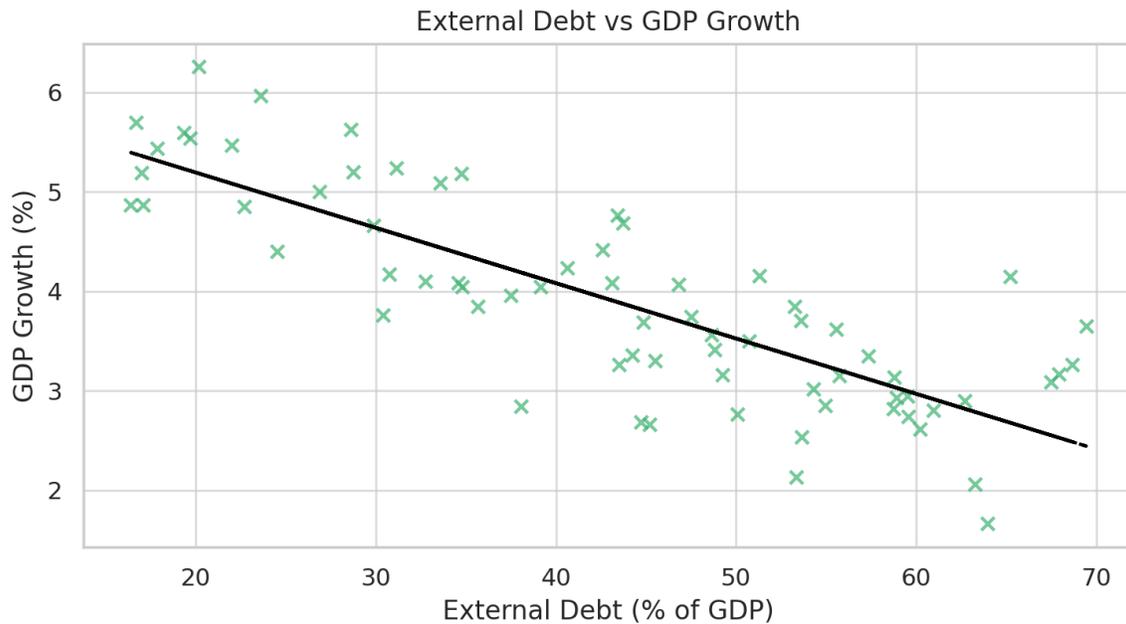


Table 7 presents the findings from the Panel Mean Group (PMG) and Autoregressive Distributed Lag (ARDL) models (Nkoro & Uko, 2016; Pesaran et al., 1999), highlighting the relationships between GDP growth and various factors, both in the long run and short run. When long-term effects are considered, it becomes evident that external debt has a detrimental effect on GDP growth. This is supported by a substantial coefficient of -0.1974, which suggests that an increase in external debt is closely linked to a decrease in GDP growth. On the other hand, fluctuations in trade can have a positive effect on the growth of GDP. This is supported by a coefficient of 0.5818, indicating that an increase in trade fluctuations can potentially stimulate GDP growth. GDP growth is positively influenced by the exchange rate, as indicated by a coefficient of 0.0245. The constant term, which represents the fundamental level of GDP growth, is also highly significant at 11.2465. When examining the short-term outcomes, a deeper understanding of the dynamics is revealed. With a significant negative coefficient of -1.7219, it is evident that the system adjusts to long-term equilibrium, as observed in the cointegration term (COINTEQ). There is no substantial effect on current GDP growth when the lagged values of GDP growth are considered. The data indicate that the short-term effects of external debt are not significant. This conclusion is supported by the nonsignificant coefficients observed for both current and lagged values. Trade fluctuation has a negative coefficient of -0.9689, which is statistically significant. However, the other lagged values do not demonstrate any significant impact. Regarding the exchange rate, the initial impact may not be very significant. However, it is worth noting that the coefficient for the lagged value at -2 is indeed significant. This suggests that previous fluctuations in the exchange rate could have some influence on the short-term growth of GDP. Based on these findings, it can be inferred that there is a clear connection between GDP growth and the explanatory variables in the long run. However, the short-term effects are more unpredictable and can differ.

Table 7: Long-Run and Short-Run PMG/ARDL Results

Dependent Variable	GDP_Growth
<b>Long-run (Pooled) Coefficients</b>	

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXTERNAL_DEBT	-0.1974	0.0093	-21.3348	0.0001
TRADE_FLUCTUATION	0.5818	0.0164	35.4369	0.0001
EXCHANGE_RATE	0.0245	0.0010	23.8898	0.0001
C	11.2465	0.3304	34.0383	0.0001

**Short-run (Mean-Group) Coefficients**

COINTEQ	-1.7219	0.7559	-2.2779	0.0276
D (GDP_GROWTH (-1))	0.4791	0.2880	1.6633	0.1034
D (GDP_GROWTH (-2))	-0.0393	0.1845	-0.2130	0.8323
D (GDP_GROWTH (-3))	0.1575	0.3784	0.4161	0.6793
D (EXTERNAL_DEBT)	-0.2456	0.3046	-0.8063	0.4244
D (EXTERNAL_DEBT (-1))	-0.0325	0.2171	-0.1499	0.8815
D (EXTERNAL_DEBT (-2))	0.1434	0.3760	0.3813	0.7048
D (TRADE_FLUCTUATION)	-0.9689	0.5043	-1.9211	0.0612
D (TRADE_FLUCTUATION (-1))	-1.1317	0.7457	-1.5177	0.1362
D (TRADE_FLUCTUATION (-2))	-0.5423	0.3477	-1.5595	0.1260
D (TRADE_FLUCTUATION (-3))	0.1363	0.1660	0.8209	0.4161
D (EXCHANGE_RATE)	0.1047	0.1661	0.6307	0.5315
D (EXCHANGE_RATE (-1))	-0.0273	0.1459	-0.1871	0.8525
D (EXCHANGE_RATE (-2))	0.1256	0.0532	2.3636	0.0226
D (EXCHANGE_RATE (-3))	0.0263	0.1656	0.1590	0.8744

Table 8 presents the essential values for the bounds-testing approach utilized to evaluate the existence of a long-term connection in econometric models. Given a sample size of 30, the critical values can be found at three different significance levels: 10%, 5%, and 1%. Based on the statistical analysis, the critical values for the lower bound (I (0)) and upper bound (I (1)) at the 10% significance level are 2.6760 and 3.586, respectively. At the 5% significance level, the lower bound critical value is 3.272, and the upper bound critical value is 4.306. With a high level of statistical significance (1%), the lower bound is calculated to be 4.614, whereas the upper bound is determined to be 5.966. In addition, the table provides asymptotic critical values for comparison purposes. At the 10% level, the values are 2.37 (I (0)) and 3.2 (I (1)). At the 5% level, the values are 2.79 (I (0)) and 3.67 (I (1)). Finally, at the 1% level, the values are 3.65 (I (0)) and 4.66 (I (1)). These crucial values are utilized to ascertain whether there is a long-term connection between the variables. When the test statistic surpasses the upper bound, it indicates the presence of a long-term relationship. On the other hand, if it drops below the lower limit, it does not suggest any long-term connection. When the statistic falls within the specified bounds, the outcome becomes inconclusive (Pesaran et al., 2001).

**Table 8: Bounds Critical Values**

Sample Size	10%		5%		1%	
	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
30.0000	2.6760	3.586	3.272	4.306	4.614	5.966
Asymptotic	2.37	3.2	2.79	3.67	3.65	4.66

\* I (0) and I (1) are, respectively the stationary and nonstationary bounds.

## 5 Discussion

### 5.1 External Debt and Economic Growth

This study provides a comprehensive analysis of the impacts of external debt, trade volatility, and the exchange rate on GDP growth in South Asian countries (Pakistan, Bangladesh, and Sri Lanka) from 1990—2022. It also offers an overview of the effects on regional and social economic development. The results repeatedly reveal that in all the models applied in this research support the debt-overhang hypothesis, finding that external debt has significant negative effects on growth (Dawood et al., 2024; Krugman, 1988). It suggests that an increase in debt reduces not only the incentive but also the ability of a country to invest productively. The PMG/ARDL results indicate a long-term negative impact (coefficient = -0.1974), which corresponds to the findings of Ale et al. (2023) and Awan and Qasim (2020). Both reported, in fact, that excessive external debt hampers economic growth in the South Asian region due to lowering the fiscal space and investor confidence. The pooled OLS and quantile regression findings strengthen this relationship, showing that high levels of debt are associated with lower GDP growth throughout the percentiles, in line with the findings of Baig et al. (2024) and Meraj et al. (2024). The negative consequences stem from elevated debt servicing costs that draw resources away from developmental sectors, such as education and infrastructure, consistent with the studies by Osband et al. (2024). First, servicing high external debt often demands the investment of a large portion of government revenue into key areas such as infrastructure, education, and healthcare. This resource diversion not only hinders the government's ability to foster economic growth but also adds to the burden of debt repayment (Mohamed & Abdulle, 2023). Due to this rise in debt, the confidence of the investors will also dip, worries about default would come in leading to a decrease in foreign direct investment (FDI) and capital flight. Hence, this limitation on the availability of capital for growth-inducing investment would throttle economic growth (Meraj et al., 2024). In South Asia, the economies are already challenged by low productivity, low income-generation, and low domestic savings; external debt reliance only serves to worsen this situation. For example, during the study period, Pakistan's external debt averaged 30.68% of GDP, whereas Sri Lanka's external debt averaged 54.70% of GDP, considered very high when compared to other countries, which means that these countries suffered heavily under outstanding debts. The high external economic indebtedness of these countries inhibits their growth, making them vulnerable to external circumstances, such as international interest and exchange rates (Khan et al., 2022).

### 5.2 Trade Fluctuations and Economic Growth

A more convoluted picture exists in South Asia with regard to trade variations and GDP growth. Long-term perspectives indicate that while trade variations increase GDP growth, the short-term impact varies (Baloch et al., 2024). The long-term positive realization of trade variations (0.5818) indicates that trade volatility increases (taking into consideration the divergence between imports and exports) relative to the support of growth. The reasoning behind this maybe trade openness per se and its ability to integrate with the global economy so as to support growth via improved competitiveness, efficiency, and resource allocation (Alam et al., 2025). However, short-term results from the PMG/ARDL model portray, in a negative way, but without statistical significance, that trade volatility negatively impacts GDP growth. This apparent conflict may arise due to market imbalances that create economic uncertainty, impinging on the growth process, at least in the short run (Subrata Deb et al., 2023). For instance, any sudden fluctuations in global demand, supply disruptions, or changes in specifications may cause market imbalances that may impact GDP growth. Added to all of this are the short-term disturbances in economic growth due to economic deficits in South Asian countries, primarily Pakistan and Sri Lanka (Baig et al., 2024). The legal frame of policies and programs that link economic fluctuations growth then becomes an important aspect to consider. In South Asia, such policies are often subject to political conflicts, protectionism, and infrastructural disruptions, which all undermine the ability of these countries' capitals to exploit the benefits of open markets (Asghar et al., 2020). Even reliance on a single-crop export market, as is the case for Bangladesh, renders that market vulnerable to external shocks, which leads to the economic change in GDP growth.

### 5.3 Exchange Rates and Economic Growth

Exchange rate has a pronounced effect on the economic performance of South Asia. The long-run estimates from the PMG/ARDL model state that exchange rates, which are the most important determinant of the

international competitiveness of a nation, would benefit GDP growth at 0.0245. This means that with good management of the exchange rate, export performance can improve, foreign capital can be attracted, macroeconomic stability can be ensured, and prolonged growth can be fostered (Anidiobu & Okolie, 2016). However, the relationship is not that straightforward. The immediate impact of exchange rate movements upon GDP growth is statistically insignificant, while changes in lagged exchange rates exert a delayed yet positive effect on economic outcomes. The delayed response might be attributed to their effects upon a change in the behavior of the investors, economic policies, and capital allocation decisions (Zellner, 1979). Currency management is all the more important in South Asia, where such incidences are common, as in the cases of Pakistan and Sri Lanka, where exchange rate volatility has been rampant. Sudden currency depreciation raises the local cost of servicing external debt, inflationary pressures, and economic momentum. For instance, depreciation of the Pakistan rupee has kept raising the cost of debt servicing and has limited fiscal space for growth (Sundus et al., 2022). For Sri Lanka, continuous instability of the currency, together with unsustainable levels of debt and lack of economic governance, has fast-tracked financial distress and reduced the productive capacity of an economy (Nicholas & Nicholas, 2023).

#### 5.4 Implications for Policy and Future Research

The results of this study have important implications for policymakers in South Asia. The negative impact of external debt on economic growth highlights the need for effective debt management strategies. Governments need to prioritize the use of credit and focus on projects that can generate more revenue and increase the country's debt servicing capacity. Efforts should also be made to diversify resources, reduce external debt dependency, and increase domestic investment support. From an economic policy perspective, the findings suggest that while economic reforms lead to long-term economic growth, short-term reforms pose risks to economic stability. Policymakers should therefore focus on supporting the economy's resilience to economic shocks by encouraging export diversification, improving the business environment, and implementing policies that facilitate integration into the global economy. Additionally, maintaining a stable and competitive exchange rate should be a key policy focus, as it can improve export markets, attract foreign investment, and stimulate economic growth.

Future research can build on this study to investigate the role of other macroeconomic factors (such as inflation, interest rates, and foreign direct investment) in establishing the relationships among external debt, economic volatility, the exchange rate, and GDP growth. Further analysis at the economic level can also provide a deeper understanding of how macroeconomic factors affect a particular economy and contribute to the economy. Finally, comparative studies with other regions or countries can help place the findings in a global context and identify best practices for respecting external debt, trade, and exchange rate policies. In summary, this study provides insight into the interactions between external debt, trade volatility, the exchange rate, and GDP growth in South Asia. These findings highlight the importance of effective debt management, economic diversification, and price stability in supporting economic growth in the region. As South Asian countries continue to grapple with the challenges of global economic integration, these policy issues are critical to achieving long-term economic growth and progress.

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The authors have no conflicts of interest to declare.

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