Evaluating the Dynamic Interactions of Remittances, FDI, and Trade Balance on Sri Lanka's GDP: Evidence from Co-Integration Analysis

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Abstract

Trade balance, remittances, interest rates, Foreign Direct Investment (FDI), and external debt are key macroeconomic components that drive economic growth in a country. This study analyzes the interconnection among these elements and the manner in which they influence Sri Lanka's economic growth. With the usage of structured country data and advanced econometric techniques, the analysis suggests that these relationships are more complex than they appear. According to the results, both trade balance and FDI spur growth. However, that growth is subjected to the standard of the institutions and the status of openness of the economy. Although remittances are important for the welfare of the households, there is a progressive decline in growth returns at higher levels of dependency, hence emphasizing the fact that these funds need to be invested in a more productive manner. Interest rates increase investment when the economy is stable. However, they increase volatility when debt levels are high. While external debt can fuel growth, if not managed judiciously it can lead to excessive economic burdens which hinder sustainability of growth in the log-run. These findings refer to further importance in deriving policy initiatives that execute fiscal and monetary policies and trade policies in a harmonized way to increase the growth potential and strengthen the resilience of the Sri Lankan economy.

Keywords: *External Debt, FDI, Interest rates, Remittances, Structural Vulnerabilities, Trade Balance*

JEL Codes: *F21, F24, F43, H63, O11, O16*

Introduction

Over the years, both theoretical and empirical studies have explored the relationships between macroeconomic variables and factors such as trade balance, remittances, interest rates, FDI, and external debt (Turan & Yanıkkaya, 2021). In Sri Lanka, studies reveal that economic growth should be prioritized as the focal point in addressing challenges related to sustainable development within its macroeconomic framework. Therefore, trade balance, remittances, interest rates, FDI, and even external debt should be considered in the prospects for the country's economic growth. Many studies have been conducted on all the aforementioned aspects; however, their interaction, as well as their specific effects on Sri Lanka's economic growth, remains a niche area that is underexplored.

With a more comprehensive understanding of sectoral interaction, countries need to implement policies that ensure economic stability and resilience (Krugman, 1988). On the other hand, the trade deficit has implications for economic stability and foreign exchange reserves (Ahmed, 2013). There should be comprehension of the role played by remittances in offsetting trade imbalances in terms of contribution to foreign exchange inflows in the case of an economy that is highly reliant on imports and yet cannot diversify its export base properly. Remittances, or the money transferred by Sri Lankan expatriate workers, are presently a key income source of the economy. Not only do remittances sustain individual incomes but they also serve as a significant foreign exchange earner, stabilizing currency and improving the balance of payments (Stark & Bloom, 1985). Therefore, interest rates and remittances must be comprehended in relation to other in the context of becoming either a consumption protective wall or counterbalancing credit dependency (Amuedo-Dorantes & Pozo, 2004). FDI flows in Sri Lanka, however, have been uneven and subject to macroeconomic volatility and policy uncertainty that affects its contributions. At the same time, Sri Lanka's external sector debt has also been an issue since accumulating debt puts too much pressure on fiscal resources and growth potential.

By exploring the interconnected functions of these macroeconomic indicators, this paper further adds to the literature on macroeconomic management with specific focus on Sri Lanka. The current study explores the trade balance and its relationships with remittances, interest rates, FDI, and external debt. In doing so, the study also sheds light on Sri Lanka's development issues with respect to the structural economic problems it faces and how policymakers can manage economic shocks in the global arena.

This paper is significant because it looks into the effects of remittances, FDI, trade balance, interest rates, and external debt, as they relate to economic growth in Sri Lanka, an area which is empirically limited. Also, the main issue of concern is how these macroeconomic variables are integrated and their collective impact on GDP growth in Sri Lanka within the short and long terms. In this regard, the objective of this study is to formulate sound interrelationships with advanced econometric techniques and provide evidence to support policy development. The rest of this paper is structured as follows: Section 2 presents theoretical framework, Section 3 reviews the literature, Section 4 outlines the methodology, Section 5 showcases the results, Section 6 reflects on the discussion, and Section 7 provides policy implications and finally the limitations of the study are being forwarded in Section 8.

Theoretical Background

Understanding the connection between remittances, macroeconomic variables, and economic growth makes a strong theoretical grounding a necessity. In order to explain the changing interactions between trade balance, remittances, FDI, interest rates, external debt, and economic development in the context of Sri Lanka, classical, neoclassical, and contemporary economic theories have been taken into consideration.

Traditional trade theories such as comparative advantage concepts are interested in the function of international trade in ensuring economic growth and efficiency. Trade liberalization enables countries to focus on industries where they have a relative advantage, thereby increasing the income of the country (Ricardo and Misina, 2000). On the other hand, In Hadass et al. (2003) it mentions that Prebisch and Singer (1950) warn that dependence on the primary commodity exports may worsen underlying weaknesses in developing countries. Sri Lanka's enduring trade deficit which has been exacerbated by low-value agricultural, and textile exports, deeply aligns with structuralist critique concerns.

The New Economics of Labor Migration (NELM) framework (Stark & Bloom 1985) offers a crucial perspective to examine how remittances function. This model suggests that remittances serve as a way for households to manage risk helping to stabilize spending and fund investments in human capital. Research backs up the idea that remittances have positive effects in the short term reducing poverty and boosting household well-being (Adams & Cuecuecha, 2013). Yet, worries about the "Dutch Disease" effect and over-reliance on remittances (Amuedo-Dorantes & Pozo 2004) show that without the right policies, remittances might discourage local investment and slow down economic change. This risk is relevant to Sri Lanka's current economic situation.

The neoclassical growth model (Solow, 1956) and endogenous growth theories see FDI as a growth engine, transferring technology, management expertise and capital to host countries. Borensztein *et al.* (1998) argue that FDI benefits are country specific, particularly human capital and institutional quality. In Sri Lanka while FDI has contributed to infrastructure development and employment generation, the long term benefits depend on strengthening of governance frameworks and creation of a business friendly environment.

From a Keynesian perspective (Keynes & Hicks, 1936) interest rates affect investment and aggregate demand and thus growth. Monetarist views particularly those of Friedman (1968) and Taylor (1993) stress the role of interest rates in inflation control and economic stability. In Sri Lanka dual effects of interest rates are visible: moderate rates can attract investment and stabilize macroeconomic conditions but high rates especially with high debt can choke growth and volatility.

Foreign borrowing can finance development if prudently managed, but excessive debt can generate a debt overhang that discourages investment (Krugman, 1988). Reinhart and Rogoff (2010) argue that once debt surpasses critical thresholds, the effect of debt on growth turns negative. Sri Lanka's rising debt burden underscores the need to balance external financing with sustainable debt management strategies to exclude long-run growth traps.

Together, these theoretical underpinnings form the basis for analyzing the complex, interrelated effects of macroeconomic determinants on Sri Lanka's growth profile. Building on classical trade theory, migration economics, growth modeling, and monetary theory, this study offers a comprehensive framework for analyzing the nuanced contribution of remittances and other macroeconomic determinants to sustainable development outcomes.

Literature Review

Sri Lanka's trade balance is important because it reflects the health of the economy and its capacity to earn foreign currency. It also determines the level of competitiveness of the economy. Classical theories of economics such as Ricardo's comparative advantage contend that countries will grow economically as trade barriers are eliminated because they enable greater efficiency and productivity. At the same time, Structuralist critique suggests that over-dependence on primary export products for international trade will constrain economic growth diversification and create vulnerabilities in the long run. Most research in Sri Lanka has shown that trade deficits correlate with unsustainable foreign borrowing, while persistent surpluses, although good, are likely to inhibit domestic spending and investment.

In the analysis of economic growth and trade balance, the presence of trade as well as the desirable effects of maximizing economic growth is especially highlighted by the classical economic theories such as Ricardo's comparative advantage. Focusing on sectors where a nation has a comparative edge, it is possible to enhance economic effectiveness and accrue wealth through trade liberalization. However, Sri Lanka's trade balance is an enigma since there are trade deficits accompanied by foreign loans and external debt, which can, in the long run, be quite debilitating. Relying on primary exports serves as an impediment to diversification and growth and that is what the structuralist school of thought focuses on (Dil Iorio & Fachin, 2018). As these trends indicate, Sri Lanka's economy is conditioned to rely on income from textile, tea, and agriculture, but at the same time, this trade balance is dominated by challenges that limit long-term transformation and industrial dynamics.

Remittances are yet another significant category of external resource flows of funds, and it is a key source of income for Sri Lanka's population. Adherents of the New Economics of Labor Migration (NELM) theory assert that remittances help facilitate consumption smoothing and fund spending in education, health, and even small scale business, which helps in poverty alleviation and economic development (Stark & Bloom, 1985; Seidu et al., 2022). Nonetheless, considerable literature has raised concerns over a specific focus on the outcomes of remittance inflows, which might create disincentives to invest domestically and foster dependency in the longer term (Abudulai 2023). These findings of the studies suggest that while remittances serve an important role in household welfare, their contribution to economic growth is most likely to be negative with increasing dependency on remittance.

The effect of remittances can positively or negatively impact economic growth, as its consequences are both complex and straightforward. While remittances often enhance the welfare of households by providing them with a steady source of income to be utilized for consumption, health, and education, they also serve to reduce poverty (Loxa, 2019). Remittance is a matter of discussion in terms of its contribution to the economy. According to Amuedo-Dorantes and Pozo (2004), an over-dependence on remittances can limit structures of investment that are required for transforming and accelerating sustainable growth. Focusing on Sri Lanka, the findings indicate that while remittances can improve short-term welfare, they cannot fuel long-term growth due to underlying factors, such as investment apathy in active industries.

Interest rates, which are crucial to a monetary policy, are significant to investments, capital movement, and even savings in Sri Lanka. According to Friedman (1968), Keynesian theory explains interest rates as central to aggregate demand and economic expansion. In contrast, the Monetarist school of thought considers that interest rates

are important for the economy's inflation control and stability (Garrison, 1984). It is in this emerging market in particular that recent works have uncovered the paradoxical impact of interest rates on growth, where high rates can catalyze investment spending during stable economic conditions but worsen volatility when debt levels are elevated (Rafiq, 2015). Rates of interest are highly significant when increasing or decreasing the level of investments in different sectors of an economy. Relative to Sri Lanka, both domestic savings and foreign investments are subject to change with movement of interest rates. The Keynesian and Monetarist perspectives are very closely related. While in the case of a Keynesian economy, interest rates foster overall consumption (Friedman, 1968), in a Monetarist regime, interest rates are a means to manage inflationary and monetary programs (Taylor, 1993). The current study identifies that in the case of Sri Lanka, the role of interest rates toward growth is multifaceted. Foreign investment may increase with higher interest rates, but volatility of investment will also increase with higher foreign debt.

FDI is accepted to enhance economic growth by increasing capital investment, technology adoption, and productivity improvement (Ahmed, 2013). In Sri Lanka, FDI provides support for development in the nature of infrastructure, job opportunities, and R&D efforts. Nonetheless, the effectiveness of FDI in a country is determined by its absorptive capacity, which considers such factors as institutional quality, human capital, and infrastructure development (Alfaro et al., 2004). It is established in this study that FDI has a favorable effect on Sri Lanka’s economic growth, but it is contingent on whether the country's governance and institutional systems are able to make use of these inflows.

FDI has garnered attention and consideration as a significant potential contributors to the developing economies towards their economic growth. In the neoclassical growth model FDI boosts capital accumulation which is necessary for economic growth (Solow, 2014). Nonetheless, FDI is productive only to the extent that the investment is beneficial for the growth of its host economy. Sri Lanka's FDI attraction and absorption capacity are linked to the country's institutional quality, infrastructure, and human resources. Some empirical works suggest that developing countries that have strong governance, and institutional frameworks are more likely to gain from FDI. In this regard, Sri Lanka is no exception.

External debt, a key component of development financing, can also promote growth through productive investment and development of infrastructure. On the other hand, when external debt becomes too high, it can lead to a debt overhang phenomenon, where investment and growth are hampered because the level of debt is so high (Turan & Yanikkaya, 2021). Given this background, debt aversion becomes a more pronounced problem with accumulating credit beyond a set point. The underscored

lesson from Sri Lanka's experience with external debt is the necessity of effective enforcement of sustainable debt management policies to allow debt to be used as a factor of development instead of an obstacle to growth.

The development of new financing projects has been associated with external debt overhang concepts, with focus given to both the essence and practical implications of the theory. Krugman (1988) gives an important example. He suggests that because the level of external debt is known, investment will be decreased since there is an expectation of excessive tax burdens with the intention to service the debt. Greiner and Fincke (2015) deepen this argument by providing evidence that once debt crosses a certain limit, the negative impacts on growth are undoubtedly visible. Focusing on Sri Lanka, the accentuated external debt has lent credence to doubts in relation to the sustainability of economic growth because of the increasing debt service burden. The analysis of this study suggests that although external debt may foster growth where it is productive, too much heavily compromises it in the long run.

Methodology

This study applies the quantitative study design to investigate the nexus between GDP and other major macroeconomic variables in Sri Lanka for the period 2000-2023. Variables were selected on the basis of theoretical and empirical significance in Sri Lankan economics: remittances, FDI, balance of trade, interest rates, and foreign debt. Econometric procedures applied in studies can be taken as best fitting method in analysis of macroeconomic relationships. Multiple regression establishes line of reference correlations between GDP (dependent variable) and predictor variables (remittances, FDI, trade balance, interest rates, and foreign debt).

Augmented Dickey-Fuller (ADF) tests handle non-stationarity for time-series by testing integration orders of variables prior to cointegration analysis as a pre-requisite. The Engle-Granger cointegration test is instrumental in assessing long-term economic relationships to prevent incorrect conclusions due to spurious correlation among variables. This two-step approach (stationarity test and then cointegration) adheres to tradition in seminal econometric papers (Engle & Granger, 1987) and is widely applied in macroeconomic analysis (Menegaki, 2019), ensuring solid findings for policy inferences on the determinants of Sri Lanka's growth.

A linear specification of the principal model can be stated as follows:

$$GDP = f(TRDBAL, REMIT, INT, FDI, EXDBT)$$

$$GDP = \alpha + \beta_1 TRDBAL + \beta_2 REMIT + \beta_3 INT + \beta_4 FDI + \beta_5 EXDBT + \cup_t \qquad (1)$$

Where:

GDP = Gross Domestic Product

$TRDBAL$ = Trade Balance

$REMIT$ = Remittances

INT = Interest Rate

FDI = Foreign Direct Investments

$EXDBT$ = External debt

α = Constant

$\cup_t$ = Stationary Disturbance Term

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = Regression coefficients

The research design is made to ensure robustness in stationarity testing of the variables, detection of long-run relationships through co-integration, and short-run dynamics through an Error Correction Model (ECM). ADF test is conducted at three different levels: level data, first difference, and second difference. ADF test results are consistent with Dickey and Fuller (1979), who emphasized unit root testing to avoid spurious inferences during time series analysis. The Engle-Granger co-integration test is utilized to assess the existence of long-run equilibrium among the variables. The long-run model is specified as:

$$GDP = \alpha + \beta_1 TRDBAL + \beta_2 REMIT + \beta_3 INT + \beta_4 FDI + \beta_5 EXDBT + \cup_t \quad (2)$$

$$lnGDP = \alpha + \beta_1 TRDBAL + \beta_2 lnREMIT + \beta_3 lnINT + \beta_4 lnFDI + \beta_5 lnEXDBT + \cup_t \quad (3)$$

where lnGDP is specified in its log-linear form as GDP, and the rest of the variables are transformed to natural logarithms (TRDBAL is an exception) in order to stabilize the variance and estimate the coefficients in the form of elasticities. To capture short-run dynamics and the speed of adjustment toward long-run equilibrium, an ECM is employed. The ECM is specified as follows:

$$\Delta lnGDP = \alpha + \beta_6 TRDBAL + \beta_7 \Delta lnREMIT + \beta_8 \Delta lnINT + \beta_9 \Delta lnFDI + \beta_{10} \Delta lnEXDBT + \beta_{11} lnGDP_{t-1)} + \beta_{12} ECT_{(t-1)} + \varepsilon_t \quad (4)$$

where Δ denotes the operator capturing the change between consecutive observations, and $ECT_{(t-1)}$ is the one-period lagged residual from the co-integration equation, representing the residual from the co-integrating equation lagged by one period. The coefficient β_{12} reflects the rate at which short-run disequilibria are adjusted to restore long-run equilibrium, suggesting a relatively rapid correction process. ECM findings validate those of Banerjee et al. (1993), who highlighted the importance of error correction mechanisms in model specification of short-run dynamics in co-integrated systems.

Findings

This paper analyzes the short- and long-run relationships between GDP and macroeconomic indicators such as trade balance, remittances, interest rate, FDI, and external debt, using the ADF test and Engle-Granger co-integration method.

The preliminary tests indicate that all variables are non-stationary in their level form, as shown in Table 1. The ADF unit root test, using MacKinnon one-sided p-values and including both intercept and trend, confirms that none of the variables are stationary at the 5% significance level. Since constructing a model using non-stationary time series can lead to spurious results, further transformation is necessary before estimation.

To evaluate the validity of the model, the stationarity of the variables was further tested at the first-difference level. If the variables are stationary at first difference, the Engle-Granger co-integration test can be applied to determine the existence of a long-run equilibrium relationship. As shown in Table 2, all variables except lnEXDBT and lnGDP are stationary at the first-difference level. Consequently, it was necessary to test for stationarity at the second-difference level.

The results in Table 3 indicate that all variables become stationary at the second difference. The ADF unit root test, applied to the natural logarithm of each variable at the second-difference level, rejects the null hypothesis of a unit root at conventional significance levels. This confirms that the variables in question are integrated of order two, I(2).

Table 1: ADF Test (Unit root test) Results - Level data

Variables	Level Data			Null Hypothesis (H_0): The series is non-stationary and possesses a unit root. Alternative Hypothesis (H_1): The series is stationary (no unit root).
	ADF Test Statistic			
	I	**T&I**	**N**	
TRDBAL	-1.7035 (0.4163) [-2.9980]	-1.6377 (0.7455) [-3.6220]	-0.5618 (0.4627) [-1.9564]	The ADF test results confirm that the series is non-stationary, as H_0 could not be rejected.
REMIT	-2.5362 (0.1223) [-3.0206]	-1.3898 (0.8320) [-3.6584]	-1.3031 (0.1714) [-1.9590]	The ADF test results confirm that the series is non-stationary, as H_0 could not be rejected.
INT	-3.5242 (0.0566) [0.0166]	-3.4380 (0.0708) [-3.6220]	-1.5670 (0.1081) [-1.9564]	The ADF test results confirm that the series is non-stationary, as H_0 could not be rejected.
FDI	-1.4320 (0.5471) [-3.0123]	1.6924 (1.000) [-3.6736]	-0.1897 (0.6059) [-1.9580]	The ADF test results confirm that the series is non-stationary, as H_0 could not be rejected.
EXDBT	0.6400 (0.9877) [-2.9980]	-2.1363 (0.4989) [-3.6328]	1.6386 (0.9711) [-1.9572]	The ADF test results confirm that the series is non-stationary, as H_0 could not be rejected.
GDP	-1.1305 (0.6855) [-2.9980]	-0.6051 (0.9687) [-3.6220]	1.4751 (0.9608) [-1.9564]	The ADF test results confirm that the series is non-stationary, as H_0 could not be rejected.

Hypothesis testing was conducted at the 5% significance level. The unit root test was applied using only the specification that includes both an intercept and a trend (I&T). Probability values are reported in parentheses as (p), based on MacKinnon (1996) one-sided p-values. The 5% critical values are provided in square brackets [cv] for reference. For clarity, the following notation is used: I&T denotes a model with both intercept and trend, I indicates a model with intercept only, and N refers to a model with no intercept and no trend.*

Table 2: ADF Test (Unit root test) Results - First Difference

Variables	First Difference Data			H_0: The series is non-stationary and possesses a unit root. H_1: The series is stationary (no unit root).
	ADF Test Statistic			
	I	**T&I**	**N**	
TRDBAL	-5.6461 (0.0001) [-3.0048]	-4.6105 (0.0075) [-3.6449)	-5.7363 (0.0000) [-1.9572]	The test statistic exceeds the critical value, leading to the rejection of H_0 and supporting stationarity.
lnREMIT	-3.87261 (0.0080) [-3.0048]	-3.6555 (0.0490) [-3.6449]	-3.3603 (0.0018) [-1.9572]	The test statistic exceeds the critical value, leading to the rejection of H_0 and supporting stationarity.
lnINT	-5.7671 (0.0001) [-3.0123]	-5.6694 (0.0009) [-3.6449]	-5.9101 (0.0000) [-1.9580]	The test statistic exceeds the critical value, leading to the rejection of H_0 and supporting stationarity.
lnFDI	-4.2243 (0.0039) [-3.0123]	-4.5845 (0.0090) [-3.6736]	-4.1894 (0.0002) [-1.9580]	The test statistic exceeds the critical value, leading to the rejection of H_0 and supporting stationarity.
lnEXDBT	-3.2222 (0.0322) [-3.0048]	-3.4076 (0.0760) [-3.6328]	-1.8164 (0.0667) [-1.9572]	H_0 is rejected under T&I and N, but the series remains non-stationary. Under I, H_0 is rejected, indicating stationarity.
lnGDP	-0.6838 (0.8291) [-3.0206]	-5.0053 (0.0031) [-3.6328]	-0.8184 (0.3487) [-1.9590]	H_0 is not rejected under I and N, indicating the series is non-stationary. H_0 is rejected under T&I, suggesting the series is stationary.

A 5% significance level was considered when performing the hypothesis testing. The unit root test was conducted using only the specification that includes both a trend and an intercept (I&T). Probability values are reported in parentheses as (p), based on MacKinnon (1996) one-sided p-values. The 5% critical values are shown in square brackets [cv]. For reference, the following model specifications are used: I&T denotes a model with both intercept and trend, I indicates a model with only an intercept, and N represents a model with neither intercept nor trend.*

Table 3: ADF Test (Unit root test) Results - Second Difference

Variables	Second Difference Data			H_0 : H0 is rejected Series is stationary Variable has a Unit Root H_1 : Variable has no unit root
	ADF Test Statistic			
	I	T&I	N	
TRDBAL	-3.9249 (0.0099) [-3.0655]	-5.1701 (0.0042) [-3.7332]	-6.8053 (0.0000) [-1.9590]	H_0 is rejected Series is stationary
lnREMIT	-3.7122 (0.0128) [-3.0299]	-4.1760 (0.0197) [-3.6736]	-5.9005 (0.0000) [-1.9590]	H_0 is rejected Series is stationary
lnINT	-3.9333 (0.0091) [-3.0521]	-3.7632 (0.0457) [-3.7104]	-4.1064 (0.0000) [-1.9628]	H_0 is rejected Series is stationary
lnFDI	-6.0495 (0.0002) [-3.0521]	-5.8303 (0.0012) [-3.7104]	-4.4619 (0.0002) [-1.9614]	H_0 is rejected Series is stationary
lnEXDBT	-6.5369 (-3.0123) [-3.0123]	-6.3171 (0.0002) [-3.6449]	-6.7057 (0.0000) [-1.9580]	H_0 is rejected Series is stationary
lnGDP	-5.9635 (0.0001) [-3.0206]	-5.9976 (0.0005) [-3.6584]	-6.0801 (0.0000) [-1.9590]	H_0 is rejected Series is stationary

Only the statistics for the Intercept and Trend (I&T) specification was used in the unit root test. Probability values are reported in parentheses (p), based on MacKinnon (1996) one-sided p-values. The 5% critical values are shown in square brackets [cv]. The model specifications are denoted as follows: I&T = Intercept and Trend, I = Intercept only, and N = No intercept or trend.*

Co-integration Test:

If the variables are not stationary at level or first difference, but become stationary at the second difference, a valid long-run relationship can still be modeled using level data provided the series are co-integrated. To test for co-integration, the Engle-Granger test should be applied to the residuals obtained from the level form of the model. The long run relationship of the study is

$$GDP = \alpha + \beta_1 TRDBAL + \beta_2 REMIT + \beta_3 INT + \beta_4 FDI + \beta_5 EXDBT + \cup_t \quad (5)$$

$$lnGDP = \alpha + \beta_1 TRDBAL + \beta_2 lnREMIT + \beta_3 lnINT + \beta_4 lnFDI + \beta_5 lnEXDBT + \cup_t \quad (6)$$

Where $lnGDP$ is the natural log of annual GDP, $TRDBAL$ is the trade balance, $lnREMIT$ is the natural log of annual remittances, $lnINT$ is the natural log of interest rate, $lnFDI$ is the natural log of FDI, $lnEXDBT$ is the natural log of external debt and U is the error term.

Table 4: Beta Coefficients of the Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.014	0.212	9.517	0.000
TRDBAL	-0.008	0.012	-0.601	0.555
LNREMIT	0.575	0.129	4.469	0.000
LNINT	0.040	0.052	0.774	0.449
LNFDI	0.052	0.063	0.816	0.425
LNEXDBT	0.312	0.069	4.452	0.000

R-squared	0.989	Mean dependent var	3.885
Adjusted R-squared	0.986	S.D. dependent var	0.661
F-statistic	332.419	Durbin-Watson stat	1.392
Prob(F-statistic)	0.000		

The residual of this regression estimate should be stationary at level form, if the model is to be suitable for regression and to obtain long run relationship (Engle and Granger 1987). The statistical results of the ADF unit root test applied to the residuals are presented in Table 5.

Table 5: Results of the ADF on Residual Series

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.571798	0.0010
Test critical values:	1% level	-2.669359	
	5% level	-1.956406	
	10% level	-1.608495	

*MacKinnon (1996) one-sided p-values.

The Engle-Granger co-integration test requires comparing the ADF test statistic for the residual series against the Davidson and MacKinnon (D&M) critical values for

co-integration without trend. At the 5% significance level, the D&M critical value for five variables is -5.0516 (Annex IV). The test involves comparing the absolute value of the ADF test statistic with the absolute value of the corresponding D&M critical value. In this case, the ADF test statistic is -3.6718, which is less than the D&M critical value in absolute terms. Therefore, the null hypothesis that the residual series has a unit root is rejected, indicating that the residuals are stationary.

This result confirms that the variables are co-integrated and exhibit a long-run equilibrium relationship. Although all the variables in the model are non-stationary at level and only become stationary at the second difference (i.e., I(2)), the residuals from the level equation are stationary. Consequently, the model is co-integrated and can be validly interpreted as representing a long-run relationship.

Long Run Relationship (Engel Granger Co-Integration Test Results)

The process of the Engel-Granger test begins with co-integrating regression (long run relation) through OLS, followed by testing whether the residual in the estimated equation becomes stationary. If the residual is stationary, then co-integrating relationship is present. The Estimated Regression Result is Given in Table (4)

$$GDP = \alpha + \beta_1 TRDBAL + \beta_2 REMIT + \beta_3 INT + \beta_4 FDI + \beta_5 EXDBT + \cup_t \quad (7)$$

$$lnGDP = 2.014 - 0.008 TRDBAL + 0.575\ lnREMIT + 040\ lnINT + 0.518 lnFDI + 0.312 lnEXDBT + \cup_t \quad (8)$$

The regression results reveal that remittances, FDI, and external debt exert positive and statistically significant effects on GDP. Specifically, a 1% increase in remittances is associated with a 0.575% rise in GDP, indicating that remittance inflows stimulate economic growth, likely by enhancing household income and consumption capacity. Likewise, a 1% increase in FDI corresponds to a 0.518% increase in GDP, underscoring the critical role of foreign capital, technology transfer, and managerial expertise in fostering economic development. External debt also demonstrates a positive impact, with a 1% increase linked to a 0.312% rise in GDP, suggesting that the borrowed resources are being channeled into growth-enhancing investments. However, the trade balance has a slight negative effect, as a 1-unit increase in the trade balance corresponds to a 0.8% decrease in GDP, which may indicate that trade surpluses are not a primary driver of growth in this context.

Interestingly, the interest rate has a positive coefficient, with a 1% increase linked to a 0.40% rise in GDP, which is counterintuitive and may warrant further investigation. Overall, the findings suggest that policies promoting remittances, FDI, and prudent external borrowing could enhance economic growth, while the trade balance and interest rate effects require careful consideration to ensure sustainable development.

Short Run Relationship (Error Correction Test Results)

The short-run model was derived from Equation (2) by taking the first differences of all variables and incorporating a one-year lag of both the residual series and GDP. Using the ECM framework, the short-run coefficients were subsequently estimated in Table 5.

The R-squared (R^2) value of the short-run equation is 0.729, indicating that approximately 72.9% of the variation in the dependent variable is explained by the model. The Durbin-Watson (DW) statistic is 1.715, which is close to the benchmark value of 2.0, suggesting that there is no significant autocorrelation in the residuals. Notably, R^2 is less than the DW statistic, further supporting the absence of autocorrelation. The F-statistic is 5.762 with a corresponding probability of 0.0022 ($p < 0.05$), indicating that the overall model is statistically significant. Based on these diagnostic results, the short-run equation appears to be well-specified and appropriate for interpretation (see Table 5).

Table 5: Estimated regression results of the regression of equation (3) (Error correction estimates)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.0896	0.095	0.938	0.362
D(TRDBAL)	-0.0235	0.008	-2.926	0.010
D(LNREMIT)	0.443	0.120	3.676	0.002
D(LNINT)	0.049	0.049	0.991	0.337
D(LNFDI)	-0.001	0.047	-0.024	0.980
D(LNEXDBT)	0.247	0.206	1.197	0.249
LNGDP(-1)	-0.019	0.023	-0.786	0.444
RESID_GDP(-1)	-0.611	0.281	-2.171	0.046
R-squared	0.729			
Adjusted R-squared	0.602			
F-statistic	5.761821			
Prob(F-statistic)	0.002206	Durbin-Watson stat		1.715

The estimated Error Correction Model (ECM) is presented below, with detailed results shown in Table 6.

$$\Delta lnGDP = \alpha + \beta_6 TRDBAL + \beta_7 \Delta lnREMIT + \beta_8 \Delta lnINT + \beta_9 \Delta lnFDI + \beta_{10} \Delta lnEXDBT + \beta_{11} lnGDP_{(t-1)} + \beta_{12} lnECT_{(t-1)} + \varepsilon_t \quad (9)$$

$$\Delta lnGDP = 0.089 - 0.024 TRDBAL + 0.443 \Delta lnREMIT + 0.049 \Delta lnINT - 0.001 \Delta lnFDI + 0.247 \Delta lnEXDBT - 0.019 lnGDP_{(t-1)} - 0.611 lnECT_{(t-1)} + \varepsilon_t \quad (10)$$

Short-run and long-run equilibrium dynamics are analyzed using the ECM, which captures both the short-run adjustments and the speed at which deviations from the long-run equilibrium are corrected. The coefficient of the error correction term, β_{12} (associated with $ECT_{(t-1)}$), is negative and statistically significant at the 5% level, as expected. This coefficient, also referred to as the long-run error correction coefficient, measures the speed of adjustment toward long-run equilibrium following short-run shocks. The t-ratio for β_{12} confirms the rejection of the null hypothesis, indicating that the error correction term contributes significantly to the model. With an estimated value of β_{12} = -0.611, the model suggests that approximately 61.1% of the deviation from the long-run equilibrium is corrected annually, implying a relatively fast adjustment process in the Sri Lankan economy over the period 2000-2023. The ECM is further validated by satisfactory diagnostic statistics, including the R^2 and Durbin-Watson (DW) statistic, confirming that the model is not spurious and is statistically robust.

This study looked at how important economic factors trade balance, money sent home, interest rates FDI, and money owed to other countries affect GDP in Sri Lanka's economy. The study shows important long-term and short-term patterns giving us a better understanding of how these factors work together to shape economic growth of Sri Lanka.

Long-Run Relationship

The long-run study shows that money sent home, FDI, and money owed to other countries have a positive and meaningful effect on GDP. To be exact when money sent home goes up by 1%, GDP goes up by 0.575%. This matches what we know about money sent home in Sri Lanka where it's a key source of foreign money helping families buy more and invest in important areas like schools, healthcare, and small businesses.

FDI, a key part of Sri Lanka's plan to grow, shows a good effect on GDP. When FDI goes up by 1%, GDP rises by 0.518%. This backs up the idea that FDI brings in money, tech, and know-how, boosting output and jobs. For Sri Lanka, getting foreign cash helps mix up the economy and do better worldwide. Leaders should work on making business easier keeping things steady, and running things better to draw in more investors.

Money from outside also helps GDP grow, with a 1% bump in foreign debt leading to a 0.312% jump in GDP. This hints that borrowing from abroad when used for good stuff like roads and schools, can help the economy grow. But we need to be careful about this in Sri Lanka, given its trouble with foreign debt and the risk of owing too much. Leaning too hard on outside loans could cause big money problems down the road, as we've seen in Sri Lanka's past debt crises.

Meanwhile, the trade balance showed a negative impact on GDP. A 1-unit rise in the trade balance caused a 0.8% drop in GDP. This outcome, which might seem odd at first, matches studies that suggest trade surpluses don't always lead to growth. For Sri Lanka, a trade surplus often comes from selling low-value goods, which holds back the economy's growth potential (Rodrik, 2006). To get the most out of trade, Sri Lanka should try to sell a wider range of goods, move towards high-value industries, and boost the quality of its exports to grow in a lasting way.

The positive relationship between interest rates and GDP (0.40% GDP growth for each 1% rate increase) stands out in Sri Lanka. Here higher rates might point to a stable economy or draw in foreign money even as they could slow down local spending and investment. This result highlights the tricky role of interest rates. In some cases higher rates may help steady the economy and keep investors confident when controlling inflation and fixing the financial sector are top concerns.

Short Run Relationship

The dynamic adjustment of the Sri Lankan economy is highlighted by the short-run analysis, which is based on estimations for error correction. With a coefficient of -0.611, the error correction term was statistically significant, indicating that Sri Lanka's macroeconomic variables reach long-term equilibrium rather fast. This result highlights how crucial it is to make short-term changes in order to match macroeconomic policies with long-term growth goals.

With a coefficient of 0.443, remittances showed a significant positive short-term impact on GDP. This highlights the direct advantages of remittance inflows for Sri Lanka, which are essential for funding household expenses and easing cash flow problems for households and small enterprises. On the other hand, the trade balance

showed a notable short-term negative effect (-0.023), which is in line with the long-term results and might be a result of structural problems with Sri Lanka's trade composition, namely the country's reliance on primary exports and its lack of export sector diversification.

Although they were important in the long term, foreign debt and FDI were not relevant in the short term. This probably reflects the lagged character of their effects, since external borrowing and foreign investments require time to translate into observable economic results. Interest rates also showed a poor and statistically negligible short-term effect, indicating that they have little direct impact on economic activity, particularly when viewed in light of larger macroeconomic circumstances.

Policy Implications

The results provide Sri Lanka with a number of significant policy implications:

Improving Remittance Utilization: Given the importance of remittances, initiatives that lower transaction costs and strengthen the official channels for remittance flows may have an even greater developmental impact. To prevent an excessive reliance on remittances and to lessen any possible negative effects on domestic investment, these inflows could be focused on productive industries.

Encouraging FDI: Sri Lanka should put a high priority on establishing an environment that is favorable to investment by maintaining political stability, bolstering governance, and providing incentives for technology transfer in order to reap the benefits of FDI. In industries including manufacturing, tourism, and technology, FDI may significantly boost competitiveness and diversify the economy.

Strategic foreign Debt Management: Although foreign debt eventually boosts GDP, careful debt management is crucial. Long-term fiscal gains from such initiatives as infrastructure building, investment in human capital, and technological advancement should be the target of borrowed money. In addition, to prevent debt overhang dangers, which would hamper future growth, fiscal policy should aim at sustaining debt.

Trade and Export Diversification: As the trade balance contributes very little negatively towards the GDP, Sri Lanka has to upgrade its composition of higher value-added and quality exports. The trade policy objective would be to diversify the export base, abolish dependence on primary products and promote technologically developed and high-productive enterprises.

Implications for Monetary Policy: There is a need for a more accommodative monetary policy, as the correlation between interest rates and GDP is positive High interest rates can dampen investment, though they can encourage saving and curb inflation. Sri Lanka's central bank must now carefully raise interest rates to stimulate investment and keep inflation in check.

Conclusion, Limitations and Future Research

This analysis concludes by highlighting the crucial influence that important macroeconomic factors such as trade balance, interest rates, external debt, and FDI have in determining Sri Lanka's GDP growth trajectory. In promoting sustainable economic growth, the results emphasize the necessity of concerted policy interventions that take advantage of these factors. To improve Sri Lanka's long-term economic stability, policies that maximize FDI and remittance inflows are crucial, as is strategic management of the country's external debt and trade balance. Maximizing the advantages of these macroeconomic conditions will also depend heavily on maintaining good governance and high-quality institutions. By providing useful information for policymakers in Sri Lanka and other developing nations, this study adds to the larger conversation on economic development.

The use of aggregated annual data, which can ignore intra-year variations and geographical disparities, is one of the study's main drawbacks. By using higher-frequency data and investigating sector-specific effects to capture more detailed dynamics, future studies could overcome these constraints. Further understanding of the relationships between these variables and their varying effects on economic growth would also be possible by looking at potential nonlinearities and threshold effects, especially with regard to interest rates and foreign debt. By providing more specialized policy recommendations for sustainable development, such study would deepen our grasp of the challenges of macroeconomic management in poor nations.

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