

The Effect of Inflation on the Trade Balance of Sierra Leone: A Cointegration Analysis

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Abstract—Investigating the impact of inflation and its consequences on Sierra Leone's trade balance between 1980 and 2022 is the main goal of this research project. The variables were included in the same sequence as suggested by the Dickey-Fuller test findings. Recognizing how the rate of inflation affects trade balance both now and, in the future, the Johansen Cointegration result looked at the immediate dynamics of the variables as well as the pattern of their long-run interactions. The explanatory variables: inflation and real GDP have an adverse and significant effect in the near term, in contrast, the actual effective rate of exchange greatly impacts Sierra Leone's trade balance. On a long-term basis, real GDP, supply of money, inflation, and actual effective rate of exchange have a substantial impact on trade balance. Maximizing trade-offs requires more than just implementing a sound exchange rate strategy. It highlights the need for further steps in bolstering the economy's external sector as well as changes in exchange rates influencing inflation. The study demonstrates the interrelationships among the actual rate of exchange, inflation, and trade balance with respect to the small developing country of Sierra Leone.

Keywords— Cointegration, Trade Balance, Inflation, Exchange Rate.

I. INTRODUCTION

A nation's ability to compete internationally is largely dependent on its trade balance, which forms a vital part of the balance of payments. The aggregate discrepancy between a nation's import and export levels during a specific period is referred to as its trade balance. Valuing imports in relation to exports provides an alternative definition of trade balance. A country's trade balance is regarded as being in excess when exportation exceeds importation, and as deficient when importation exceeds exportation (Mustafa, 2015). Foreign commerce plays a vital part in a nation's economic development and progress. An essential channel for improving a nation's social and economic performance is its foreign commerce, particularly in emerging nations. Additionally, trade improves welfare by opening new markets, fostering the efficiency of failing businesses, and assisting nations in obtaining commodities and services that are either unavailable domestically or much less expensive elsewhere. Therefore, fluctuations in international commerce are a serious worry, particularly for developing nations with ongoing trade deficits.

Research indicates that most developing nations use monetary policy and currency rate depreciation/devaluation to improve their trade balance situation. Economic theory states that adjusting the nominal rate of exchange can affect the relative costs of imports and exports, which will improve the

state of trade balance. A crucial element of policy that determines international reserves is the exchange rate, remittances, capital flows, inflation, foreign direct investment, and trade (A. B. Tarawalie & Kpana, 2022). It is important to highlight that many countries in Sub-Saharan Africa (SSA) have experienced a negative trade balance. According to (Keho, 2021) the SSA countries' ongoing trade deficit is mostly caused by their high reliance on imported manufactured goods, non-diversification of their economies, over-reliance on primary products for export, and ineffective economic tactics used in significant economic reform initiatives.

In the academic literature, there are three basic theories that try to explain why a nation's trade balance varies. These models consist of three approaches: monetary, absorption, and elasticity. The elasticity approach indicates that if there is more than unity in the elasticity demand for imports and exports, the trade balance will benefit from a real drop in the value of the home currency as provided by the Marshal-Lerner conditions. The J-curve effect, as is called, according to (Keho, 2021), transpires when the trade balance temporarily declines to offset the long-term trade balance gain brought on by the currency drop. In contrast, the monetary method explains why the monetary phenomenon of the balance of payments is everywhere and always through the interplay of money supply and demand.

The monetarist perspective states that an excess of demand for imported commodities would require a growth in the quantity of money utilized. As such, foreign currency inflows will satisfy the extra demand for money and enhance the trade balance if it surpasses the money supply. Foreign exchange outflows, however, will reduce the excess money supply if there is more money than there is demand, which will hurt the trade balance. The absorption strategy states that when total output surpasses total domestic spending, a nation's trade balance will improve. Thus, a currency's devaluation can only make the trade balance better if there is a larger disparity between domestic spending and output (Svensson, 2016). As the average cost of goods and services continuously rises, the country's currency loses value, a phenomenon known as inflation. The currency of a nation with higher inflation tends to lose value in relation to the currency of a nation with lower inflation. Because they become comparatively more affordable for foreign consumers, the goods and services of the nation with higher inflation may become more competitive in global markets because of this devaluation.

In contrast, the nation with lower inflation has an increase in the value of its currency, which raises the cost of its exports to outside consumers. With exports rising and imports falling, the nation with higher inflation may thus see an improvement in its trade balance. However, when a nation's currency gains value because of reduced inflation, domestic consumers can buy comparably less expensive imports. As a result, consumers may find imported goods to be more affordable which may cause the quantity of imports to rise. The country's trade balance with lower inflation can worsen, with imports rising and exports falling. (Syed & Zwick, 2015) argue that unexpected monetary expansion leads to actual exchange rate depreciation and that the advantages of surprise inflation diminish with more economic openness since real devaluation is more detrimental in more open economies.

Consequently, a nation experiencing higher inflation may find it more difficult to compete in global markets, which could have an adverse effect on its trade balance. Therefore, how central banks respond to inflation through their policies may also have impacted the trade balance. A nation's central bank raising interest rates to combat inflation may attract foreign investment seeking higher returns. The country's currency may appreciate, which would impact the trade balance. This fits well with the time consistency models of inflation (Gordon, 2016). These examples show that; sharing the private sector's desires for inflation relative to production, central banks adopt higher-than-optimal inflation rates due to the absence of reliable commitment devices. The results of empirical research on how inflation affects the trade balance are ambiguous and conflicting. While some studies (Baharumshah, 2001) showed little or no link between the two factors, other studies (Tunaer Vural, 2016) showed that the trade balance is improved by a real fall in the exchange rate. Hence, the supply of money and trade balance also showed a positive association in one study and a negative correlation in another (Ousseini et al., 2017).

Because of the imbalance in merchandise trade, Sierra Leone's economy has suffered from a persistent trade deficit ever since the country gained its independence in 1961. Machinery and transportation equipment, fuel, and food make up most of the imports into the nation (50% of total imports). In addition, the primary exports, which make up 78.3% of the total, include rough wood, cocoa beans, unset diamonds, aluminum ores and concentrates, and titanium ores and concentrates. The nation has also been characterized by a significant budget deficit, high rates of inflation, declining terms of trade, recurrent devaluation of the currency, and excessive monetary and credit growth.

Based on a critical review of Figure 1, it can be inferred that Sierra Leone achieved a trade surplus in only one year, 1986, between 1980 and 2020. The 1986 trade surplus resulted from the execution of the structural adjustment program (SAP). Figure 1 also clearly shows that the country experienced trade deficits every other year except for 1986. The country saw its largest trade imbalance in 2011 because of heavy machinery imports before mining iron ore began in 2012. The nation also had to deal with an enormous trade imbalance in 2015 because of the double blow of the Ebola

outbreak and the drop in iron ore prices. Furthermore, the COVID-19 pandemic's predominance led to a significant decline in the mining industry in 2020 and there will be a trade imbalance, particularly regarding iron ore.

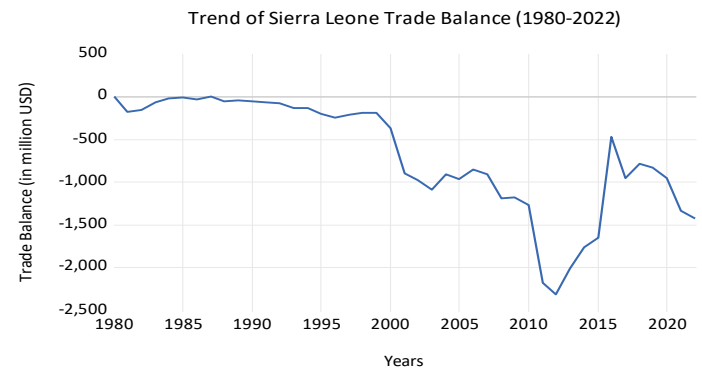


Figure 1: Sierra Leone Trade balance
Source: World Bank Using CEIC Data (processed using E-Views 12)

The analysis clearly shows that there was no clear pattern in Sierra Leone's link between inflation and trade balance. Consequently, a study is necessary to ascertain whether Sierra Leone's trade balance and inflation are correlated. Considering this, the study investigates how inflation affects Sierra Leone's trade balance. The research makes use of annual data covering the years 1980 through 2020 and applies the cointegration modeling technique.

Therefore, this essay aims to contribute to the corpus of existing knowledge on how inflation affects Sierra Leone's trade balance by using annual data and cointegration analysis, which takes into consideration the variables' long-run equilibrium relationship. Policymakers will find the study's findings helpful in boosting economic growth in Sierra Leone. The literature is reviewed in Part 2, the methodology is covered in Part 3, and the results are estimated and discussed in Part 4 and Part 5, to form the conclusion and recommendation.

II. REVIEW OF LITERATURE

An extensive examination of the literature regarding how inflation affects the trade balance was discussed. Some studies have yielded inconsistent empirical outcomes; for instance, (Ng et al., 2009) showed that Malaysia's trade balance is improved by both devaluation and domestic income using cointegration approaches. Conversely, growth in foreign revenue causes the trade balance to worsen, (Ha et al., 2020) examined Pakistan's circumstances. The findings offered compelling evidence that; the money supply and the trade balance showed an inverse relationship, while the actual exchange rate and domestic income showed a positive link.

Gambia, Nigeria, Ghana, and Sierra Leone make up the West African Monetary Zone (WAMZ) and (Keho, 2021) studied these four nations; and discovered the J-curve effect solely in Nigeria. Real devaluation in Ghana and Gambia first helps the trade balance before eventually making it worse. In Nigeria, trade balance and domestic income are negatively correlated and have a positive correlation with foreign

revenue, according to research (Keho, 2021). There exists a weak but inverse link between the actual effective rate of exchange and trade balance. Tanzania's trade balance has benefited from foreign direct investment, trade liberalization, the abundance of natural resources, human capital, and foreign money, according to (A. B. Tarawalie & Kpana, 2022) research. Conversely, inflation, government spending, and household consumption expenses negatively impact the balance of trade and thus, on the trade balance, the actual exchange rate has a minimal impact.

Some factors influencing Kenya's trade balance were examined by (Elliott & Rauscher, 2018) and the findings show that both real exchange rate reductions and foreign direct investment significantly enhance trade balance. The role of currency rates in predicting Sierra Leone's long-term trade balance performance is examined by (A. B. Tarawalie & Kpana, 2022) utilizing annual data from 1980 in their analysis. According to the results, the main long-term factors affecting Sierra Leone's trade balance are domestic revenue and money availability. Furthermore, the findings suggest that Sierra Leone does not finally satisfy the Marshall-Lerner requirements. The immediate results demonstrate that the trade balance is significantly worsened by one period when the actual money supply and real exchange rate lag.

Rice, oil, and cocoa prices were included as explanatory variables in (Danladi, 2020) investigation of the relationship between worldwide commodity prices and Sierra Leone's inflation dynamics. Inflation is impacted by the worldwide prices of rice and oil, both in the near and distant future and cocoa short-term lessens the persistence of inflation but has a major effect on it in the long term. An unrestricted VAR was employed by (Aleem & Masood, 2007) to investigate Sierra Leone's implementation of inflation targeting. The findings showed that, in addition to the significant influence of exchange rate fluctuations, there was a poor brief history of the money supply's correlation with inflation and a high long-term relationship between inflation and a shock to itself. This implies that in the short and medium terms, the IT framework is not a practical choice.

"How to cure the trade balance?" is the title of his empirical study. (Ju et al., 2010) found that the trade deficit was more affected by devaluation than the budget deficit. Devaluation has a 25-month effect when analyzed using annual or monthly data. Nearly 19% of the inflation in consumer prices can also be explained by it. (Sowa, 1994) discovered through econometric techniques in their "Inflation Trends and Control in Ghana" study that after the devaluation, the trade balance would improve if exports increased, and imports decreased. Assessing the effect of budgetary deficits on inflation (Ree & Saffa, 2019) used an ARDL model. He found that depreciation of the currency rate, money growth, and real GDP all affect inflation. The revenue shortfall was explained by the money supply's elasticity (M2).

Using data from 1967Q1–1987Q4, (Leone et al., 1987) used OLS and found that Inflation rises by 1.3% with every 1% increase in the money supply over time. Inflation is also influenced by real GDP growth and increased inflation forecasts. In addition to supply-side considerations, (Amalia

Yunia Rahmawati, 2020) discovered that inflation expectations and money growth were significant contributors to inflation. For the sample period 2000–2006, (Kalonji et al., 2008) used a structural VAR with monthly oil price, reserve money, and nominal exchange rate as explanatory variables. Domestic inflation is correlated with rising oil prices, expanding money supply, and falling nominal exchange rates. They only have a small sample duration and do not differentiate between long-term and short-term influences. Using a structural vector autoregressive technique, (A. Tarawalie, 2011) investigated the connection between inflation and currency rate pass-through during the 1998Q1–2011Q4 period. Exchange rate shocks have a greater influence on prices than monetary shocks, but monetary shocks on inflation are transient.

About describing how inflation affects the trade balance, empirical research has yielded conflicting and evasive conclusions. A positive correlation was found between inflation and trade balance (Iqbal et al., 2019), despite previous studies (A. B. Tarawalie & Kpana, 2022) demonstrating a drawback association. Furthermore, a small number of studies revealed no discernible connection between trade balance and inflation (A. B. Tarawalie & Kpana, 2022). This research attempts to add to the empirical discussion by analyzing the impact of inflation on Sierra Leone's trade balance, a small open economy that is marked by a growing money supply, a persistent trade deficit, and a prolonged depreciation of the currency rate. Based on erratic and ambiguous findings about inflation's impact on trade balance, the study was conducted. The investigation makes use of the Cointegration estimation approach. Therefore, it is critical to comprehend the long-term connection between inflation and trade balance while creating and implementing policies in emerging nations.

III. METHODOLOGY

A. Source of Data

In this work, secondary data examination is utilized to investigate the enduring partnership between the estimated variables. Owing to data limitations in Sierra Leone, data for the study were obtained from Sierra Leone's Central Bank and the CEIC database of the World Bank. The empirical methodology in this study was multiple regression analysis which uses data on inflation (INF), real gross domestic product (RGDP), money supply (MS) or M2, government expenditure (GS), and real effective exchange rate (REER) from 1980 to 2022.

B. Methodology and Model Specifications

To restate, this study's main goal is to investigate how inflation affects Sierra Leone's trade balance. Several important factors that are derived from economic theory have a major impact on imports, exports, and consequently the trade balance. Let us now define an economy's trade balance as follows: export revenue = X - import expenditure M.

This research builds upon (Personal & Archive, 2018) empirical work by utilizing the conceptual and experimental structure for simulating the equation for the balance of trade.

The structural characteristics of an economy primarily reliant on imports are also considered, specifically pertaining to Sierra Leone. The elasticity and monetary methodologies are combined to create a hybrid theoretical framework for this research. In line with the elastic technique, if the combined import and export demand elasticities are larger than one, a decrease in the currency's value will bolster the trade balance. Put otherwise, because of the fall in the currency rate, the trade balance will see a short-term fall but a long-term increase. Conversely, the monetary approach asserts that there is a monetary issue with the payment balanced. As a result, supply and demand for money determine the payment balance. Specifically, a surplus of demand for foreign commodities would necessitate a corresponding increase in the supply of money. The cointegration approaches are used in the investigation.

The standard formulation proposed by economic theory dictates the empirical model that was used in this investigation. A functional version of the model is defined as follows, in accordance with (Rasaki & Oyedepo, 2023):

$$TB = f(INF_t, RGDP_t, MS_t, GS_t, REER_t) \dots \dots \dots (1)$$

With the basic variables present, a linear empirical model is then defined as follows:

$$TB_t = \beta_0 + \beta_1 INF_t + \beta_2 RGDP_t + \beta_3 MS_t + \beta_4 GS_t + \beta_5 REER_t + \beta_6 D_u + \mu_t \dots \dots \dots (2)$$

Consequently, the econometric model above can be expressed in logarithmic form as follows:

$$LogTB_t = \beta_0 + \beta_1 LogINF_t + \beta_2 LogRGDP_t + \beta_3 LogMS_t + \beta_4 LogGS_t + \beta_5 LogREER_t + \beta_6 D_u + \mu_t \dots \dots \dots (3)$$

where: TB = Trade Balance, INF = Inflation, $RGDP$ = Real Gross Domestic Product, MS = Money Supply, GS = Government Spending, $REER$ = Real Effective Exchange Rate, D_u = Dummy Variable, μ_t = the error term that fulfils each of the traditional OLS presumptions, and t = the period (1980-2022).

D_u represents a dummy variable to represent the war's impact (period of war =1; non war period = 0), β_0 is the constant while $\beta_1 \dots \dots \dots \beta_5$ are the independent variables' coefficients? The error term and natural logarithm are indicated by the log. The model's coefficients are anticipated a priori to be: $\beta_1 < 0$, $\beta_2 < 0$, $\beta_3 < 0$, $\beta_4 > 0$, $\beta_5 > 0$, and $\beta_6 < 0$.

According to economic theory, it is anticipated that a rise in INF , $RGDP$, MS and $DUMMY$ would cause the trade balance to drop, and the value of GS and $REER$ would improve the trade balance. Considering the empirical findings, the explanatory variables GS and $REER$ are therefore predicted to have positive coefficients, whereas the variables INF , $RGDP$, MS , and $DUMMY$ are likely to have negative coefficients.

IV. RESULT ESTIMATION AND DISCUSSION

This part displays and evaluates the estimated regression's findings and looks at the variables' time series characteristics. Several statistical techniques and econometric analyses were employed to determine how much inflation affected Sierra Leone's trade balance. The predicted variables' unit root and stationarity at first difference are tested by the Augmented Dickey-Fuller test; the short-term endogenous and exogenous variables' connection is established by the test of Error Correction Mechanism; the extended partnership is ascertained by the Johansen's Cointegration test.

A. Empirical Results

Above all, performing the unit root test is essential to avoid trended data issues when processing time series data. The variables' order of integration can be found using the Augmented Dickey-Fuller (ADF) unit root test. Thus, standard ADF can be found below, and Table 1 displays the estimation results:

$$\Delta x_t = \alpha + \alpha_1 + \gamma x_{t-1} + \sum_{i=1}^k \Delta x_{t-1} + e_t \dots \dots \dots (4)$$

where: xmb_t = the series' first disparity x_t , x_t = each time series separately, e_t = white noise error term, k = the lag order, t = linear trend and α = constant.

Table 1: Results of Stationary Tests at Levels and the First Difference

Parameters	Integration	test of ADF stats.	critical test Value	Prob. value	Component of formula	Inference
Log TB	level	-4.025612	-3.53308**	0.0161	intercept & trend	nonstationary
	first difference	-4.324941	-3.54033**	0.0080	intercept & trend	stationary
Log INF	level	-2.656927	-3.55297**	0.2596	intercept & trend	nonstationary
	first difference	-6.102997	-3.55775**	0.0001	intercept & trend	stationary
Log RGDP	level	-1.323589	-3.52078**	0.8682	intercept & trend	nonstationary
	first difference	-5.982467	-3.52362**	0.0001	intercept & trend	stationary
Log MS	level	-4.455734	-3.55297**	0.0063	intercept & trend	nonstationary
	first difference	-1.137234	-3.55775**	0.9064	intercept & trend	stationary
Log GS	level	-2.388663	-3.54428**	0.3787	intercept & trend	nonstationary
	first difference	-5.092355	-3.52362**	0.0009	intercept & trend	stationary
Log REER	level	-2.525253	-3.52975**	0.3150	intercept & trend	nonstationary
	first difference	-3.885113	-3.52362**	0.0217	intercept & trend	stationary
DUMMY	level	-1.862239	-3.52078**	0.6561	intercept & trend	nonstationary
	first difference	-6.218823	-3.52362**	0.0000	intercept & trend	stationary

* Denotes 1%; ** denotes 5% and *** denotes 10% significance level, Source: E-views 12.0, the author's estimation

With nine (9) chosen as the automatic lag length option, and with a 5% significance level the root of the ADF unit test results is displayed in Table 1. Based on the conclusions,

every variable in the model is stationary at the initial disparity. Consequently, the first difference and integrated series at every level require a cointegration test.

B. The Johansen's Cointegration Method

In this empirical investigation, testing for cointegration would be the next step considering the same order, I (1), the variables are integrated at the first difference, and it is possible to ascertain the long-term connection between the factors. It is necessary for the error term to stay constant throughout time to function. The co-integration approach specifies the order in which integration is needed for the variables to enter the cointegration relationship as proposed by (Jiranyakul & Opiela, 2014) and is used in this study.

Thus, logs of TB, INF, RGDP, MS, GS, REER, and a dummy are the cointegrating series. A lag interval of 1 to 2 was employed under the VAR lag order selection criteria for Johansen's cointegration rank trace and maximum eigenvalue tests through the lens of the Akaike information criteria and the results displayed in the table below:

Table 2: Test of Cointegration outcome (Trace)

Hypothesized no. of CE(s)	Eigen Value	Trace stats.	5% Critical Value	Prob.**
none*	0.827740	223.0040	125.6154	0.0000
at most 1*	0.741815	152.1870	95.75366	0.0000
at most 2*	0.658087	98.02379	69.81889	0.0001
at most 3*	0.472207	55.09582	47.85613	0.0090
at most 4	0.352199	29.53379	29.79707	0.0536
at most 5	0.258297	12.16692	15.49471	0.1491
at most 6	0.005353	0.214686	3.841465	0.6431

*Denotes rejection of the hypothesis at the 5% level and **MacKinnon-Haug-Michelis (1999) p-values Source: E-views 12.0, the author's estimation

Table 3: Test of Cointegration outcome (Maximum Eigenvalue)

Hypothesized no. of CE(s)	Eigen Value	trace stats.	5% Critical Value	Prob.**
none*	0.829740	70.81704	46.23142	0.0000
at most 1*	0.741815	54.16319	40.07757	0.0007
at most 2*	0.658087	42.92797	33.87687	0.0032
at most 3	0.472207	25.56203	27.58434	0.0887
at most 4	0.352199	17.36687	21.13162	0.1554
at most 5	0.258297	11.95223	14.26460	0.1125
at most 6	0.005353	0.214686	3.841465	0.6431

*Denotes rejection of the hypothesis at the 5% level and **MacKinnon-Haug-Michelis (1999) p-values Source: E-views 12.0, the author's estimation

Outcomes from rank tests for unconstrained cointegration trace and max eigenvalue are shown in Tables 2 and 3, respectively. The outcome of the preceding tables indicates that the variables have 4 cointegrating relationships. At the 5% significance level for the rank test trace, the null hypothesis for none and the maximum 3 cointegrating links among the variables was rejected. The variables exhibit 3 distinct cointegrating connections, according to the results of the maximum eigenvalue analysis, which also supports the null hypothesis for no or at most 2 cointegration relationships. The above tables' results demonstrate that, in the event of a difference in value, the max-eigen statistic under the maximum eigenvalue is more dependable than the trace statistic under the rank tests trace. As a result, we trust the max-eigen statistic. A potential enduring connection between the factors is suggested by their cointegration. Consequently, the study estimates both long-term and short-term models.

Table 4: Long-term correlation between inflation and trade balance impact

Parameter	Coefficient	Std. error	t-stats	Prob.
C	-15.15517	15.00840	1.009552	0.3217
LINF	-0.440600	0.190344	2.314751	0.0291
LRGDP	-0.207903	0.048004	-4.330969	0.0002
LMS	0.162302	0.043804	3.705229	0.0011
LGS	0.213095	0.102951	0.206987	0.8377
LREER	0.839432	0.363263	2.310809	0.0294
DUMMY	-18.62584	15.98261	-1.165382	0.2549

Source: E-views 12.0, the author's estimation

According to Table 4's findings, the main variables affecting Sierra Leone's trade balance are inflation, real GDP, currency rate in practice, and supply of money. According to the results, 1% more inflation will result in a 44% enhancement of the trade balance. Inflation's outcome validates the a-priori sign and implies that a decline in inflation could cause the trade balance to rise. Stated differently, low levels of domestic inflation deter imports, which improves the trade balance. Long-term favourable effects regarding the actual exchange of trade balance were also found by the study, showing that an 83% rise in trade balance occurs because of a rise of 1% in the actual effective exchange rate. According to the literature, devaluation increases the competitiveness of domestic commodities against imported goods, hence increasing exports. Local goods will become more affordable outside due to the devaluation of the currency, which will increase demand for them and boost exports, improving the trade balance. The analysis indisputably shows that improving the monetary supply will enhance the trade balance.

The study by (Ilmas et al., 2022), which found that there was an empirical negative association between the two variables in terms of economic growth, conforms to the idea that trade balance and inflation are inversely correlated. The results of a study performed by (Keho, 2021) further corroborate our conclusions that trade balance is favourably connected with foreign income and domestic spending and that trade balance is improved over time by real effective exchange rate depreciation. This result aligns with research by (Brata, 2002) which discovered that imports and interest rates significantly negatively impacted the ASEAN-5 trade balance. A substantial favourable effect on the trade balance of the ASEAN-5 nations was derived from GDP and exchange rates. On the other hand, inflation is harmful and significantly affects the ASEAN-5 nations' trade balance.

C. Short run dynamic relationship (model for error correction)

The endogenous variable trade balance's long- and short-term behaviour with respect to its explanatory variables has been investigated utilizing the method for error correction. This dynamic relationship comprises not only the first difference variables but also the lag-incorporated cointegrating regression residual value. The long-term association's elements would be indicative of the short-term dynamics. Since there may be short-term disequilibrium, to remove deviations, the error correction model is run from the long-term equilibrium. Here is a definition of the ECM:

$$\Delta \log TB_t = \alpha_0 + \sum_{i=1}^q \alpha_{1i} \Delta \log TB_{t-1} + \sum_{i=1}^q \alpha_{2i} \Delta \log INF_{t-1} + \sum_{i=1}^q \alpha_{3i} \Delta \log RGDP_{t-1} + \sum_{i=1}^q \alpha_{4i} \Delta \log MS_{t-1} + \sum_{i=1}^q \alpha_{5i} \Delta \log GS_{t-1} + \sum_{i=1}^q \alpha_{6i} \Delta \log REER_{t-1} \Delta \log DUMMY_{t-1} + \pi ECM_{t-1} + e_t \dots \dots \dots (5)$$

In the short run, α_i are parameters, π is the adjustment speed, and e_t is the white noise error parameter. Since each variable in the ECM is steady, spurious regression is not an issue for the ECM. If π is significant, it indicates that the variables have a short-term relationship. Following a short-term shock, the pace of adjustment toward equilibrium is represented by the value of π .

Table 5 displays the model for correcting errors for the immediate term and the outcome indicates that trade balance suffers greatly from inflation. At major levels of 5%, a 1% increase in inflation will result in a 52.2% short-term increase in trade balance. Nonetheless, the result aligns with the goal.

Table 5: Findings for the dependent variable from the error correction model (TB)

Parameters	coefficient	std.error	t-stats	Prob.	Inference
C	-30.65862	35.20929	-0.870754	0.3901	insignificant
D(LINF)	-0.5220699	1.386055	0.37567	0.0168	significant
D(RGDP)	-0.040182	0.062468	-0.64325	0.0524	significant
D(LMS)	0.021942	0.016336	1.343208	0.1881	insignificant
D(LGS)	-5.195063	11.55059	-0.449755	0.6557	insignificant
D(LREER)	0.453694	0.759232	0.59757	0.0415	significant
D(DUMMY)	197.7287	153.0065	1.292298	0.205	insignificant
ECM (-1)	-0.769829	0.149517	-5.14876	0.0001	significant
r-squared	0.744368		mean dependent var.	-39.33481	
adjusted r-squared	0.635913		s.d. dependent var.	22.3421	
s.e. of reg.	0.214600		akaike info criterion	13.74097	
sum of square resid.	1.559393		schwarz criterion	14.07195	
log likelihood	-20.5603		hannan-quinn critier	13.86229	
f-statistic	3.931973		durbin-watson stat	1.717274	
Prob. (f-stats)	0.0003044				

Source: E-views 12.0, the author's estimation

Table 6: Residuals test for the ECM and the optimal regression model diagnostic

Null Hypothesis	Test	Prob. value	Inference
Residual Test for Best Regression Model			
no serial correlation	Breusch Godfrey LM Test	0.0500	reject null hypothesis
normally distributed	Jarque-Bera Statistics	0.0306	reject null hypothesis
not heteroskedastic	Breusch-Pagan-Godfrey	0.2549	fail to reject the null hypothesis
not heteroskedastic	ARCH	0.0036	reject the null hypothesis
model is stable	Ramsey Reset	0.1327	fail to reject the null hypothesis
Residual Test for ECM			
no serial correlation	Breusch Godfrey LM Test	0.0194	reject null hypothesis
normally distributed	Jarque-Bera Statistics	0.0002	reject null hypothesis

Source: E-views 12.0, the author's estimation

V. DIAGNOSTIC TEST

An analytical instrument that is illustrated and a model free from spuriousness is essential for any research activity to have meaning. A better understanding of our process for choosing the model utilized in this investigation is provided by the findings from the diagnostic tests displayed in Table 6. It appears that we accept rather than reject the null hypotheses, indicating that serial correlation has no effect on the residuals of the model, according to the multiple tests for the optimal models of regression and error correction. According to the results of the ARCH and Breusch-Pagan-Godfrey tests, they are homoscedastic and regularly distributed, respectively. The

The outcome additionally demonstrates that a rise in government expenditure causes the trade balance to worsen over time. One possible explanation for this could be that the government is bringing in more imports. Real GDP is similarly substantial at 5% with a negative sign. At the 1% significance level, the result also demonstrates that the term for error correction bears a statistically significant negative coefficient of 0.76. This indicates that in a year, almost 76% of all disequilibrium will be restored. This demonstrates a high rate of adaptation. The diagnostic analysis yields an R-square of 0.74. According to this, independent factors account for 74% of the volatility in economic development. Additionally, the model's overall grade of fit is indicated by the F-statistics; however, the absence of autocorrelation is shown by the Durbin-Watson statistics (1.71).

model is also stable, as seen by the Ramsey Reset test result of 13.2%, which is higher than 5%.

VI. CONCLUSION AND POLICY RECOMMENDATION

Between 1980 and 2022, this study used 43 annual observations and six variables. A significant macroeconomic issue facing the Sierra Leonean economy is inflation. There are several factors that determine and impact the trade balance, and reducing inflation would support economic growth and development. The first step in creating a long-term remedy is to understand the factors that contribute to the inflation of the Sierra Leone trade balance. Due to Sierra Leone's ongoing budget deficit and increasing inflationary

pressure, this has historically been mostly managed by fiscal conduct in terms of seigniorage production through monetization. The unit root tests reveal that every single variable is stationary. The two variables that favourably benefited inflation and adversely affected real GDP growth, according to the computed inflation model, exchange rates dropped as the money supply expanded. The fluctuation of the currency rate has an impact on inflation, the cost of products and services, and business growth. To restore the value of Sierra Leonean export earnings, we must increase domestic production and significantly decrease imports of goods and services, particularly necessities such as rice, salt, cement, and other essentials. The currency rate and inflation rate have a high correlation, according to the preceding analysis. For instance, increased inflation and economic growth will undoubtedly result from a rise in currency rates that will impact trade balance.

The study's conclusions led to the following suggestions, which Sierra Leone's policymakers may find helpful. To maintain low inflation, Sierra Leone's monetary policy should be implemented by projecting the target inflation rate, real GDP growth, and nominal exchange rate. This will guarantee that a simulation procedure based on a structural model of inflation will yield the needed money supply (M2) target. To ensure that the fiscal operations do not contravene the observed limits on the expansion of broad money as well as the GDP-based fiscal deficit, coordination between the fiscal and monetary authorities would be needed to conduct monetary and fiscal policies in accordance with these guidelines. This would encourage the monetary authorities to compromise with the fiscal authorities in an unfavourable way.

It is especially crucial since the central bank's main purpose is low inflation, but policymakers have other macroeconomic goals, such as inclusive and sustained economic growth. Given Sierra Leone's real GDP's detrimental effect on inflation, the government must prioritize supply-side policies that raise economic output to lower the country's inflation rate and bolster the central bank's legitimacy. Hence, the economy's health, education, justice, and private sector policies should be developed. To boost export revenue and have a positive effect on exchange rate stabilization, Sierra Leone must expand investment in the tradeable goods sector, since the country's inflation rate rises when the nominal exchange rate drops.

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