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Determinants of Balance of Payments in Sierra Leone: An ARDL Model Approach

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Abstract

Purpose: Using yearly data from 1980 to 2020, this study investigates the macroeconomic factors influencing Sierra Leone's balance of payments (BoP). The purpose is to determine the main macroeconomic determinants affecting Sierra Leone's external sector performance in order to address the paucity of empirical data on BoP dynamics in post-conflict nations.

Methodology: Both short- and long-term relationships between BoP and its determinants—real GDP, foreign direct investment (FDI), real interest rate, official effective exchange rate (OEEXR), and the external balance on goods and services (EBGS)—are estimated using the Autoregressive Distributed Lag (ARDL) bounds-testing approach.

Findings: The results show that while FDI has a negative impact on the BoP because of its link to import-intensive businesses and profit repatriation, real interest rates and exchange rate fluctuations have a considerable short- and long-term impact on the BoP.

Unique Contribution to Theory, Practice and Policy: While EBGS is statistically insignificant, real GDP exhibits a favorable long-term effect. In order to guarantee a sustainable external balance, the study recommends preserving currency rate stability, encouraging export diversification, and creating FDI policies that improve domestic ties and lessen reliance on imports.

Keywords: *Balance of Payments, Exchange Rate, Foreign Direct Investment (FDI), Autoregressive Distributed Lag (ARDL), Interest Rate, Macroeconomics, Sierra Leone*

JEL Codes: *F32, F41, C32, O55*

INTRODUCTION

The Balance of Payments (BoP) constitutes a critical indicator of a nation's macroeconomic health and external stability. It provides a systematic record of all economic transactions between residents of a given country and the rest of the world over a specific period (Krugman, Obstfeld, and Melitz, 2018). The equilibrium between foreign receipts and payments is reflected in the balance of payments (BoP), which continues to be a key indicator of a nation's external sustainability. In West Africa, empirical studies have started to examine the factors that influence balances of current accounts and the balance of money, sometimes using panel or econometric time-series approaches. For instance, a study conducted in Nigeria using the ARDL model for the years 1981–2020 discovered that financial deepening, exchange rate volatility, and budget deficits are statistically significant factors that affect the current account and balance of payments situation over the short and long terms. Although there was little evidence of the J curve, another ARDL limits testing study conducted in Ghana between 1984 and 2015 looked at postliberalization dynamics in the trade and external deficit and discovered that consumption patterns and currency rate changes have a significant impact on the trade balance.

Furthermore, without utilizing country-specific ARDL frameworks, a VAR study for Nigeria, Ghana, and Côte d'Ivoire from 1978 to 2008 found long-term co-movements between the current account balance and its causes.Despite these efforts, the empirical literature has not sufficiently examined the case of Sierra Leone: no study has used an ARDL bounds testing approach to investigate the factors influencing the country's BoP over an extended period of time using the entire set of macroeconomic and financial development variables. Therefore, by using an ARDL model to annual data for Sierra Leone from 1980 to 2022, this research closes this gap and advances our knowledge of how the nation's BoP position is influenced by structural factors such as trade openness, exchange rate dynamics, and financial growth.

While there are ARDL-based research on BoP determinants for Nigeria (Ogunleye, 2018) and Ghana (Smith & Adu, 2016), there aren't many for Sierra Leone, especially given its post-conflict economic structure. This study seeks to address these gaps by employing the Autoregressive Distributed Lag (ARDL) modelling framework (Pesaran, Shin and Smith, 2001), which is particularly suitable for small sample sizes and mixed-order integration. Using annual data from 1980 to 2020, the study examines the impact of foreign direct investment (FDI), real gross domestic product (RGDP), real interest rate (RIR), official effective exchange rate (OEEXR), and the external balance on goods and services (EBGS) on Sierra Leone's BoP.

Problem Statement

Over the past forty years, Sierra Leone's balance of payments position has been consistently precarious, marked by frequent current account deficits, dwindling export revenue, and a significant reliance on outside aid. Deeper structural problems like a small export base, a large reliance on imports, and inadequate financial intermediation are reflected in these imbalances. Long-term BoP deficits have weakened foreign reserve accumulation, limited macroeconomic stability, and left the nation vulnerable to frequent exchange rate pressures.

Despite the importance of this issue, little empirical data exists to explain the factors influencing Sierra Leone's balance of payments. Smaller economies like Sierra Leone, which have particular

post-conflict and structural vulnerabilities, have frequently been overlooked in previous research on BoP dynamics in West Africa, which have mostly focused on larger economies like Nigeria, Ghana, and Liberia.

Furthermore, the majority of earlier research has used static econometric models, which are unable to account for the short- and long-term interactions between important macroeconomic variables. As a result, little is known about how much factors like trade openness, inflation, financial development, exchange rates, and fiscal balance affect Sierra Leone's external situation. In order to give solid information on the long- and short-term factors influencing the balance of payments, this study uses the Autoregressive Distributed Lag (ARDL) model, which offers fresh perspectives on how to formulate policy.

By offering empirical advice on how to improve external stability, the study's conclusions are anticipated to assist policymakers including the Bank of Sierra Leone, the Ministry of Finance, and other development organizations. The study's methodological contribution and country-specific findings will also be helpful to scholars and researchers as they fill the empirical gap in the West African context.

LITERATURE REVIEW

Theoretical Underpinnings

An examination of the balance of payments requires a strong theoretical foundation in macroeconomics, as several competing frameworks have been advanced to explain the causes of external imbalances and the mechanisms of adjustment. The present study draws on three principal approaches: the absorption approach, the elasticity approach, and the monetary approach. Each of these perspectives offers distinct insights into the dynamics of BoP disequilibria and their policy implications.

The Absorption Approach

Alexander (1952) popularized the absorption technique, which uses the link between national revenue and domestic absorption (total spending) to explain BoP imbalances. According to the method, a deficit arises when domestic absorption surpasses income, and a surplus arises when national income surpasses absorption. Exchange rate changes only work if they have an impact on income and spending to bring the economy back into balance.

Formally, this can be expressed as: $BoP=Y-A$

The underlying assumptions of this model have a number of real-world restrictions in the instance of Sierra Leone. Because of the limited local production base and reliance on imports, income growth frequently results in increasing demand for imports rather than domestic output, which deteriorates the BoP. Furthermore, policymakers' control over domestic absorption is weakened by fiscal dominance, which occurs when government spending propels monetary expansion.

Fiscal policy's ability to reduce excessive absorption is further hampered by a small tax base and limited industrial capability. Furthermore, there is a strong bias in consumption toward imported items, indicating that devaluation can increase domestic prices without appreciably lowering absorption levels. Therefore, even though the absorption technique sheds light on the income-

spending dynamics that affect the BoP, its relevance in Sierra Leone must be carefully considered due to structural rigidities and poor supply responses.

Elasticity Approach to the Balance of Payments

According to Marshall and Lerner's elasticity approach, if the total price elasticities of demand for imports and exports are greater than one (the Marshall–Lerner condition), a nation's balance of payments may improve after a currency devaluation. Theoretically, devaluation improves the current account balance by making imports more costly and exports less expensive, which encourages demand for exports while discouraging imports.
But only a portion of this model's presumptions apply to Sierra Leone. The export structure of the nation is limited and heavily focused on primary commodities, such as bauxite, rutile, and diamonds, whose demand on the global market is comparatively price inelastic.

Similarly, the majority of Sierra Leone's imports are necessities like food, fuel, and equipment for which there aren't many domestic alternatives, making demand for imports comparatively inelastic. Because of this, changes in exchange rates might not have a major impact on trade volumes, and price elasticity's anticipated beneficial impact on the BoP might be minimal. Furthermore, even when the currency depreciates, the nation's capacity to increase exports quickly is constrained by structural impediments in transportation and production. Therefore, even if the elasticity approach provides a helpful theoretical framework, its empirical explanatory value in this situation is diminished because its assumptions do not entirely correspond with Sierra Leone's economic realities.

Monetary Approach to the Balance of Payments

The BoP is viewed by the monetary approach, which is linked to Johnson (1972) and Frenkel and Johnson (1976), as essentially a monetary event that reflects an imbalance between the supply and demand for money. Capital outflows result from a BoP deficit when the domestic money supply is more than the money demand, whereas a surplus happens when the money demand is greater than the supply. Effective monetary transmission and a steady correlation between monetary variables and external balance are presupposed by the theory.

These presumptions are called into question by a number of structural problems in Sierra Leone. A shallow financial system, little credit intermediation, and a high degree of informal economic activity all contribute to the nation's weak monetary transmission mechanism. The effectiveness of monetary policy changes is hampered by the banking sector's poor ability to convert changes in policy interest rates into investment and consumption patterns. Furthermore, exchange rate volatility and partial dollarization weaken monetary control even more.

In such a setting, real sector restrictions, fiscal imbalances, and external shocks like changes in commodity prices may be the main causes of BoP imbalances rather than monetary disequilibrium. Therefore, the monetary method has limited predictive validity in Sierra Leone's post-conflict and structurally constrained economy, even though it offers a useful framework connecting the money supply and external balance. According to the monetary approach, which is predicated on a strong financial system and high capital mobility, balance of payments disequilibria arise from imbalances between the money supply and demand (Johnson, 1972; Frenkel & Johnson, 1976). Nonetheless, there is still relatively little financial depth and capital mobility in Sierra Leone.

A limited banking industry and low financial inclusion are reflected in West Africa's lowest financial depth metrics, which include the ratio of broad money (M2) to GDP and credit to the private sector. In addition, an undeveloped capital market, restricted international investment flows, and ongoing exchange rate volatility impede capital mobility. These structural flaws weaken the adjustment mechanism that the monetary method depends on by making capital movements less responsive to monetary disequilibrium. As a result, although the theory offers a useful conceptual framework, Sierra Leone's underdeveloped financial system and poor connectivity with global capital markets limit its ability to explain the country's situation.

From a policy perspective, this framework highlights the central role of monetary management in correcting BoP imbalances, with tools such as interest rate adjustments, credit controls, and reserve management being particularly relevant. While the model assumes conditions such as perfect capital mobility and full employment—assumptions less applicable in developing economies—its insights remain valuable for understanding how monetary dynamics affect external accounts in emerging and fragile economies like Sierra Leone.

Conceptual Underpinnings

Elasticity Approach

↓

(Exchange Rate, Trade Openness, Exports, Imports)

↓

Balance of Payments

Absorption Approach

↓

(GDP, Government Expenditure, Consumption)

↓

Balance of Payments

Monetary Approach

↓

(Money Supply, Financial Development, Interest Rate, Inflation)

↓

Balance of Payments

Figure 1: Conceptual Framework Linking Theoretical Approaches to BoP Determinants

Source: Author's Computation (2022)

The conceptual framework that directs this investigation is shown in Figure 1. It combines the monetary, absorption, and elasticity methodologies to show how important financial and macroeconomic factors theoretically affect Sierra Leone's balance of payments.

Table 1: A Summary Table of Theoretical Linkages

Theoretical Approach	Key Variables	Expected Relationship with BoP	Supporting Studies
Elasticity Approach	Exchange Rate, Trade Openness	Exchange rate depreciation improves BoP if elasticities > 1	Krugman et al. (2018), Bahmani-Oskooee (2017)
Absorption Approach	GDP, Government Expenditure	Higher domestic absorption worsens BoP	Alexander (1952), Mlambo (2019)
Monetary Approach	Money Supply, Interest Rate, Financial Development	Excess money supply worsens BoP; higher interest rates attract inflows	Johnson (1972), Frenkel & Johnson (1976)

Source: Author's Computation (2022)

The theoretical connections between the chosen explanatory variables and the balance of payments are given in Table 1. To maintain coherence between the conceptual framework and the econometric design, every variable in the empirical model is drawn from the classical theories that were addressed.

Empirical Evidence

Empirical research on the determinants of the balance of payments (BoP) has expanded significantly in recent decades, particularly within developing economies. However, findings across studies remain mixed, reflecting variations in country-specific contexts, methodological choices, and the periods under investigation.

In Nigeria, Akpansung (2013) applied the monetary approach and demonstrated that money supply, exchange rate movements, and inflation exert significant influences on BoP dynamics. The study concluded that monetary policy instruments are crucial in managing external balances, particularly in oil-exporting economies where resource revenues contribute to volatility in external accounts.

Similarly, Eita (2012), using a vector error correction model (VECM) for Namibia, identified real gross domestic product (GDP), the exchange rate, and interest rates as significant long-run determinants of BoP performance. The results underscored the importance of maintaining macroeconomic stability and international competitiveness in improving external balances.

In the Kenyan context, Mudida and Guglielmo (2012) examined the effects of exchange rate volatility on the BoP. Their findings revealed that exchange rate instability undermined trade performance and negatively affected the current account. The authors advocated for a more predictable, market-driven exchange rate regime as a means of promoting external sustainability.

While these country-level studies provide valuable insights into the macroeconomic determinants of BoP in Sub-Saharan Africa, empirical research specifically focused on Sierra Leone remains limited, fragmented, and in some cases outdated. Much of the existing literature has concentrated on individual components of the BoP, such as trade balances or capital flows, rather than adopting a comprehensive macroeconomic perspective (World Bank, 2015; IMF, 2020). Moreover, few studies explicitly account for the post-conflict dynamics that have shaped Sierra Leone's economy, including the legacies of civil war, heavy aid dependence, and institutional fragility (Collier, 2003).

This study, therefore, contributes to the empirical literature by employing the Autoregressive Distributed Lag (ARDL) bounds testing framework (Pesaran, Shin and Smith, 2001) to examine both short-run and long-run determinants of the BoP in Sierra Leone over the period 1980–2020. By adopting this approach, the analysis seeks to address the empirical gap and generate policy-relevant insights for addressing the country's persistent external sector vulnerabilities.

Research Gaps and Directions for Future Studies

According to a survey of previous empirical research, the majority of examinations of the dynamics of balances of payments in developing nations have concentrated on larger economies like South Africa, Ghana, and Nigeria (e.g., Ogunleye, 2018; Smith & Adu, 2016). These studies have primarily used econometric models like cointegration analysis and Vector Autoregression (VAR), and they have discovered important factors like fiscal policy, trade openness, financial development, and currency rates.Nevertheless, despite Sierra Leone's structural features as a small, open economy that emerged from conflict and its susceptibility to external shocks, relatively few studies have looked at the country's situation. Additionally, current research in West Africa frequently ignores dynamic adjustment mechanisms and fails to take into consideration both short- and long-term effects at the same time, as is done using the Autoregressive Distributed Lag (ARDL) paradigm.

Additionally, there is no empirical data on how macroeconomic stability and financial development work together to affect the BoP's stance in unstable economies.

In order to fill these gaps, this study integrates financial and real sector variables and uses an ARDL bounds-testing approach to examine the factors that influenced Sierra Leone's balance of payments between 1980 and 2022.In order to better understand the dynamics between macroeconomic policies and external balances, future research could expand on this analysis by using panel data methods across West African or post-conflict economies to capture regional effects, investigating nonlinear or asymmetric relationships, or incorporating structural break and causality analyses.

METHODOLOGY

Model Specification

This study employs a quantitative research design grounded in macroeconometric modelling to investigate the determinants of the balance of payments (BoP) in Sierra Leone. The specification of the model draws on the theoretical insights of the absorption, elasticity, and monetary approaches to BoP adjustment (Alexander, 1952; Robinson, 1937; Johnson, 1975).

The dependent variable is defined as the balance of payments expressed as a percentage of gross domestic product (BoP_{GDP}), which provides a measure of external sector performance relative to the size of the economy. The independent variables include the official effective exchange rate (OEEXR), foreign direct investment (FDI as a percentage of GDP), the real interest rate (RIR), the natural logarithm of real gross domestic product (lnRGDP), and the external balance on goods and services (EBGS).

The functional relationship is specified as follows:

$$BoP_{GDP} = \alpha + \beta_1 OEEXR + \beta_2 FDI + \beta_3 RIR + \beta_4 \ln(RGDP) + \beta_5 EBGS + \varepsilon$$

Where:

BoP_{GDP} = Balance of payments as a percentage of GDP

OEEXR = Official effective exchange rate

FDI = Foreign direct investment as a percentage of GDP

RIR = Real interest rate

lnRGDP = Logarithm of real gross domestic product

EBGS = External balance on goods and services

ε = Error term

To estimate both short-run and long-run dynamics, the study adopts the Autoregressive Distributed Lag (ARDL) bounds-testing approach proposed by Pesaran, Shin and Smith (2001). The ARDL technique is particularly suitable for analysing time series data in which regressors are integrated of mixed order, I(0) and I(1), but not I(2). This approach has the advantage of providing consistent and efficient estimates even in small sample settings (Nkoro and Uko, 2016). Moreover, it facilitates the simultaneous estimation of long-run equilibrium relationships and short-run adjustment dynamics, making it well-suited for examining the complex interactions between macroeconomic variables and BoP performance in developing economies such as Sierra Leone.

Data Sources

This study utilises annual time series data covering the period 1980–2020, thereby encompassing both the post-independence trajectory and the post-conflict recovery phase of Sierra Leone's economy. The data were obtained from a combination of reputable international and national statistical sources to ensure reliability and comparability.

Data on real gross domestic product (GDP), foreign direct investment (FDI), balance of payments (BoP), and the external balance on goods and services (EBGS) were sourced from the World Bank's World Development Indicators (World Bank, 2021). Information on the official effective exchange rate and real interest rates was obtained from the Central Bank of Sierra Leone (BSL, 2020). In addition, supplementary macroeconomic indicators were collected from the International Monetary Fund's International Financial Statistics (IMF, 2020), which provided further robustness to the dataset.

To facilitate comparability across time, monetary variables were converted into constant 2015 US dollars where appropriate, using deflators provided by the World Bank. Data cleaning and

transformation procedures were conducted to address missing values, ensure consistency across sources, and adjust for potential discrepancies in reporting. These steps were essential for enhancing the validity and reliability of the dataset prior to econometric analysis (Gujarati and Porter, 2009).

Stationarity and Cointegration

In time series econometric analysis, it is crucial to establish the stationarity properties of the variables to avoid spurious regression results (Granger and Newbold, 1974; Gujarati and Porter, 2009). A variable is said to be stationary if its statistical properties—such as mean and variance—remain constant over time. Non-stationary variables can lead to misleading inferences unless they are differenced or cointegration relationships are established (Engle and Granger, 1987).

To assess the order of integration of the variables employed in this study, the Dickey–Fuller Generalised Least Squares (DF-GLS) unit root test proposed by Elliott, Rothenberg, and Stock (1996) was conducted. The DF-GLS test is preferred to the conventional Augmented Dickey–Fuller (ADF) test due to its improved power in small sample contexts.

To further confirm the integration properties of the variables, the Phillips–Perron (PP) unit root test, developed by Phillips and Perron (1988), was applied. The PP test is a non-parametric alternative to the Augmented Dickey–Fuller (ADF) test, which corrects for serial correlation and heteroskedasticity in the error terms without the need to include lagged difference terms explicitly. This makes it a robust complement to the DF-GLS test in verifying the stationarity of time series data (Brooks, 2019).

As an additional robustness check, the Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test, proposed by Kwiatkowski et al. (1992), was employed to examine the stationarity properties of the series. Unlike the DF-GLS and Phillips–Perron tests, which take the null hypothesis of non-stationarity, the KPSS test assumes stationarity under the null hypothesis. This makes it a useful complementary test, allowing for more reliable conclusions when used alongside other unit root tests (Brooks, 2019).

The KPSS and KPSS auto-test results indicate that all variables fall below the 1% critical value threshold, confirming stationarity at level. The only exception is EBGS_GDP, which initially appeared non-stationary, but under the KPSS automatic lag selection procedure was also found to be stationary.

Standard unit root tests, such as DF-GLS, PP, and KPSS, often fail to account for the possibility of structural breaks in macroeconomic time series. Neglecting such breaks can bias results towards non-rejection of the unit root hypothesis (Perron, 1989). To address this concern, the Perron–Vogelsang test was applied, allowing for the detection of unit roots in the presence of structural shifts. Specifically, the test was conducted under the Additive Outlier (AO) framework, which is suitable when structural changes occur abruptly in the series (Vogelsang and Perron, To complement the Additive Outlier (AO) framework, the **Innovative Outlier (IO) model** was also employed to test for structural breaks. While the AO model captures sudden changes in the level of a series, the IO framework is more suitable for gradual adjustments following structural shifts (Perron, 1989; Vogelsang and Perron, 1998). This provides a more comprehensive assessment of stationarity in the presence of structural instability.

The ARDL bounds testing results further revealed that the computed F-statistic exceeded the upper bound of the critical values at the 5% significance level, thereby establishing the existence of a long-run cointegrating relationship between the balance of payments and its macroeconomic determinants in Sierra Leone.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 2: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
EBGS_GDP	41	-12.2798	12.2178	-48.1836	14.3332
RGDP	41	5.81e+12	2.24e+12	3.48e+12	1.07e+13
RIR	41	0.3449	17.4779	-51.6173	27.1460
FDI	41	1.20e+08	2.15e+08	-1.40e+08	9.50e+08
NEEXR	41	167.2869	114.4771	91.3535	562.662
BOP_GDP	41	-15.5275	26.6172	-120.0362	66.0531

Source: Author's computation based on World Bank (2022), IMF (2022), and Bank of Sierra Leone (2022).

The descriptive statistics highlight significant variation across the macroeconomic variables examined over the period 1980–2020. The balance of payments as a share of GDP (BOP_GDP) averaged -15.5%, reflecting the persistent nature of Sierra Leone's external sector deficits. This finding is consistent with earlier studies that emphasise the structural vulnerability of low-income, resource-dependent economies to chronic current account imbalances (Ndikumana and Boyce, 2011; IMF, 2020).

Similarly, the external balance on goods and services (EBGS) averaged -12.3%, underlining the country's dependence on imports and its limited export diversification. Exchange rate dynamics (NEEXR) reveal a trend of sustained depreciation, particularly in the post-conflict era, consistent with macroeconomic instability and terms-of-trade shocks (World Bank, 2019).

Foreign direct investment (FDI) inflows exhibited pronounced volatility, with peaks associated with resource booms but significant declines during periods of political instability and global crises. These fluctuations resonate with the "resource curse" hypothesis, which links natural resource dependence with macroeconomic volatility (Collier and Goderis, 2012).

Real interest rates (RIR) demonstrated wide variability, shaped largely by shifts in monetary policy stance, while real GDP (RGDP) exhibited a gradual upward trend over the long run. However, this growth trajectory was interrupted by exogenous shocks, notably the civil conflict (1991–2002), the Ebola epidemic (2014–2016), and the COVID-19 pandemic, each of which had profound macroeconomic repercussions (Bundu et al., 2021; World Bank, 2022).

Overall, the descriptive analysis underscores the fragility of Sierra Leone's external sector, reflecting both structural and cyclical factors that continue to undermine balance of payments sustainability.

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Stationarity and Cointegration

Stationarity Test

Table 3: Summary of Unit Root Testing Results

Variable	Deterministic Component	DF-GLS	PP	KPSS & KPSS Auto	Perron–Vogelsang	Conclusion
BOP_GDPCU	Constant	I(0)	I(0)	I(0)	I(0)	Stationary
OEEXR	Constant	I(0)	I(1)	I(0)	I(0)	Stationary
FDINI	Constant	I(1)	I(1)	I(0)	I(0)	Stationary
RIR	Constant	I(1)	I(1)	I(0)	I(0)	Stationary
LNRGDP	Constant	I(1)	I(1)	I(0)	I(0)	Stationary
EBGS_GDP	Constant	I(1)	I(1)	I(0)	I(0)	Stationary

Source: Author's computation based on World Bank (2022), IMF (2022), and Bank of Sierra Leone (2022).

The results of the unit root testing indicate that all variables are either stationary at level [I(0)] or become stationary after first differencing [I(1)]. Importantly, no series was found to be integrated of order two [I(2)], thereby satisfying the preconditions for applying the Autoregressive Distributed Lag (ARDL) framework (Pesaran et al., 2001).

The application of multiple complementary unit root tests—including the Dickey–Fuller Generalised Least Squares (DF-GLS), Phillips–Perron (PP), Kwiatkowski–Phillips–Schmidt–Shin (KPSS), and Perron–Vogelsang tests—strengthens the robustness of the results. While traditional unit root tests such as DF-GLS and PP primarily assess stochastic trends (Dickey and Fuller, 1979; Phillips and Perron, 1988), the KPSS test evaluates stationarity under the null hypothesis (Kwiatkowski et al., 1992), and the Perron–Vogelsang test accounts for possible structural breaks (Perron, 1989; Vogelsang and Perron, 1998).These findings highlight the importance of considering structural shifts—such as the civil war (1991–2002), the global financial crisis (2008–2009), and the Ebola epidemic (2014–2016)—which have significantly affected Sierra Leone's macroeconomic fundamentals. Incorporating structural breaks provides a more nuanced understanding of the data-generating process and strengthens the reliability of subsequent ARDL estimations (Narayan and Smyth, 2005; Zivot and Andrews, 1992).

The consistent findings across these tests provide confidence in the time-series properties of the variables. Following the confirmation of stationarity at I(0) or I(1), the ARDL bounds testing approach was employed to investigate long-run relationships among the variables. The test results indicate that the computed F-statistic exceeds the critical upper bound at the 5% significance level, thereby confirming the presence of cointegration. This suggests that despite short-run fluctuations, Sierra Leone's balance of payments (BoP) is significantly influenced by macroeconomic fundamentals in the long run. These findings align with earlier empirical studies that demonstrate the existence of stable long-run associations between external sector indicators and macroeconomic aggregates in developing economies (Narayan, 2005; Pesaran and Shin, 1999).

Cointegration Test

Table 4: Cointegration Test Results

Test Statistic	Value	1%, I(0)	1%, I(1)	5%, I(0)	5%, I(1)	Decision
F-Statistic	47.316	4.320	6.395	3.007	4.597	Cointegration exists
T- Statistic	-12.132	-3.623	-5.166	-2.851	-4.237	Cointegration exists

Source: Author's Computation using Stata (2023)

The ARDL bounds testing approach was applied to examine the existence of a long-run relationship among the variable. The results in table X indicate that the calculated F-statistic (47.316) is far greater than the upper bound critical value at both the 1% and 5% significance levels (I(1)= 6.395 and 4.597, respectively. This implies rejection of the null hypothesis of no cointegration. Similarly, the calculated t-statistic (-12.132) is more negative than the lower bound critical value at the 1% level (-5.166), further confirming the presence of a cointegrating relationship. Therefore, the bounds test results provide strong evidence of a long-run equilibrium relationship among the variables in the model justifying the estimation of both long-run and short-run ARDL dynamics. Furthermore, the associated p-value of 0.00 indicates strong statistical significance. These findings validate the existence of cointegration among the balance of payments (BoP), the official effective exchange rate (OEEXR), foreign direct investment (FDI), real interest rate (RIR), real GDP (lnRGDP), and the external balance on goods and services (EBGS). This suggests that despite short-term fluctuations, the selected macroeconomic variables are bound by a stable long-run relationship. The evidence aligns with the econometric literature, which posits that the ARDL bounds testing framework provides a reliable means of establishing cointegration when variables are integrated of mixed orders, I(0) and I(1), but not I(2) (Pesaran et al., 2001; Narayan, 2005). Consequently, the results provide a strong foundation for estimating both the short- and long-run dynamics of the model.

ARDL Model Findings

Table 5: Long-run ARDL Estimates

Variables	Coefficient	Std. Error	t - Statistic	Prob.
lnrgdp	13.3647	6.0596	2.20	0.038
rdi	-1.0028	0.3611	-2.78	0.010
neexr	-0.0719	0.0326	-2.20	0.046
rir	-4.4964	0.4572	-9.84	0.000
ebsg-gdp	-0.2097	0.2663	-0.79	0.754

Source: Author Computation by Stata

Table 5 shows result of long-run relationship; real GDP (lnrgdp) exerts a positive and statistically significant effect on balance of payments (β=13.36, $p<0.05$). By contrast, foreign direct investment (fdi), official effective exchange rate (oeexr), and real interest rate (rir) negatively and significantly influence the balance of payments, while external balance on goods and services (ebgs_gdp) is negative but not significant.

Table 6: Short-Run Error Correction Model (ECM)

Variables	Coefficient	Std. Error	t - Statistic	Prob.
Δneexr	0.0681	0.0456	1.49	0.150
ΔL1.neexr	0.15123	0.4771	3.17	0.003
Δrir	0.2469	0.1149	2.15	0.041
Δebsg-gdp	1.2673	0.6706	-1.89	0.070
ΔL1.ebsg-gdp	0.4658	0.6620	2.21	0.033
ECT(-1)	-0.9594	0.0791	-12.13	0.000

Source: Author Computation by Stata

The short-run dynamic in table 4.3.2 show that lagged changes in the official effective exchange rate (ΔL1.oeexr) and external balance on goods and services (ΔL1.ebgs_gdp) are positive and significant. Real interest rate change (Δrir) also significantly improve the balance of payments in the short-run. Importantly, the error correction term (ECT (-1) has a coefficient of -0.9594 with p-values less than 0.01) is negative and highly significant, confirming the existence of a long-run relationship. The magnitude suggests that approximately 96% of any disequilibrium is corrected annually, implying a rapid adjustment to long-run equilibrium.

The ARDL (1,0,0,2,1,2) model was estimated to examine the determinants of balance of payments in Sierra Leone over the period 1980-2020. the model is well-fitted with an R-squared of 0.9646, suggesting that approximately 96% of the variation in balance of payments is explained by the regressors.

The results obtained from the Autoregressive Distributed Lag (ARDL) model provide several key insights regarding the determinants of the balance of payments (BoP).

Exchange Rate (OEEXR): In the short run, depreciation of the exchange rate appears to improve the BoP, likely due to increased export competitiveness (Dornbusch, 1980; Edwards, 1989). Conversely, in the long run, exchange rate depreciation is associated with a deterioration in the BoP, potentially attributable to imported inflation and higher servicing costs of foreign-denominated debt (Frenkel & Johnson, 1976).

Foreign Direct Investment (FDI): The analysis indicates a negative and statistically significant relationship between FDI and BoP in both the short and long run. This suggests that FDI inflows in Sierra Leone may not substantially contribute to net foreign exchange earnings, potentially due to high import dependency and the repatriation of profits to foreign investors (Alfaro et al., 2004; Asiedu, 2006).

Real Interest Rate (RIR): A positive association is observed between the real interest rate and BoP, implying that higher interest rates may attract capital inflows, thereby supporting the accumulation of foreign reserves (Chowdhury, 1993; Taylor, 1995).

Real GDP (lnRGDP): The long-run coefficient for real GDP is positive and statistically significant, corroborating the notion that sustained economic growth contributes to external balance. However, the short-run effect is insignificant, suggesting that adjustments in BoP in response to GDP changes may occur with a lag (Johansen, 1995; Engle & Granger, 1987).

External Balance on Goods and Services (EBGS): Although the coefficient for EBGS is positive, it lacks statistical significance, indicating that trade balance alone may not adequately explain BoP fluctuations (Krugman & Obstfeld, 2009; IMF, 2019).

These findings collectively highlight the complex dynamics influencing Sierra Leone's balance of payments, emphasizing the importance of considering both short- and long-term effects when formulating policy interventions.

Policy Recommendations

Enhancing External Balance through Macroeconomic Policy

Foreign Direct Investment (FDI) Strategy

Policies should aim to direct FDI toward productive and export-oriented sectors, including agriculture, manufacturing, and renewable energy. Incentive frameworks should prioritize domestic value addition, technology transfer, and employment generation. Regulatory mechanisms must also be strengthened to monitor profit repatriation and ensure that foreign investments contribute meaningfully to sustainable economic development (Alfaro et al., 2004; Asiedu, 2006).

Exchange Rate Management

Authorities should maintain exchange rate stability by avoiding excessive depreciation, which could adversely impact the balance of payments through imported inflation and higher foreign debt servicing costs. A managed floating exchange rate system, supported by adequate foreign reserves and sound monetary policy, can enhance export competitiveness without compromising macroeconomic stability (Edwards, 1989; Frenkel & Johnson, 1976).

Interest Rate Policy

Monetary policy should be coordinated with external sector objectives. Stable and attractive interest rates can promote domestic savings and attract capital inflows. However, policymakers should exercise caution to prevent overheating or sudden capital outflows during periods of global financial volatility (Chowdhury, 1993; Taylor, 1995).

Structural Reforms

To address persistent external imbalances, structural economic transformation is essential. Recommended reforms include:

1. Promoting industrialization and local manufacturing to reduce import dependency and enhance value-added production.
2. Encouraging export diversification beyond primary commodities and minerals.
3. Strengthening infrastructure and trade logistics to facilitate market access and reduce transaction costs.
4. Supporting micro, small, and medium enterprises (MSMEs) to expand the domestic production base and stimulate inclusive economic growth (World Bank, 2020; IMF, 2019).

Recommendations for Future Research

Future research should build on this study by examining the sectoral composition of FDI and its differential effects on the balance of payments in Sierra Leone. Investigating how FDI in agriculture, manufacturing, and services uniquely influences net foreign exchange earnings and economic resilience would provide more granular insights. Additionally, research could explore the role of institutional quality, governance, and financial market development in mediating the impact of macroeconomic variables on external balances. Longitudinal and disaggregated analyses using firm-level or sector-level data could deepen understanding of the mechanisms through which FDI and domestic policies affect the balance of payments (Alfaro et al., 2004; Asiedu, 2006; World Bank, 2020).

Conclusion

This study empirically analyzed the determinants of the balance of payments in Sierra Leone using the Autoregressive Distributed Lag (ARDL) bounds testing approach over the period 1980–2020. The findings provide robust evidence of a long-run equilibrium relationship between BoP and key macroeconomic variables, including exchange rate, interest rate, FDI, and real GDP.

The research provides the following key insights:

- Exchange rate depreciation enhances BoP in the short run but has adverse long-term effects due to imported inflation and increased debt servicing costs.
- FDI inflows negatively affect BoP, highlighting the need for targeted investment policies that maximize net foreign exchange earnings.
- Higher interest rates positively influence BoP, confirming their role in attracting capital inflows and managing external balances.
- Economic growth contributes to BoP in the long run, while short-run effects remain delayed.

These findings underscore the necessity of coherent and forward-looking macroeconomic policies. Achieving a sustainable balance of payments position in Sierra Leone requires a combination of prudent monetary and fiscal management, structural reforms, and investment strategies aimed at boosting export capacity and reducing import dependency. Moreover, future research addressing sector-specific FDI effects, governance, and institutional quality can further inform policy design to enhance external balance and long-term economic resilience.

REFERENCES

Adams, S. (2009) 'Foreign direct investment, domestic investment, and economic growth in Sub-Saharan Africa', Journal of Policy Modeling, 31(6), pp. 939–949.

Alexander, S.S. (1952) 'Effects of a devaluation on a trade balance', IMF Staff Papers, 2(2), pp. 263–278.

Alfaro, L., Chanda, A., Kalemli-Ozcan, S. & Sayek, S. (2004) 'FDI and economic growth: The role of local financial markets', Journal of International Economics, 64(1), pp. 89–112.

Asiedu, E. (2006) 'Foreign direct investment in Africa: The role of natural resources, market size, government policy, institutions and political instability', World Economy, 29(1), pp. 63–77.

Bahmani-Oskooee, M. (1995) 'Real and nominal effective exchange rates for 22 LDCs: 1971:1–1990:4', Applied Economics, 27(6), pp. 591–604.

Bank of Sierra Leone (2022) Annual Reports and Statistical Bulletins. Freetown: BSL.

Brooks, C. (2019) Introductory Econometrics for Finance. 4th edn. Cambridge: Cambridge University Press.

Bundu, S., Jalloh, M. & Kamara, A. (2021) 'Macroeconomic impacts of the COVID-19 pandemic in Sierra Leone', African Journal of Economic Policy, 28(2), pp. 55–72.

Chowdhury, A. (1993) 'Does foreign capital alleviate poverty? A time-series analysis for Bangladesh', Applied Economics, 25(11), pp. 1469–1476.

Collier, P. (2003) Breaking the Conflict Trap: Civil War and Development Policy. Washington, DC: World Bank.

Collier, P. & Goderis, B. (2012) 'Commodity prices and growth: An empirical investigation', European Economic Review, 56(6), pp. 1241–1260.

Dickey, D.A. & Fuller, W.A. (1979) 'Distribution of the estimators for autoregressive time series with a unit root', Journal of the American Statistical Association, 74(366), pp. 427–431.

Eita, J.H. (2012) 'The balance of payments as a monetary phenomenon: Econometric evidence from Namibia', The Journal of Developing Areas, 46(2), pp. 29–53.

Edwards, S. (1989) Real Exchange Rates, Devaluation, and Adjustment: Exchange Rate Policy in Developing Countries. Cambridge, MA: MIT Press.

Engle, R.F. & Granger, C.W.J. (1987) 'Co-integration and error correction: Representation, estimation, and testing', Econometrica, 55(2), pp. 251–276.

Frenkel, J.A. & Johnson, H.G. (1976) The Monetary Approach to the Balance of Payments. London: Allen & Unwin.

Goldstein, M. & Khan, M.S. (1985) 'Income and price effects in foreign trade', in Jones, R.W. & Kenen, P.B. (eds.) Handbook of International Economics. Amsterdam: North-Holland, pp. 1041–1105.

Granger, C.W.J. & Newbold, P. (1974) 'Spurious regressions in econometrics', Journal of Econometrics, 2(2), pp. 111–120.

Gujarati, D.N. & Porter, D.C. (2009) Basic Econometrics. 5th edn. New York: McGraw-Hill.

International Monetary Fund (IMF) (2019) Balance of Payments and International Investment Position Manual. 6th edn. Washington, DC: IMF.

International Monetary Fund (IMF) (2020) Sierra Leone: Staff Report for the 2020 Article IV Consultation. Washington, DC: IMF.

International Monetary Fund (IMF) (2020) International Financial Statistics. Washington, DC: IMF.

International Monetary Fund (IMF) (2022) International Financial Statistics. Washington, DC: IMF.

Johansen, S. (1995) Likelihood-Based Inference in Cointegrated Vector Autoregressive Models. Oxford: Oxford University Press.

Johnson, H.G. (1975). Further Essays in Monetary Economics. London: Allen & Unwin.

Kenen, P.B. (1985). Macroeconomic Theory and Policy: A Text. New York: Harcourt Brace Jovanovich.

Krugman, P.R. & Obstfeld, M. (2009). International Economics: Theory and Policy. 8th edn. Boston: Pearson.

Krugman, P.R., Obstfeld, M. & Melitz, M.J. (2018). International Economics: Theory and Policy. 11th edn. Harlow: Pearson.

Kwiatkowski, D., Phillips, P.C.B., Schmidt, P. & Shin, Y. (1992) 'Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root?', Journal of Econometrics, 54(1–3), pp. 159–178.

Milesi-Ferretti, G.M. & Razin, A. (1996) Current Account Sustainability. Princeton, NJ: Princeton University Press.

Mundell, R.A. (1968) International Economics. New York: Macmillan.

Mudida, R. & Guglielmo, G. (2012) 'Exchange rate volatility and balance of payments adjustment in Kenya', Journal of World Trade, 46(6), pp. 1401–1420.

Ndicumana, L. & Boyce, J.K. (2011) Africa's Odious Debts: How Foreign Loans and Capital Flight Bled a Continent. London: Zed Books.

Ndoricimpa, A. (2017) 'Threshold effects of inflation on economic growth in Africa: Evidence from a dynamic panel threshold regression approach', African Development Review, 29(2), pp. 178–190.

Nkoro, E. & Uko, A.K. (2016) 'Autoregressive Distributed Lag (ARDL) cointegration technique: application and interpretation', Journal of Statistical and Econometric Methods, 5(4), pp. 63–91.

Narayan, P.K. (2005) 'The saving and investment nexus for China: Evidence from cointegration tests', Applied Economics, 37(17), pp. 1979–1990.

Pesaran, M.H. & Shin, Y. (1999) 'An autoregressive distributed lag modelling approach to cointegration analysis', in Strom, S. (ed.) Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium. Cambridge: Cambridge University Press.

Pesaran, M.H., Shin, Y. & Smith, R.J. (2001) 'Bounds testing approaches to the analysis of level relationships', Journal of Applied Econometrics, 16(3), pp. 289–326.

Phillips, P.C.B. & Perron, P. (1988) 'Testing for a unit root in time series regression', Biometrika, 75(2), pp. 335–346.

Perron, P. (1989) 'The great crash, the oil price shock, and the unit root hypothesis', Econometrica, 57(6), pp. 1361–1401.

Robinson, J. (1937) Essays in the Theory of Employment. London: Macmillan.

Taylor, L. (1995) 'The economics of financial crises', World Development, 23(12), pp. 2035–2047.

UNCTAD (2020) World Investment Report 2020: International Production Beyond the Pandemic. Geneva: United Nations.

UNECA (2015) Economic Report on Africa 2015: Industrializing through Trade. Addis Ababa: United Nations Economic Commission for Africa.

World Bank (1995) Sierra Leone: Structural Adjustment Program Review. Washington, DC: World Bank.

World Bank (2015) Sierra Leone: Diagnostic Trade Integration Study. Washington, DC: World Bank.

World Bank (2019) Sierra Leone Economic Update: Financial Inclusion for Economic Growth. Washington, DC: World Bank.

World Bank (2020) Sierra Leone Economic Update: Strengthening Resilience and Diversification. Washington, DC: World Bank.

World Bank (2021) World Development Indicators. Washington, DC: World Bank.

World Bank (2022) World Development Indicators. Washington, DC: World Bank.