

## The Dynamism of Trade Balance in Ghana

Christiana Afriyie Manu

Accra Technical University



**ABSTRACT:** Developing economies have frequently employed macroeconomic factors such as the currency rate, inflation, investment, and so on to manage trade flow; yet, there are often chronic deficits in the balance of trade and payments due to a structural imbalance between the amounts of exports and imports. As most rich countries intentionally used the benefits of international trade to improve their trade balance position, many developing countries signed up for numerous unilateral and multilateral trade policy reforms that provided little to no economic benefit. As a result, this study employs cointegration and an error correction model based on the Autoregressive Distributed Lag (ARDL) framework to analyse and estimate the effect of macroeconomic factors on Ghana's trade balance and how Ghana's trade balance has changed from 2000 to 2018. Quarterly time series data covering a period of 19 years, from 2000 to 2019 was collected on all dependent and independent variables such as exchange rate, inflation rate, interest rate and GDP per capita. The results indicate that exchange rate and interest rate significantly affect trade balance while GDP per capita and inflation insignificantly affect trade balance. The study recommended that the government should put in more measures to stabilise the currency and local manufacturers should be motivated by giving subsidies and tax exceptions.

**KEYWORDS:** Autoregressive Distributed Lag (ARDL); Trade Balance; bound test; Cointegration test; GDP per capita

### 1.0 INTRODUCTION

#### 1.1 Introduce the Problem

Worldwide, trade between countries has increased in both quantity and sectors since the last decade leading to changes in the balance of trade among the party nations. An example is the changes and increased trade in agricultural products among countries caused by globalization (Porkka et al. 2013). Developing economies have frequently used macroeconomic factors such as the exchange rate, money supply, foreign direct investment, and so on to control trade flow; however, due to structural differences in exports and imports, there are frequently persistent deficits in the balance of trade and payments. As most rich countries intentionally leveraged the benefits of international trade to improve their trade balance position, many developing countries agreed to unilateral and multilateral trade policy reforms that gave them little to no economic use (Osoro, 2013; Shawa & Shen, 2013; UNCTAD, 2005, 2013). Developing economies frequently have an impact on both exports and imports. Researchers and others typically quantify these linkages in terms of monetary value (e.g., in dollars or tonnes traded), which gives a more generic measure for analysing the volume of trade flows and equalisation of most domestic variables (e.g., GDP) or production (e.g., tonnes of cultivated rice).

Several existing research on the trade balance, particularly in emerging African countries such as Ghana, have frequently studied the effect of various factors such as household consumption expenditure, government consumption expenditure, domestic pricing, FDI, and inflation on the trade balance (see, Bhattarai & Armah, 2005; Danquah, 2008; Gallagher, Moreno-Brid, & Porzecanski, 2008; Akorli, 2017; Iyke & Ho, 2017; Akoto & Sakyi, 2019). Despite short gains in economic growth from successive reform implementation of several unilateral and multilateral trade policy and devaluations of macroeconomic to correct disastrous performance in economic growth worsening trade balance position experienced in Ghana in the decades (Bhattarai & Armah, 2013).

#### 1.2 Problem Statement

Trade balance is key to the development of every country. Ghana as a developing economy has experienced both a trade surplus and deficit in different periods. However, deficit in trade balance continue to increase (Akoto, & Sakyi, 2019). It is therefore important to study how some relevant macroeconomic factors could be used to minimize some of the imbalances in the trade characterizing the Ghanaian economy. Hence, this study adopts the cointegration and the error correction model within a

## The Dynamism of Trade Balance in Ghana

symmetric and asymmetric Autoregressive Distributed Lag (ARDL) framework to analyse and estimate the effect of macroeconomic factors on the trade balance in Ghana, and how trade balance has changed in Ghana from 2000 to 2018. This study consists of five parts, the introduction, a literature review of similar studies, the methodology and data used for the study, analysis and presentation of results and finally recommendation and suggestions for future research.

### 1.3 Research Hypotheses

The following research hypotheses are proposed;

$H_0$ : There is no significant relationship between exchange rate and trade balance.

$H_0$ : There is no significant relationship between the interest rate and trade balance.

$H_0$ : There is no significant relationship between GDP per capita and trade balance.

$H_0$ : There is no significant relationship between inflation and trade balance.

## 2.0 LITERATURE REVIEW

This section reviews related literature on the relationship between macroeconomic variables and trade balance and also highlighting how existing studies examined similar relationships.

### 2.1. Exchange Rate and Trade Balance

The impact of exchange rates on global economies cannot be overlooked because it is one of the primary macroeconomic elements influencing an economy's trade balance. The Marshall-Lerner condition and the J-curve effect can explain the relationship between the exchange rate and trade balance. According to the Marshall-Lerner condition, for a domestic currency depreciation to improve the balance of payments, the sum of the price elasticities of demand for exports and imports must be greater than one. According to the J-Curve Effect, the initial effect of depreciation on the balance of trade is negative, but as imports and exports adjust to price changes, the net impact on the balance of trade becomes positive in the long run. The more price elastic demand for exports and imports, the higher the long-run improvement in the trade balance. Exchange rate fluctuations substantially impact other macroeconomic variables such as inflation, GDP, exports, imports and the balance of payments. Changes in the real exchange rate (real appreciation and depreciation) significantly impact trade flow and balance. A volatile real exchange rate creates uncertainty and undesirable economic situations. When the real exchange rate of a country depreciates under constant macroeconomic factors, its export increase. However, when the exchange rate of that country appreciates, it imports increase since the cost of its goods and service relative to other trading partners fluctuates with the changing exchanged rates. her goods and services become cheaper relative to those of her trade partners (Salehi-Isfahani, 1989; Sekkat & Varoudakis, 2000).

Ghana in the 1960s and 1970s implemented a fixed exchange rate system coupled with periodic interventions to correct unwanted economic crises caused by exchange rates (Asuming-Brempong, 1998). Studies such as Petrovi and Gligori (2010) and Anning et al., (2015) provided evidence that trade balances decline in the short run after currency devaluation, but trade balances improve in the long run. Bhattarai and Armah (2013) confirmed a stable long-run relationship between exports and imports and the real exchange rate. However, the short-run elasticity of imports and exports indicates contractionary effects of devaluation and concluded that strengthened coordination between exchange rate and demand management policies based on the economy's long-run fundamentals was required for an improved balance of trade in Ghana. The actual exchange rate and the trade balance have a one-way relationship, according to Narayan (2006). By evaluating the influence of real exchange rate changes on the country's trade balance using quarterly data from 1986 to 2016, Lyke and Ho (2017) identified evidence to support the J-curve effect and indicated that domestic and foreign income improve Ghana's trade balance.

Lucy, Sunday, and Pacific (2015) investigated the validity of the Marshall Lerner Condition using co-integration analysis and VECM (the theory that explains the relationship between the exchange rate and the trade balance). From 1980 to 2013, they used annual data from Ghana on macroeconomic factors like the exchange rate and GDP to explain the relationship between trade balance and exchange rates. They discovered that the trade balance falls in the short run after a currency depreciation. Even though a currency depreciation could enhance the trade balance, Ghana did not meet the Marshall-Lerner requirement.

Maehle et al. (2013) evaluated the successes, failures, and lessons learnt from the liberalisation of Sub-Saharan Africa's currency rates. They discovered that the Sub-Saharan African countries' different economic changes were successful. The introduction of these changes signalled the end of decades of economic decline and turmoil. When these reforms were implemented, the countries saw robust and sustained economic growth. The liberalisation of exchange rates was a critical component of many countries' reform initiatives. Fiscal deficit reductions, monetary expansions, external assistance, and structural changes contributed to economic development. However, they observed that fixing exchange rates in the face of exogenous shocks without backing it with sound monetary and fiscal policies resulted in severe pressure on the balance of payments and exchange

## The Dynamism of Trade Balance in Ghana

rate overvaluation. Attempts by governments and central banks to establish price restrictions and import licences decreased income, slowed the economy, and moved external commerce to the informal sector.

### **2.2 Money Supply, Inflation and Trade Balance**

According to Akoto and Sakyi (2019), foreign income and money supply have a positive and significant relationship with the trade balance in the short run. The government's successful implementation of monetary policy is critical for adequately evaluating the timing and impact of such policies on economic variables such as trade balance. According to economic theories, a country's money supply can influence its trade balance position through the monetarist effects on the total balance of payments described by money demand and supply volatility. When the domestic money supply increases at a given exchange rate while there is no real change in demand for money, the balance of payments worsens, having a negative effect on the trade balance. People or individuals with extra discretionary cash frequently raise their need for additional foreign (imported) goods, resulting in a trade deficit and, as a result, a balance of payments deficit.

The saving-investment gap has also been discussed with respect to the relationship between government spending and trade balance. It demonstrates how individual and government savings affect trade balance imbalances when all other things remain constant. A rise in private sector investment worsens an economy's trade balance, whereas increasing government spending worsens an economy's trade balance (Alexander, 1952, 1959; Harberger, 1950; Meade, 1951).

Bahmani-Oskooee (2001) discovered in a research of 11 Middle Eastern nations that while local income impedes trade balance, foreign income enhances trade balance. Narayan (2004) discovers no cointegration (i.e., no stable long-run relationship among the variables) between New Zealand's real effective exchange rate, domestic income, foreign income, and trade balance and uncovers a causal relationship between foreign income and trade balance in both directions. Bahmani-Oskooee, Halicioglu, and Ghodsi (2016) found evidence of a long-run asymmetric effect of exchange rate on the trade balance, while foreign income positively influenced the trade balance between the trade between the UK and Germany, the UK and Italy, and the UK and Japan. Domestic income had a negative impact on the trade balance in both circumstances.

Using the j-curve pattern, Sulaiman and Abdul-Rahim (2014) investigate Thailand's forest product trade with the rest of the globe. The study applies the Bounds Test within the ARDL framework to data spanning from 1970 to 2010. The study also looks at the short- and long-run dynamics of Thailand's trade balance and the factors that influence them. The study's findings found that the J-curve pattern does not exist in Thailand's forest product trade.

Tutueanu (2015) studies the J-impact curve's on foreign trade in Romanian forest products. The study applies the Bounds testing approach within the ARDL framework to annual time series data covering 1990 to 2014. The study's findings revealed that the j-curve pattern did not exist in the trade balance of forest products. The data also demonstrated that, over time, Romanian national income and global income had a favourable and considerable impact on Romania's forest product trade balance.

Alawin and Maghareez (2013) used Granger causality and cointegration techniques on data from 1980 to 2010 in Jordan and discovered that real GDP and foreign direct investment have a significant effect on the trade balance, but the real exchange rate has no effect, which the authors attribute to Jordan's nominal exchange rate being fixed since 1995.

Moyo and Le Roux (2018) used the Pooled Mean Group (PMG) estimate technique and the ARDL bounds tests to study the relationship between interest rates and economic growth. They discovered that interest rate reforms boost economic growth through savings and investments, and they recommended that allowing market force equilibrium is the best determinant of interest rates. Hatmanu, Cautisanu, and Ifrim (2020) established a short-run negative link between economic growth and interest rates in their research.

### **2.3 GDP per capita and trade balance**

There has been empirical research on cross-country and panel or individual country examples. Most studies on the causal association between trade balance and economic growth at the individual nation-level concentrated on emerging countries. According to Sun and Heshmati (2010), international trade positively impacts China's economic growth; however, the country is confronted with low domestic absorption capacity, deteriorating trade conditions, negative environmental impact, trade friction with partners, and uneven regional development. Altaee et al. (2016) researched used ARDL and ECM to explore trade's long-run and short-run effects on economic growth. According to their findings, export has a favourable impact on economic growth in Saudi Arabia, whereas import has a negative impact on real GDP growth. According to Bakari (2017), exports and imports are seen as the key drivers of economic growth in Germany. Exports and imports do not affect Panamanian economic growth, according to Bakari and Mabrouki (2017). According to Keho (2017), foreign trade has a favourable impact on Ivory Coast's economic growth. Akari et al. (2019) looked at the long-term and short-term relationships between exports, imports, and economic development in Brasilia and China. Exports had beneficial effects in both countries, but imports had adverse effects in both, underlining the

## The Dynamism of Trade Balance in Ghana

importance of exports in generating solid economic performance. Kumar (2020) has emphasised the benefits of Indian trade to the economies of Bangladesh, Sri Lanka, Nepal, and Bhutan.

Another category of studies looks at the relationship between trade and economic growth using cross-country or panel data. Michelis and Zestos (2004) proved Granger causality from export and import growth to GDP growth, suggesting that export promotion strategies alone can be unsuccessful. Awokuse (2007) asserts that trade boosts economic growth by emphasising the importance of export and import. Furthermore, Awokuse (2008) discovered that trade influences economic growth in three European countries. Cetintas and Barisik (2008) stated that rising import demand is expected to impact economic growth in 13 transition economies.

Awokuse and Christopoulos (2019) investigated the non-linear relationship between export and economic growth in five developed economies (Canada, Italy, Japan, the United Kingdom, and the United States), observing that the impact of export on economic growth is diminishing, allowing them to identify the threshold level at which export is still beneficial for economic growth. By building a panel model for 108 nations, Busse and Königer (2012) discovered that trade balance significantly impacts economic growth (87 of which were developing countries). Fetahi-Vehapi et al. (2015) examined the positive benefits of trade on economic growth in ten South-East European countries, controlling for starting per capita income and other explanatory variables, including human capital and gross fixed capital formation.

According to Bakari and Tiba (2019), exports negatively influence economic growth, but imports have no effect due to favourable externalities such as technological transfer bias, financial capacity, human knowledge, huge market size, and spillover effect. Butkus and Seputiene (2018) examined debt threshold levels (turning points) and their impact on economic growth using a trade balance indicator. Their findings indicate that the trade balance significantly affects the threshold level.

### 3.0 METHOD

This section focuses on the research methodology of the study and specifically, comprises model specification, variable measurement and finally the estimation technique used in this paper.

#### 3.1 Variable description

##### *Dependent Variable*

**Trade Balance:** The balance of trade is simply measured by the differences between a Ghana's exports and its imports over a particular period influenced by all the factors of international trade. There is a trade deficit when the country's imports exceed its exports. There is a trade surplus when the country's export exceeds its imports. These factors include exchange rate, money supply, foreign currency reserves, inflations, foreign direct investment, remittance and GDP.

##### *Independent Variables*

**Exchange rate:** is the price of a country's currency in another country's currency. In this paper, the exchange rate was measured using a bilateral exchange rate where the Ghana Cedi was quoted against the US dollar.

**Foreign currency reserve:** In Ghana, the foreign assets held or controlled by the country's central bank are called Foreign Exchange Reserves (FER). Gold or a specific currency is used to make the reserves. They can also be special drawing rights and marketable foreign currency instruments such as treasury bills, government bonds, corporate bonds and shares, and foreign currency loans.

**Inflation:** The consumer price index measures inflation or the rate at which prices in the local economy change over time. Inflation is computed as the percentage of price of the baskets of goods and services in a given period over the price of the same basket in the base year. This implies that should pay the price of a commodity in the local economy surge over a period; then the researcher expects the price of domestic product to rise to make it expensive relative to the foreign product.

Given this, it is expected that inflation will positively affect the trade balance.

**Money supply:** The money supply is all the currency and other liquid instruments in a country's economy on the date measured. The money supply roughly includes both cash and deposits that can be used almost as easily as cash. Governments issue paper currency and coin through some combination of their central banks and treasuries.

**Interest rate:** The interest rate is basically what is charged by a lender when giving out a loan to a borrower. It is usually a proportion of the principal that the lender gives out to the borrower. The real interest rate is used in this paper and is measured by calculating the interest earned on Treasury bills taking into consideration the maturity date and Treasury bill rate and has been adjusted for inflation. In general, the interest rate is expected to harm the trade balance. When the trade balance reduces, which is known as a trade deficit, the country is expected to have a high real interest rate. As such, that is what expected of this paper concerning Ghana.

**GDP:** Gross Domestic Product (GDP) is the monetary value of all finished goods and services made within a country during a specific period. GDP provides an economic snapshot of a country, used to estimate the size of an economy and growth rate.

## The Dynamism of Trade Balance in Ghana

*Foreign Direct Investment:* A foreign direct investment (FDI) is an investment made by a firm or individual in one country into business interests located in another country. Generally, FDI takes place when an investor establishes foreign business operations or acquires foreign business assets in a foreign company.

*Remittance:* A remittance refers to money that is sent or transferred to another party. The term is derived from the word remit, which means to send back. Remittances can be sent via a wire transfer, electronic payment system, mail, draft, or check.

### 3.2 Source of Data

Quarterly time series data were collected of all independent variables such as exchange rate, inflation rate, money supply and income. The data covers a period of 19 years, from 2000 to 2019.

**Table 1: Source of Data**

Variables	Proxy	source of Data
Trade Balance	TB	Bank of Ghana
Gross Domestic Product	GDP	Bank of Ghana
Inflation rate	IR	Bank of Ghana
Foreign Currency Reserve	FCR	Bank of Ghana
Money supply	MS	Bank of Ghana
Foreign Direct Investment	FDI	Bank of Ghana
Interest Rate	IR	Bank of Ghana
Remittance	Rem	Bank of Ghana
Exchange rate	ER	Bank of Ghana

**Source:** Author compilation

### 3.3 Model specification

The paper adopted a time series estimation technique. To begin, the paper assessed the stationarity properties for the variables and based on the stationarity results the appropriate estimation technique (Autoregressive Distributed Lag (ARDL)) were employed to estimate the short-run and long-run relationship. Then diagnosis test such as normality test, serial correlation test, heteroscedasticity test, functional form and model stability were performed.

#### 3.3.1. Stationarity test

The paper employed the Augmented Dickey-Fuller (ADF) test to test for the existence of a unit root in the model. The generalized form of the ADF is stated as :

$$\Delta Y_t = \alpha V_t + \phi y_{t-1} + \sum_{i=1}^p \psi_i \Delta y_{t-i} + \varepsilon_t \quad (1)$$

where  $y_{t-1}$  is the differenced past values of the process,  $\alpha$  is the estimated parameter,  $\Delta$  is the first difference operator,  $\varepsilon_t$  is sequentially independent and homoscedastic (white noise error term), and  $V_t$  contains deterministic terms.

#### Hypothesis

$H_0: \phi = 1$ : {there exists unit root or non-stationary}

$H_1: \phi < 1$ : {there exists no unit root or stationarity}

#### Test statistic

The test statistic is given as:

$$ADF_t = \tau_{\phi=1} = \frac{\hat{\phi}-1}{SE(\hat{\phi})} \quad (2)$$

#### 3.3.2 Cointegration test

The cointegration test is the next test after the stationary of the variables has been established. This is a pre-requisite to test for the use of the ARDL. In this study, Autoregressive Distributed Lag (ARDL) bounds test is used. Peseran et al. (2001) constructed a critical value of the number of independent variables with or without the trend and constant terms. The critical values of the bounds test at both 95 per cent confidence interval have both lower and upper bound critical.

- If the F-statistics is lower than the lower bound critical value then we fail to reject the null hypothesis implies that there exist no cointegration.
- Also, if the F-statistic is exceeded the upper bound critical values then we reject the null hypothesis implies that there exist cointegration.
- More so, if the F-statistics is between the lower and upper bound critical values then the result is inconclusive.

## The Dynamism of Trade Balance in Ghana

A hypothesis test is then performed to test if there exists a long-run relationship or not with the following hypothesis.

$$H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = \alpha_7 = \alpha_8 = 0 \quad (3)$$

$$H_1: \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6 \neq \alpha_7 \neq \alpha_8 \neq 0$$

If the null hypothesis is rejected then this implies that there is a long relationship or cointegration, in the long run, otherwise, there is no cointegration amongst the variables.

### 3.3.3 ARDL Model

Peseran and Peseran (1997), Peseran and Shin (1999), Peseran et al. (2001) pioneered the cointegration estimation technique known as ARDL bounds test, which possesses some advantages over other cointegration techniques.

First ARDL technique they propose produces much more reliable results when the sample size is relatively small (Ghatak & Siddiki, 2001). Also, Peseran et al., (2001) posited that the merit of using ARDL when the variables are strictly cointegrated of order one, I(1) or order zero, I(0) or a mixture of both but not at a higher order. More so, Peseran and Peseran (1997) stated that ARDL model specification can be done after conducting the bounds test to determine whether there is cointegration or not and this guides in determining the model to specify for the paper.

The general model specification of the ARDL test is given by equation (4) and it includes both the short run and long run.

$$\ln TB_t = \delta_0 + \alpha_1 \ln TB_{t-1} + \alpha_2 \ln Rem_{t-1} + \alpha_3 \ln IR_{t-1} + \alpha_4 \ln GDP_{t-1} + \alpha_5 \ln FCR_{t-1} + \alpha_6 \ln ER_{t-1} + \alpha_7 \ln INT_{t-1} + \alpha_8 \ln FDI_{t-1} + \sum_{i=1}^p \gamma_1 \Delta \ln TB_{t-i} + \sum_{i=1}^{q_1} \gamma_2 \Delta \ln Rem_{t-i} + \sum_{i=1}^{q_2} \gamma_3 \Delta \ln IR_{t-i} + \sum_{i=1}^{q_4} \gamma_4 \Delta \ln GDP_{t-i} + \sum_{i=1}^{q_5} \gamma_5 \Delta \ln FCR_{t-i} + \sum_{i=1}^{q_6} \gamma_6 \Delta \ln ER_{t-i} + \sum_{i=1}^{q_7} \gamma_7 \Delta \ln INT_{t-i} + \sum_{i=1}^{q_8} \gamma_8 \Delta \ln FDI_{t-i} + \mu_t \quad (4)$$

From equation (4), the ARDL model shows that the dependent variable is a function of the lag of the dependent and independent variables in the short and long run. The model is written in the form  $ARDL(p, q_1, q_2, q_3, q_4, q_5, q_6, q_7, q_8)$  where  $p$  refer to the optimal lag order of the dependent variables and the  $q$  represent the optimal lag order for the regressor in the model,  $\delta_0$  is the constant term,  $\alpha_1, \dots, \alpha_8$  refer to the long-run parameters, the coefficient  $\gamma_1, \dots, \gamma_8$  demotes the short run parameter and  $\mu_t$  represent the error term.

### 3.3.4 Diagnostic Test

The study conducted several diagnostic tests to ensure that the results obtained are robust. The diagnostic test includes the normality test, serial correlation test, heteroscedasticity test, functional form and model stability.

Serial correlation and heteroskedasticity were conducted using Breusch-Godfrey LM test, Breusch-Pagan test respectively. In this test, the null hypothesis of no serial correlation and homoskedasticity was tested against the alternative hypothesis of serial correlation and heteroskedasticity. The null hypothesis is not rejected if the probability values are greater than 0,05 which indicates the absence of serial correlation and heteroskedasticity in the model. However, if the probability values are less than 0.05, the null hypothesis is rejected and this will indicate the presence of serial correlation and heteroskedasticity in the model. Again, normality test and functional form test which determines whether the series are normally distributed and the model is correctly specified respectively were also conducted.

In these tests the null hypothesis of normal distribution and model correctly specified was tested against the alternative hypothesis of not normally distributed and model not correctly specified. The Jarque-Bera and the Ramsey reset tests are used for these tests respectively. Again, the plots of cumulative sum and cumulative sum squares are used to determine the stability in this paper.

## 4.0 RESULTS

This section primarily presents the research results and discussion of the ARDL model. The section contains four sections; the first and second section focuses on the descriptive analysis and trend analysis respectively whereas the third and fourth section contains the ARDL estimation with the bound test (short and long-run estimates) and diagnostics test (including stability test).

### 4.1 Descriptive Statistics

The study spans between the year 2000 to 2019; which implies that data consists of 20 observation. The data was extracted from the administrative record of the Central Bank of Ghana. In Table (1.0), the result indicates that on the average Ghana Trade balance record a negative of 3.0612 which implies Ghana import exceed export over the study period. Also, on the average Ghana inflation rate, interest rate recorded as 15.724, 19.356 and 2.0971 respectively.

**Table 2.0: Descriptive statistics**

Variable	Mean	Std Dev	Min	Max
Trade Balance	-3.0612	1.9926	-6.258296	0.385406
GDP per Capita	1360.7	307.77	969.2236	1845.938
Inflation rate	15.724	8.005	7.21	40.54

## The Dynamism of Trade Balance in Ghana

Interest rate	19.356	8.0811	10.19	41.99
Exchange rate	2.0971	1.6682	0.5449192	5.788126

Source: Author's Estimation

### 4.2 Trend Analysis of Trade Balance

The study examined the trend analysis of trade balance and the pictorial view (Figure 1.0) shows that since the year 2000 till the year 2018, Ghana recorded a negative trade balance demonstrating that over these years the country import exceeds the export. However, between the year 2009 till 2016 shows the trade balance fluctuates due to the commercialization of oil inflows.

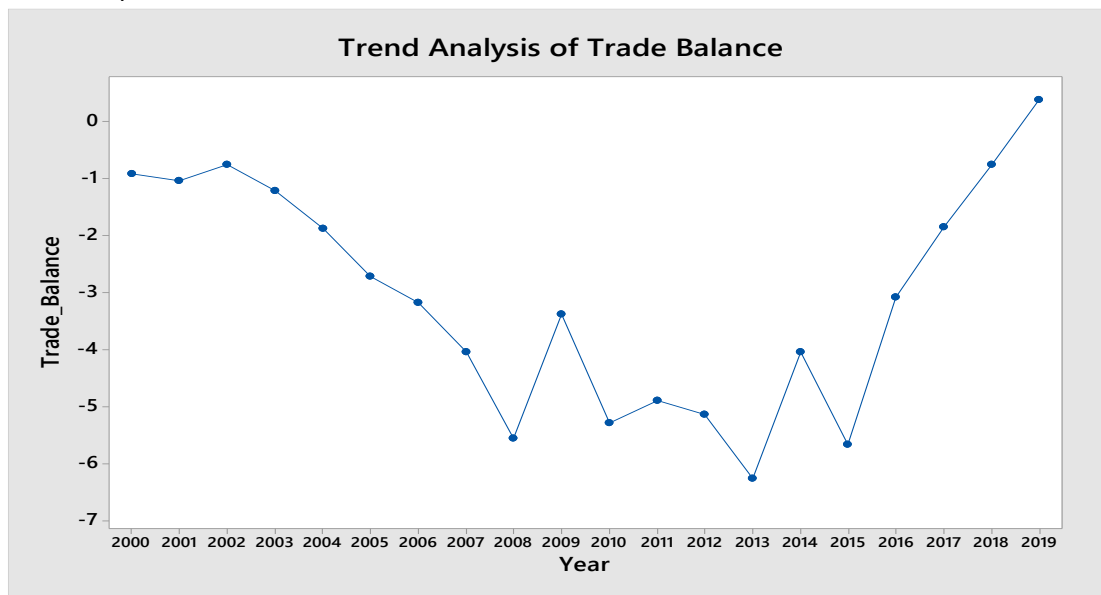
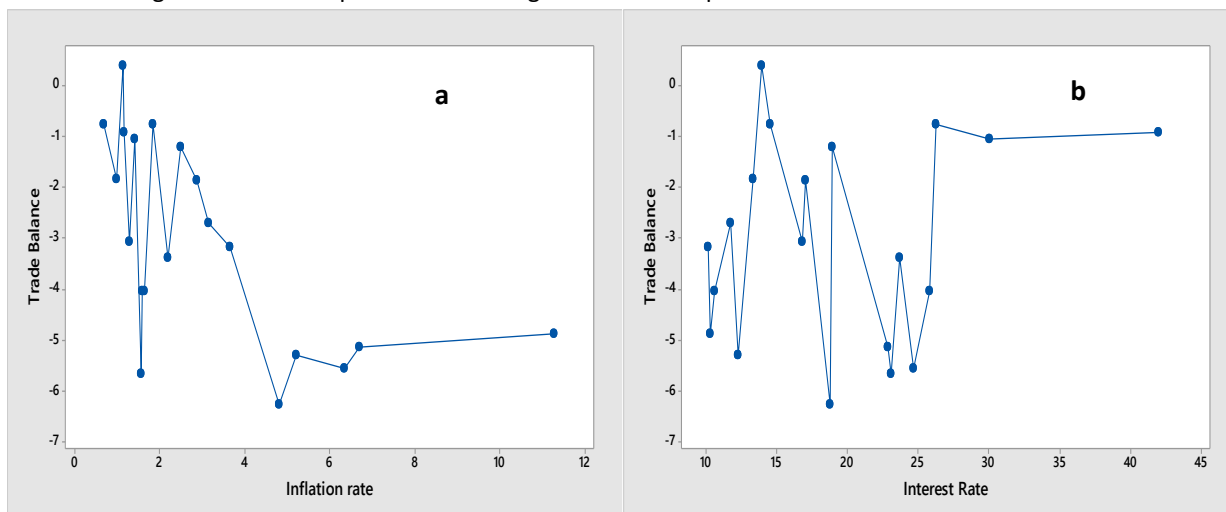


Figure 1.0: Trend analysis of Trade Balance

### 4.3 Trend Analysis Between Trade Balance and the Independent variables

Figure 2.0 displays the scatter plot between the dependent variable (Trade Balance) and the independent variables. Figure "a" represents the relationship between trade balance and inflation. It can be seen that at the initial stage, there was a decreasing relationship, then it becomes a bit stale at the end. Figure "b" shows the relationship between Trade balance and interest rate. It can be seen that the direction of the relationship fluctuates at the initial they exhibit a positive relationship then later display a negative relationship and a positive relationship at the end. Figure "c" and "d" represents the relationship between Trade balance and exchange rate and the relationship between Trade balance and GDP per capita, respectively. Similar results were found where the trend shows a negative relationship at the initial stage but becomes positive at the end.



## The Dynamism of Trade Balance in Ghana

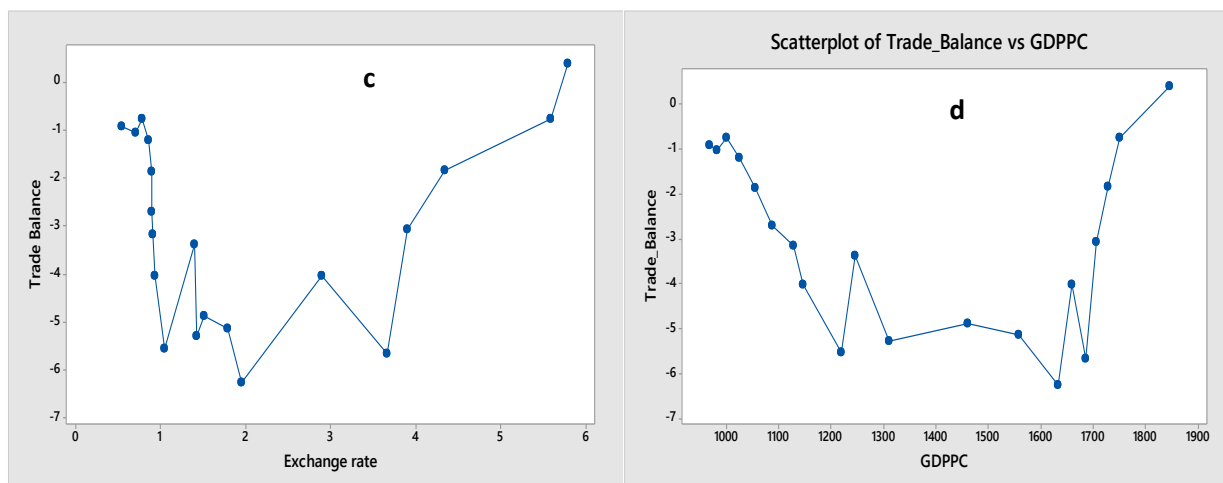


Figure 2.0: Scatter plot between Trade Balance and the Independent Variables

### 4.4 Stationary test

This study adopted the Augmented Dickey-Fuller test to test for unit root test. From Table (3.0), the study result of the unit root test at their actual level indicates that only the inflation rate was stationary for both constant and trend. This implies that the changes in inflation rate are independent of time. Subsequently, the result after second difference for constant and constant with trend revealed that all the variables were stationary for both constant and constant with the trend. Therefore, the study proceeds to conclude that the variables were integrated at order zero and one which lends support for the use of the ARDL model.

Table 3.0: ADF Unit root test

Variable	Actual		log of Second Difference	
	Constant	Constant &Trend	Constant	Constant &Trend
Trade Balance	-1.184	-0.499	-11.073**	-10.849**
GDP per Capita	0.684	-1.921	-4.884**	-4.684**
Inflation rate	-4.475**	-4.718**	-6.021**	-5.948**
Interest rate	-3.691	-3.317	-5.528**	-5.343**
Exchange rate	2.571	-0.131	-5.455**	-5.159**

Note: \*\*, and \* represent significance at 1% and 5% respectively.

Source: Author's Estimation (STATA 15)

### 4.5 ARDL Estimation with the Bound test

The study examined the ARDL estimation for the Bound test using the Pesaran, Shin and Smith (2001) criterion. The outcome revealed that we reject the null hypothesis indicating level relationships.

Table 4.0: ARDL bounds test results for cointegration relationship.

F statistics	Level of Significance	Lower bound	Upper Bound
138.137	5%	2.88	4.01

Source: Author's estimation (STATA 15 output)

Thus, since the F-statistics value (138.137) exceed the bound criteria of 4.01 at a significance level of 5 per cent indicates the presence of cointegration in the study. As a result, there exists a long-run cointegration between Trade balance, interest rate, inflation rate, GDP and exchange rate.

### 3.6 ARDL Long-Run Estimates

As indicated from the Pesaran, Shin and Smith (2001) criteria for ARDL bound test, the result for the long-run as indicated in Table (5.0).



## The Dynamism of Trade Balance in Ghana

**Table 5.0: ARDL Long-Run estimates**

Trade balance	Coefficient	Std Error	T-Stat	P-value
GDP per Capita	-16.972	8.1424	-2.08	0.105
Inflation rate	1.2076	0.5588	2.12	0.101
Interest rate	1.8157	0.7372	2.46	0.069
Exchange rate	-4.3378	1.5383	-2.86	0.048

**Source:** Author's Estimation

From Table (5.0), exchange rate has a p-value of 0.048 with a negative coefficient. This implies that the exchange rate has a negative significant effect on the trade balance in the long run at a 5 per cent significance level. Thus, a unit of increase in the exchange rate will lead to a -4.34 in the trade balance in Ghana. Therefore, we reject the null hypothesis that there is no relationship between exchange rate and trade balance.

The study result of the interest has a p-value of 0.069 and a positive coefficient. This indicates that the interest has a positive significant impact on the trade balance in Ghana in the long run at a 10 per cent significance level. Also, concerning the study result for GDP and inflation rate had an insignificant relationship with the trade balance in Ghana. Hence, the hypothesis that interest rate has no relationship with trade balance is rejected.

### 3.7 ARDL Short-Run Estimates

Table (6.0) presents the result of ARDL short-run estimates.

**Table 6.0: ARDL Short-run estimates**

Trade balance	Coefficient	Std Error	T Stat	P-value
GDP per Capita				
D1	11.644	7.8128	1.49	0.21
LD	44.73	5.8728	7.62	0.002
Inflation rate				
D1	-0.5673	0.3457	-1.64	0.176
Interest rate				
D1	-2.8986	0.617	-4.7	0.009
LD	-2.1542	0.3213	-6.71	0.003
Exchange rate				
D1	4.5645	1.1839	3.86	0.018
ecm_1				
	-1.2412	0.0702	-17.69	0.000

**Source:** Author's Estimation

From Table (6.0) revealed exchange rate, interest rate, inflation rate and the second lag of GDP per capita have significant effect on trade balance. In the case of exchange rate have a p-value of 0.018 and a positive coefficient in the short run indicating that exchange rate impact positively on the trade balance. Also, the GDP per capita has a positive significant impact on the trade balance in the short run. However, the interest rate and inflation rate had a negative significant impact on the trade balance in the short run.

The study result reported in table (5.0) showed that the error correction is negative and statistically significant at 1 per cent significance level. The result of the ECM represents an adjustment to the state of equilibrium following the shocks. The result indicates that the previous year's deviations from the long-run equilibrium effect in the short run. From the results, when there is a disequilibrium in the short run, the coefficient means that long-run equilibrium will be restored at a speed of about 124%.

### 3.8 Diagnostic Test

The diagnostic test result reported in Table (7.0) shows that all the p-values exceeds the threshold 5 per cent significance level. For Breusch-Godfrey test for serial correlation indicates we fail to reject the null hypothesis (p-value > 0.05) which implies the absence of serial correlation. Also, the white test and Breusch-Pagan test examined the constant variance; the results revealed

## The Dynamism of Trade Balance in Ghana

that we fail to reject the null hypothesis ( $p\text{-value} > 0.05$ ) referring that test conforms with constant variance (homoscedasticity). More so, the result of the Ramsey reset revealed that model is correctly specified.

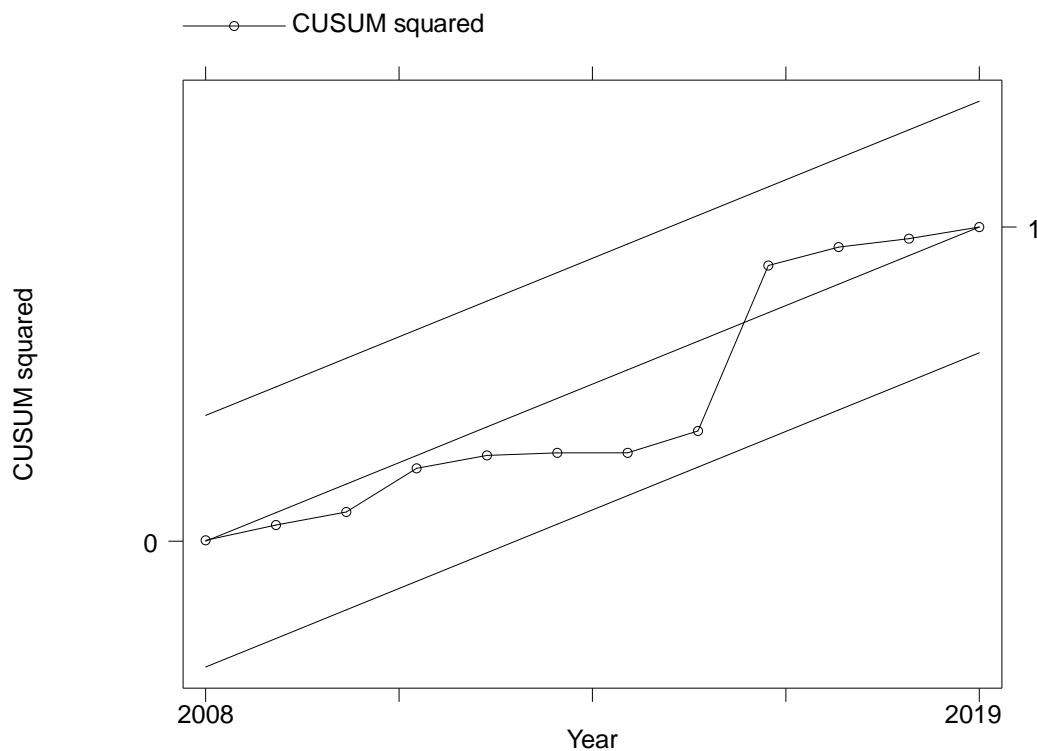
**Table 7.0: Diagnostic test**

Diagnostic Test	Chi-square	P-value
Breusch-Godfrey	7.358	0.067
White test	15.16	0.3676
Skewness	4.21	0.3785
Kurtosis	1.06	0.3031
Ramsey reset	2.45	0.1172

Source: Author's Estimation

### 4.8 Stability

The study investigates the stability model using a plot of the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) are shown in Figure 2.0. From the figure it can be seen that the trend line lying between the two boundary lines, this implies that the model is stable.



**Figure 3.0: Cumulative sum of squares**

## 5.0 DISCUSSION

Based on Figure 1.0, the study found increasing trade balance from the year 2016 till 2019 as a result of the Government policies which includes 'planting food and job and one district one factory initiative in the balance of trade trend analysis.

This study also found that the first hypothesis that there is no significant relationship between exchange rate and trade balance was rejected at 5%. It was found that there is a significant positive relationship between exchange rate and trade balance. This result is supported by those Iyke and Ho (2017) who reported of an asymmetric effect of the exchange rate on the trade balance. When the exchange rate of that country appreciates, it imports increase since the cost of its goods and service relative to other trading partners fluctuates with the changing exchanged rates. her goods and services become cheaper relative to those of her trade partners.

The second hypothesis that there is no significant relationship between inflation and trade balance was not rejected at 5%. This result confirms Mengistu and Lee (2014) that interest rates give a negative impact on the trade balance. They explained that the

## The Dynamism of Trade Balance in Ghana

high-interest rate increases the cost of capital, in turn; discourage potential entrepreneurs to export goods.

The study did not reject the third hypothesis that there is no significant relationship between GDP per capita and trade. The result is not in line with Falk, M. (2008), he found out that GDP per capita harms the trade balance in 32 industrialized and emerging economies.

The fourth hypothesis that there is no significant relationship between inflation and trade balance was not rejected. The study found out that there is no short and long run relationship between inflation and trade balance. The result contradicts Mengistu and Lee (2014) who found out that negatively affect the trade balance. This is because high inflation increases the cost of borrowing by reducing the purchasing power and as a result, increasing the cost of capital investment and trade balance.

### 6.0 POLICY IMPLICATION

At policy level, our results suggest that trade balance has been increasing positively recently, therefore the government should intensify the current policies that are increasing the volume of goods in the country. Such as establishing companies in one district one factory initiatives and planting for food and jobs. Since the exchange rate affects trade balance, measures of currency stabilisation could be adopted to improve the trade balance as a stable exchange rate would enable producers of tradable goods. Measures to reduce importations should be encouraged through import substitution policies for major import goods such as cars, petroleum products and electronic equipment can also be adopted. Also, tax exception and subsidise of inputs can be granted to local manufacture companies.

### REFERENCE

- 1) Alawin, M., & Al-Maghareez, E. (2013). Factors affecting Trade Balance, The case of Jordan. *Far East Journal of Psychology and Business*, 11(3), 33-49.
- 2) Akoto, L., & Sakyi, D. (2019). Empirical analysis of the determinants of trade balance in post-liberalization Ghana. *Foreign Trade Review*, 54(3), 177-205.
- 3) Akorli, E. (2017). *The Effects of Exchange Rates on Trade Balance in Ghana* (No. 88833). University Library of Munich, Germany.
- 4) Alemu, A. M., & Jin-sang, L. (2014). Examining the Effects of Currency Depreciation on Trade Balance in Selected Asian Economies. *International Journal of Global Business*, 7(1).
- 5) Asuming-Brempong, S. (1998). Profitability, competitiveness and welfare effects of trade liberalization on the rice sub-sector in Ghana. *Structural Adjustment and Agriculture in West Africa; Tchikala, T., Ed*, 276-298.
- 6) Bahmani-Oskooee, M., Halicioğlu, F., & Ghodsi, S. (2016, September). Asymmetric effects of exchange rate changes on British bilateral trade balances. In *Prepared for the 18th Annual Conference of ETSG, Helsinki-Finland*.
- 7) Bhattarai, K. R., & Armah, M. (2013). The effects of exchange rate on the trade balance in Ghana: Evidence from co-integration analysis. *African Journal of Business Management*, 7(14), 1126-1143.
- 8) Danquah, B. A. (2008). *The effects of exchange rate on Ghana's external trade* (Doctoral dissertation).
- 9) Erb K-H, Krausmann F, Lucht W, Haberl H. (2009). Embodied HANPP: Mapping the spatial disconnect between global biomass production and consumption. *Ecological Economics* 69: 328–334.
- 10) Fader M, Gerten D, Krause M, Lucht W, Cramer W. (2013). Spatial decoupling of agricultural production and consumption: Quantifying dependence of countries on food imports due to domestic land and water constraints. *Environmental Research Letters* 8 (art. 014046).
- 11) Falk, M. (2008). *Determinants of the trade balance in industrialized countries* (No. 013). FIW Research Reports.
- 12) Gallagher, K. P., Moreno-Brid, J. C., & Porzecanski, R. (2008). The dynamism of Mexican exports: lost in (Chinese) translation? *World development*, 36(8), 1365-1380.
- 13) Lyke, B. N., & Ho, S. Y. (2017). The real exchange rate, the Ghanaian trade balance, and the J-curve. *Journal of African Business*, 18(3), 380-392.
- 14) Lucy, A., Sunday, R. J., & Pacific, Y. K. T. (2015). Exchange rate and trade balance in Ghana-testing the validity of the Marshall Lerner condition. *International Journal of Development and Emerging Economics*, 3(2), 38-52.
- 15) Maehle, M. N. ., Teferra, M. H., & Khachatryan, M. A. (2013). Exchange rate liberalization in selected Sub-Saharan African countries successes, failures, and lessons. IMF Working Paper, Africa Department.
- 16) Narayan, P. K. (2006). Examining the relationship between trade balance and exchange rate: the case of China's trade with the USA. *Applied economics letters*, 13(8), 507-510.
- 17) Osoro, K. (2013). Kenya's foreign trade balance: An empirical investigation. *European Scientific Journal*, 9(19), 176-189.
- 18) Petrović, P., & Gligorić, M. (2010). Exchange rate and trade balance: J-curve effect. *Panoeconomicus*, 57(1), 23-41.

## The Dynamism of Trade Balance in Ghana

- 19) Porkka M, Kummu M, Siebert S, Varis O. (2013). From food insufficiency towards trade dependency: A historical analysis of global food availability. PLOS ONE 8 (art. e82714)
- 20) Sekkat, K., & Varoudakis, A. (2000). Exchange rate management and manufactured exports in Sub-Saharan Africa. *Journal of Development Economics*, 61(1), 237-253.
- 21) Shawa, M. J., & Shen, Y. (2013). Analysis of the determinants of trade balance: Case study of Tanzania. *International Journal of Business and Economics Research*, 2(6), 134-141.
- 22) Sulaiman, C., & Abdul-Rahim, A. S. (2014). J-curve effect and Thailand's trade in forest products: ARDL bounds testing. *World Applied Sciences Journal*, 29(1), 150-155.
- 23) Tuteanu, G. (2015). Measuring the Influence of the J-curve Effect on Trade in Romanian Forest Product. *Theoretical and Applied Economics*. Vol, 22, 75-84.
- 24) UNCTAD (2013) World Investment Report 2013: Global Value Chains: Investment and Trade for Development, New York: United Nations. [Crossref], [Google Scholar]



There is an Open Access article, distributed under the term of the Creative Commons Attribution – Non Commercial 4.0 International (CC BY-NC 4.0) (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits remixing, adapting and building upon the work for non-commercial use, provided the original work is properly cited.