The Effects of Exchange Rates on Trade Balance in Ghana

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October 2017

"THE EFFECTS OF EXCHANGE RATE ON TRADE BALANCE IN GHANA"

BY

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A dissertation submitted to the Department of Economics, Kwame Nkrumah University of Science and Technology in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN ECONOMICS

Faculty of Social Sciences

College of Humanities and Social Sciences

OCTOBER, 2017

DECLARATION

I hereby declare that this thesis is the result of my own original work towards the Master of Science Degree in Economics and that to the best of my knowledge, it neither contains materials published by another person nor materials which have been accepted for the award of any other degree in the university, except where due acknowledgements have been made in the text.

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ABSTRACT

This study examines the impact of exchange rates on the trade balance of Ghana. The paper uses macroeconomic indicators such as CPI and GDP in addition to Real Effective Exchange Rate to achieve the objectives of this study. Annual Time Series Data gathered from 1980 – 2016 was used in the analyses. Simple OLS regression was conducted to estimate the long run relationship of the variables on trade balance. The Johansen Cointegration Test and Error Correction Model were used to establish short run relationships. Findings from the study indicate that exchange rate has a negative impact on trade balance in the long run whiles GDP was revealed to impact negatively on the trade balance thus suggesting that an increase in the GDP leads to a deteriorating trade balance. The J-Curve phenomenon was however found to be non-existent in Ghana.

DEDICATION

This work is dedicated to my dear parents, Mr. and Mrs. Akorli, my siblings and my beloved, for their enormous financial support, encouragement, love and patience. I wouldn't have achieved this feat of academic excellence without them.

ACKNOWLEDGEMENTS

I am, first and foremost, highly grateful to the Almighty God whose divine providence has helped me overcome the challenges that came with preparing this thesis. This work wouldn't have been complete without the assistance and guidance of my very good friend, Ivy Oduro-Mensah. To you I say a big thank you. God richly reward you for the time taken off your busy schedule to assist me.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

ADF	AUGMENTED DICKEY FULLER
CPI	CONSUMER PRICE INDEX
ECM	ERROR CORRECTION MODEL
GDP	GROSS DOMESTIC PRODUCT
IMF	INTERNATIONAL MONETARY FUND
OLS	ORDINARY LEAST SQUARES
Pp.	PAGES
PP	PHILLIPS PERRON
REER	REAL EFFECTIVE EXCHANGE RATE
RGDP	REAL GROSS DOMESTIC PRODUCT
RGDP_INDIA	REAL GROSS DOMESTIC PRODUCT OF INDIA
SAP	STRUCTURAL ADJUSTMENT PROGRAM
TB	TRADE BALANCE
Vol.	VOLUME

CHAPTER ONE

INTRODUCTION

1.1 Background of the Story

The impact of exchange rates on economies worldwide can't be overemphasized. After the breakdown of the Bretton Woods system in 1973, the world's economy experienced periods of low growth, trade conflicts and exchange rate fluctuations. The periods that followed the breakdown of the Bretton Woods system were very difficult times for most developing countries with respects to their economies and international trade relationships. In order to correct these exogenous shocks and restore balance in the economies, stringent fiscal and monetary policies were required to control spending in both the public and private sectors and to prevent the emergence of untenable current account deficits and competition from foreign trade partners. With a few exceptions, developing countries generally did not follow this policy guideline and consequently worsened the negative effects of these external shocks on their economies.

Among the developing nations facing the effects of the exogenous shocks in their economies is Ghana. Since the breakdown of the Bretton Woods system, Ghana implemented reforms and policies that were aimed at correcting the exchange rates dilemma. The government with the help of the IMF structured and implemented policies that helped the country solve its exchange rates problem. Both the fixed exchange rate and the floating exchange rate regimes were implemented to solve

these issues. In the 1960's and 1970's the government of Ghana implemented the fixed exchange rate system in addition to its occasional intervention to correct unwanted economic crises. It also implemented the floating exchange rate regime in the 80's and also legalized the creation of foreign exchange bureaus to provide competition for the foreign exchange market that existed at the time (Asuming-Brempong, 1998).

An amalgamation of a climate of political instability and unrest, worsening trade balances and an enormous balance of payment deficit compelled the government of Ghana to accept the World Bank and IMFs stringent conditions that accompanied Structural Adjustment Programme (SAP) in 1973 (). Under this programme, the Cedi was devalued, trade and financial markets were liberalized and also, the government was advised to implement stringent fiscal policies. The implementation of the SAP clocked some successes namely, a reduction in the inflation figure, increase in exports and an increase in the annual GDP figure. GDP figures surged by an average of 5% per year since 1984, inflation decreased by 20%, and earnings from exports gained US$1 billion.

International trade has played a major role in the rapid development and growth of emerging economies and most developing countries such as Ghana. Among the goals of the SAP was to ensure that the economy of Ghana became one that is market oriented. This then enables the country to concentrate on trade and production in order to boost its economy. Some economists have argued that a devaluation of one's home currency can improve upon its trade balance by stimulating the patronization of

exports. Among the stabilization policies of the SAP was enabling reduction in balance of payment deficits through the devaluation of the Cedi.

Theoretically speaking, the real exchange rate is very important in economic activities for at least two reasons. First, changes in the real exchange rate (real appreciation and depreciation) have a strong influence on the direction of trade. If a country's real exchange rate experiences depreciation, other factors held constant, her goods and services become cheaper relative to those of her trade partners. Therefore, the country should experience a surge in its exports (Sekkat and Varoudakis, 2000). In contrast, if the real exchange rate appreciates, then the country's goods and services become expensive, leading to a surge in her imports (Salehi-Isfahani, 1989). Second, an unstable real exchange rate creates uncertainty, which may produce undesirable consequences.

The clear importance of the real exchange rate in economic activities has led to discussions regarding what form of exchange rate management is optimal for achieving and maintaining long-term growth. To this end, most economies have practised the various forms of exchange rate arrangements: fixed, managed-float, and flexible regimes. In recent times, most countries have adopted the managed-float regime, which permits their policymakers to intervene in the foreign exchange markets during periods of exchange rate uncertainty and trade imbalances. One such policy intervention for countries experiencing trade imbalances (in this case, deterioration in the trade balance) entails devaluing or depreciating the real exchange rate. However, will such a policy reverse the trade imbalances? Theoretically speaking, real devaluation or depreciation can overturn a deteriorating trade balance,

but this will not occur immediately due to the adjustment lags in the underlying mechanism. Magee (1973) argues that due to production and delivery delays and recognition lags, among other factors, a devaluation or depreciation will not reverse a deteriorating trade balance in the short run. The trade balance will continue to deteriorate before improving in the long run. This behavior of the trade balance in response to real depreciation or devaluation is known in the international finance literature as the J-curve (see Magee, 1973; Bahmani-Oskooee, 1985).

Some verifications of the J-curve are those presented by Bahmani-Oskooee (1985) and Rose and Yellen (1989). Bahmani-Oskooee (1985) found that the coefficients of the initial lags of the real exchange rate are negative, while the subsequent ones are positive, thus supporting the J-curve. Rose and Yellen (1989) argue that since the trade balance may only respond to real exchange rate changes in the future, a suitable approach for verifying the J-curve is cointegration testing and error correction modelling. This allows the short-run adjustment process of the trade balance to be captured. Using the US trade balance model with six of her trade partners and the error correction mechanism, Rose and Yellen (1989) found no support for the J-curve, suggesting that the trade balance does not respond to real depreciation of the US dollar.

An understanding of the correlation between exchange rates and trade balance is needed to implement trade and exchange rate policies. Conventional economic reasoning suggests a devaluation of currency leads to favorable trade balance. However, the MLC asserts that a devaluation of currency can remedy a current

account deficit if only the sum of the export and import demand elasticities is greater than unity (1) or the coefficient of the real exchange rate is one (1)

1.2 Statement of Problem

Policies implemented to manage exchange rates are very crucial and important in achieving and sustaining long-term economic growth within economies. This had led to a lot of discussions about what optimal exchange rate policy is best to enable and sustain long-term economic growth. Although Ghana implemented the SAP and a lot of economic reforms and also adopted several exchange rate policies, it still continues to experience high trade deficits and balance of payment deficits. The success of growth in some economies in Southeastern Asia is attributed to implementing correct exchange rate policies and the volatility of exchange rates has been a major defining obstacle to economic growth in most Latin American and African economies (Krugman, 1979).

Balance payment deficits have become serious issues for governments in recent times. Ghana is not an exception because the country has been recording deficits over the years and this has greatly impacted the growth and development of the country adversely. It is highly possible that exchange rate is very crucial in determining the Ghanaian trade balance; a component of the balance of payment account. Hence, it is very prudent to investigate the impact of exchange rates on trade balance in Ghana, so as to identify appropriate policies that could improve upon the trade balance in the economy.

1.3 Objectives

The main objective of the study is to determine the effect of exchange rate on the Ghanaian trade balance. This study will also investigate whether a devaluation of the Ghana Cedi will lead to favorable trade balances and a correction of its trade deficit. The specific objectives of the study are to:

1. Assess the impact of exchange rate on trade balance.
2. Test the validity of the Marshall Lerner's Condition.
3. Determine the existence of a J-Curve effect.

1.4 Research Hypothesis

The hypotheses to be tested in this study include;

1. H_0 : Exchange rate has no significant effect on trade balance in Ghana.

H_1 : Exchange rate has significant effect on trade balance in Ghana.

2. H_0 : The Marshall Lerner Condition does not apply when the Ghana Cedi is devalued.

   H_1 : The Marshall Lerner Condition applies when the Ghana Cedi is devalued.

3. H_0 : The J-Curve phenomenon does not exist after a devaluation of the Ghana Cedi.

   H_1 : The J-Curve phenomenon exists after a devaluation of the Ghana Cedi.

1.5 Justification of the Study

Exchange rates management has been crucial to the growth of many economies. The best choice thereof, leads to favorable economic repercussions. This piece of study seeks to contribute to the knowledge gap where empirical study on the effects of exchange rate on the Ghanaian trade balance does not include the validity of a Marshall-Lerner condition and the existence of a J-Curve phenomenon. This study will inform policy makers in Ghana as to which exchange rate regimes to adopt in order to ensure optimal economic growth. Also, it will inform them on whether a devaluation of the Ghanaian Cedi will help Ghana's trade position or not.

1.6 Scope and limitations of the study

This study employs secondary data for its analysis. The study will be limited to the impact of exchange rate fluctuations on Ghana's trade balance from 1980 – 2016; thus 36 observations. The variables for this study are the Gross Domestic Product (GDP) of Ghana, the GDP of a major trading partner (India), the Real Effective Exchange Rate and inflation that is measured as the Consumer Price Index. All data would be gathered from the World Bank's World Development Indicators. The main limitation of the study was choosing the optimal measurement for the trade balance.

1.7 Organization of the Study

The study is structured into five chapters. Chapter one takes a look at the introduction of the topic, which takes into account the background of the study, the problem statement of the research work, the objectives of the study, the justification behind

conducting this study among others. Chapter two reviews relevant empirical and theoretical literature. Chapter three focuses on the research methodology that is used in analyzing the various data collected. Chapter four analyzes the results of the relevant econometric models used in the study. Chapter is devoted to summarizing the results of the study, recommendations for policy adaption and conclusions drawn from the study.

1.8 Background Summary

Ghana has been experiencing balance of payment deficits over the past years and this has impacted on the growth and development of the economy adversely. Past studies have shown that a real devaluation or depreciation of a country's currency leads to improvement in its trade balance, which ultimately improves the balance of payment account since trade balance is a component of balance of payment. This study seeks to determine the effects of exchange rates on trade balance in the Ghanaian economy.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter introduces review of relevant literature of the study. The chapter will explore previous studies on the effects of exchange rate on trade balance in both domestic and international scenarios. The chapter is structured in two parts. The first part focuses on the theoretical review of variables that influence trade balance thus exchange rate. A review of the Marshall Lerner Condition and the J-Curve phenomenon will be conducted. The other part focuses on the empirical authentication of the relationship between exchange rate and trade balance.

2.2.1 Mercantilism

The mercantilism is a also known as the William Petty, Thomas Mun and Antoine de Montchrétien model is an international trade theory that has been around for the past 300 years. This theory was based on the commercial revolution as economies make transition from feudalism to capitalism and from domestic trade to international trade. This was the economic system prevent in the 16^{th} century to the 18^{th} century. It was best defined as increasing the wealth and power of nations through the exchange of exports of goods and services for precious metals like gold and silver. This method of trade was prevalent in Western European countries like the United Kingdom, France, Spain, Netherlands, Belgium and Portugal. Exporting to countries that they control and restricting imports through tariffs and quotas, thus creating a positive trade

balance enhanced the wealth of these nations. The efforts of exploration and colonizing other nations furthered this agenda. These efforts stimulated international trade and also produced affluence in silver, gold and other precious metals. This theory holds that the wealth of the world is fixed and in order to enhance a country's wealth, a nation must take the wealth of another nation.

International trade at the time was conducted through corporations and trading companies who determine and control economic life in these nations. The medium of payment in exchange for goods and services at that time was in gold. This form of trade however led to the amassing wealth at the expense of human development and bettering the lives of citizens within these economies.

2.2.2 Hecksher-Ohlin Model

Eli Hecksher and Bertil Ohlin propounded the Hecksher-Ohlin Model of international trade based on the foundations of the Comparative Advantage Theory. Another name for this theory is the Factor Proportions Theory. While the Comparative Advantage Theory was unable to solve the questions of which types of investment in products will give a comparative advantage or what products give comparative advantage, this model answers such questions.

This theory is based on some underlying assumptions. They are as follows;

- Technological differences. The technology the producing two separate commodities are not the same.
- There exist constant returns to scale.
- Factor mobility.
- Perfect competition
- Prices of goods and services are the same everywhere.

The model takes into account factors of production like capital, land and labor. It states that an excess supply of factors of production to existing demand will make them cheaper and cost effective. Whiles factors of production that have excess demand to existing supply are expensive. Thus the theory suggests that countries should import goods and services that are scarce and export goods and services that are in abundant supply. Cost effectiveness and the viability of goods and services that should be exported are determined by their input costs. Goods and services that have cheaper to produce are more viable and cost effective than good and services that are scarce.

2.2.3 Purchasing Power Parity

The Purchasing Power Parity Theory of determining exchange rates states that the exchange rates of two (2) countries are in equilibrium when the purchasing powers of the two currencies are equal. This simply means that the ratio of the price levels of a given (fixed) basket of goods and services are equal. When a country experiences inflation, its exchange rate must be reduced in order for it to retain purchasing power parity. Gustav Cassel (1916) developed the theory of purchasing power parity was and it has become the basis for the analyzing exchange rates.

The PPP is identical to the Law of One Price, which holds for individual commodities. It states that goods that are identical and are sold in different countries should be sold for the same price when the prices are stated in the terms of the same currency. This law is applicable in competitive markets where there are no trade barriers and transport costs. The PPP is applicable to the general price level while the Law of One Price is applicable to individual commodities. In order for PPP to be

maintained for same baskets of goods and services across different countries, the Law of One Price must hold for every commodity.

There are two types of Purchasing Power Parity and there are, Absolute Purchasing Power Parity and Relative Purchasing Power Parity.

Absolute Purchasing Power Parity can be simply defined as two countries having the price levels. It assumes parity in the purchasing power of the two countries. When the price levels in one country is multiplied by the exchange rate, it should give you the price levels in the other country. This is due to the existence of arbitrage opportunities. This phenomenon occurs when goods can be bought at cheaper prices in one country and be sold at expensive prices in another country. All this is possible when there is no barrier to trade and transport cost. This can be denoted as

$$e = \frac{P_d}{P_f} \quad or\ P_d = P_f * e \ldots\ldots\ldots\ldots\ldots\ldots (2.1)$$

where e denotes the exchange rate (spot rate)

P_d denotes price levels in the domestic country

P_f denotes price levels in the foreign country

Relative Purchasing Power Parity is explained in the terms of inflation. It states that exchange rate is determined by the rate at which price levels of commodities in one country change relative to the price levels in another country. It holds that the purchasing power of the currency of two countries will differ by the same proportion. It can be denoted as:

$$e = P_d - P_f \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.2)$$

Where e denotes the exchange rate (spot rate)

P_d denotes price levels in the domestic country

P_f denotes price levels in the foreign country

2.2.4 Monetary Approach

The monetary approach was initially used as a measure towards the balance of payment in the 1950s before it was refocused on determining exchange rates. Palok (1957 Hahn (1959) Pearce (1961), Prais (1961), Mundell (1968, 1971) and Johnson (1972, 1976a) were the champions of this approach. They suggested balance of payment to be a monetary phenomenon. They argued that since exchange rate is a currency expressed in the terms of another, balance of payment can also be expressed from the view of demand and supply of money.

The monetary approach states that as exchange rate can be defined as the relative price of domestic currency to foreign currency, it should be determined by the relative supply and demand of money (Frankel and Rose, 1994). It suggests that when the demand for money exceeds the supply of money by the monetary authority, the excess demand is remedied by inflow from abroad thus improving trade balance. The opposite is true and trade balance is worsened when there is an oversupply of money and this excess flows out to other countries. Balance of payment thus reflects the disequilibrium in the money market. It is therefore prudent not to ignore the role of supply and demand of money in determining exchange rates.

2.2.5 Marshall-Lerner Condition

The Marshall-Lerner Condition (MLC), which results in a J-Curve phenomenon, is considered when talking about the effects of exchange rates on trade balance. This is

also known as the elasticity approach of devaluation on trade balance. The elasticity approach implicitly ignores unidirectional transfers of capital inflow as an element of current account. This results in the nation's current account been determined by the movements of the nation's real income and real exchange rate. According to the MLC, "ceteris paribus, a devaluation of currency improves the current account if the volumes of exports and import are adequately elastic with respect to the real exchange rate" (Krugman, P., 2006). This suggests that, devaluation will lead to an improvement in the current account given that the sum of the elasticities of demand for import and export surpasses unity (1) (Krugman, 2006).

The Marshall Lerner Condition evaluation is a partial equilibrium evaluation that examines the response of tradables to changes in prices. Some adjusted versions of the MLC incorporate elasticity of tradables and conjecture that exports and imports face constant costs (Albert Hirschman, 1949).

In order to increase foreign exchange earnings through the devaluation of a country's currency, we quantity resultant effects of rising exports and falling imports, which must be greater than the estimation effect of a rise in trade surplus. The MLC is representation of this precondition: at a trade balance position, a devaluation of a country's currency will improve the trade balance if the export and import elasticities of demand adds up to more than unity (1).

$$\epsilon_x + \epsilon_m > 1 \text{……..(2.2)}$$

In the equation above, ϵ_x denotes the real exchange rate elasticity of demand for exports while ϵ_m denotes the real exchange rate elasticity of demand for imports.

The reasoning behind the MLC is easy. Assuming imports and exports are entirely not responsive to changes in relative prices, a one percent (1%) increase in exchange rates will lead to a commensurate one percent (1%) decrease in the exports value. This leads to a weakening trade balance. The decrease in the exports values can be counterbalanced by a 1% increase in exports. At a trade balance position, a price effect can be counterbalanced by a 1% reduction in the value of imports, this can be attained by a 1% reduction in imports quantities. (Alan Isaac, 2005).

Devaluation is considered when the trade balance is in deficit. Although a 1% rise in exchange rates may still be counterbalanced by a 1% rise in the quantity of exports, this can also be done by decreasing imports values by less than 1%. A 1% decrease in the volume of imports, which eventually reduces import values by 1%, has a greater effect on the trade balance than a 1% increase in exports, which reduces the export values by 1%.

To represent this algebraically, trade balance is measured in terms of the locally produced goods:

$$TB = X - QM$$

$$TB(Q, Y, Y^*) = X(Q, Y^*) - QM(Q, Y)$$

We differentiate with respect to the real exchange rate Q, to arrive at

$$\frac{\delta \mathrm{TB}}{\delta \mathrm{Q}} = X_Q - QM_Q - M$$

$$= M\left(X_Q \frac{X}{QM}\frac{Q}{X} - M_Q \frac{Q}{M} - 1\right)$$

$$= M\left(\epsilon_x \frac{X}{QM} + \epsilon_m - 1\right)$$

$$= M\left(\epsilon_x \frac{TB}{QM} + \epsilon_x + \epsilon_m - 1\right) \ldots\ldots\ldots\ldots\ldots (2.3)$$

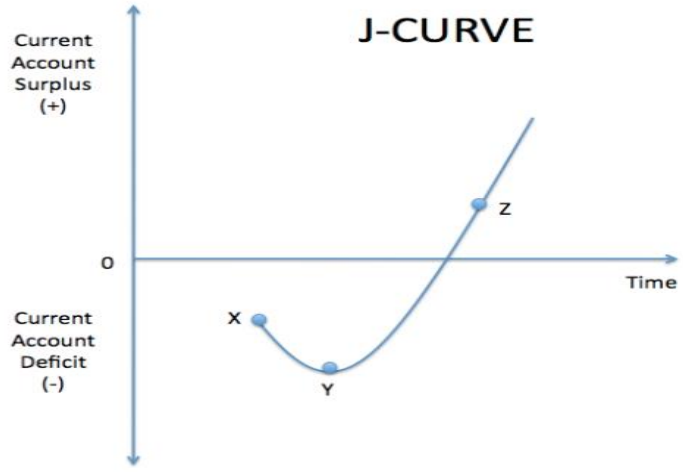
Where ϵ_x denotes real exchange rate elasticity of exports and ϵ_m denotes the real exchange rate elasticity of imports. At a trade balance position where X = QM, we have

$$\frac{\delta TB}{\delta Q} = M(\epsilon_x + \epsilon_m - 1) \ldots\ldots\ldots\ldots\ldots\ldots (2.4)$$

When the value of this equation is positive, then we can say that the MLC is fulfilled. (Alan G. Isaac, 2005)

2.2.6 J-Curve Effect

The J-curve phenomenon is a description given to the J-like time related pattern of change in the trade balance of a country, in reaction to an instantaneous or significant devaluation of its currency. The J-curve proposes that after a devaluation of a currency, a country's current account balance falls initially for a period of time before it begins to rise in subsequent periods. At a position of balanced trade, trade balances will initially fall into deficit before rising subsequently in reaction to a devaluation of currency.



Source: elitewm.com/japans-j-curve

Figure 2.2.1 Graphical Representation of the J-Curve

In the nutshell, J-Curve represents a short-run decline and a long run recovery in trade balance.

2.3 Empirical Review

This section uses empirical evidence from the research works, experiences and observations of researchers that have researched on the topic of the impact of exchange rate fluctuations on trade balance.

Anning et al (2015) in their study, "Exchange Rate and Trade Balance in Ghana-Testing the Validity of the Marshall Lerner Condition" used co-integration analysis and VECM to analyze effects of exchange rate on the Ghanaian trade balance. They used annual data from 1980 – 2013 on macroeconomic determinants like exchange rate and GDP to explain the correlation between trade balance and exchange rates. They discovered that trade balance declines in the short run after a currency devaluation. This was due to terms of trade agreements that the country had with most of their trading partners. The Marshall-Lerner condition was not met even though a devaluation of the currency could improve the trade balance. They recommended that Ghana should devalue their currency in order to experience favorable trade balances since currency devaluation can lead to favorable trade balances in the long run. Also, Ghanaians should switch from importing goods for consumption and rather focus on consuming domestic goods.

Mduduzi Biyase (2014) in his work "An export-led growth (ELG) paradigm on Africa: A Panel Data Approach", he investigated linkages between exports and economic growth in African economies. Panel data on 30 African countries from 1990 – 2005 was used to achieve this objective. He used variables like export, labor force, inflation, government expenditure and gross domestic investment in his regression and modeling. In the study, he observed that a 1% increase in exports brings about a resulting 0.056% in economic growth. He noted that this finding has been congruent with studies conducted by Krueger (1978), Tyler (1981) and Chenery (1979). He recommended that since export-led trades bring about economic growth, policy-makers must implement policies that will promote the expansion of exports.

Maehle et al (2013), in their work "Exchange Rate Liberalization in Selected Sub-Saharan African Countries. Successes, Failures, and Lessons" researched on economic reforms policies that were implemented by Sub-Saharan Africa economies. They discovered that economic reforms implemented by countries in the region were successful. The periods during which these reforms were implemented marked the end of decades of economic crises and decline. When these reforms were sustained, the countries started experiencing strong and sustained economic expansions.

A fundamental element to the success of the reform effort by these nations was exchange rate liberation. Reduced fiscal deficits, monetary expansions, external assistance and structural reforms were also important in achieving the economic expansion. They noted however that fixing the exchange rates in the face of exogenous shocks without supporting it with prudent monetary and fiscal policies resulted in severe pressure on the balance of payment and an overvaluation of the exchange rates. Also, attempts by government and monetary policy authorities to

implement price controls and import licenses, reduced revenue, depressed the economy and also shifted the external trade to the informal sector.

Colton Christensen (2011) assessed the impact of the Dollar/Peso exchange rates and the GDPs of US and Mexico on trade balance between US and Mexico. He used quarterly data from 1994 – 2010. The independent variables in the regression were domestic GDP, foreign GDP and real exchange rates. He discovered that a rise in the GDP of Mexico causes a trade surplus with a smaller impact than the GDP of USA. The US Dollar has a positive effect on its trade balance in the period in which it depreciates. This phenomenon is likely to reduce the US trade deficit with Mexico.

Thorbecke, (2011) in his work "The Effect of Exchange Rate Changes on Trade in East Asia", noticed that changes in bilateral exchange rate bring about a decline in exports of capital and intermediate goods from developed countries in Asia to developing countries in the same region. He employed panel data on 30 countries from 1982 – 2003, thus 21 observations. He examined that there is a substantial decline in the exports of finished products from developing economies in Asia to the world. Appreciations in the economies of Thailand, Malaysia and Indonesia relative to economies in the region would also cause a significant decline in exports. He concluded that the current exchange rate regimes would interfere with the relationship that exists between developing and developed economies in Asia, if the market forces exert pressure on currencies in that region to appreciate.

In their research work "Exchange Rate and Trade Balance: J-Curve Effect" (2010), Petrović and Gligorić explored the correlation between trade balance and currency depreciation in Serbia. The objective of the study was to find whether currency

depreciation improves on the trade balance or an appreciation of it will worsen it. They employed both the Johansen's co-integration analysis and the Auto Distributive Regression Line (ADRL) lag approach in approximating the long run effects of currency depreciation on trade balance. A time series data at a monthly frequency on macroeconomic variables like GDP from 2002 - 2007 were used in estimating this relationship. They discovered a positive effect of currency depreciation on Serbia trade balance in the long-run. Although in the short run trade balance declines initially, it improves later in the long run. Estimates from the error correction model used showed short run movement of the trade balance thus proving the J-Curve effect.

Armah & Bhattarai, (2005) in their work "The effects of exchange rate on the trade balance in Ghana: Evidence from co-integration analysis" noticed that Ghana's trade balance will not be favorable in the short run except if it implements policies in the currency market. The adoption of policy rules however may have negative consequences if such policy adjustments are done without proper care and supervision in the long run. The econometric models they used show that the Marshall-Lerner-Robinson condition necessary for a devaluation would not be enough to neutralize the trade deficit in the short run. A devaluation of the Cedi may increase exports and reduces imports but this policy may have a negative consequence on the welfare of Ghanaians by increasing the cost of living due to the reduction of the Cedi in the international market.

Hsing (2005) found that Japan's aggregate trade provided evidence of the J-Curve phenomenon while Korea and Taiwan did not show any presence of the phenomenon. He argues that this may be attributed to a small open economy effect. In small open

economies like Korea and Taiwan, both imports and exports are invoiced in foreign currency and as a result, the short run effect of real devaluation is hedged and the trade balance remains unaffected.

Tihimor Stucka (2004) found evidence of the J-Curve effect on trade balance in Croatia. His study employed a reduced form model to estimate the impact of a permanent shock on the merchandise trade balance. It was found that 1 percent depreciation in the exchange rate improves the equilibrium trade balance by the range of 0.94 to 1.3 percent and it took 2.5 years for equilibrium to be established

In their research work "Exchange Rate Policy and Macroeconomic Performance in Ghana", Jebuni et al. (1994), investigated the relationship between exchange rates policies and macroeconomic aggregates in Ghana. They estimated the link between the GDP and exchange rate. They discovered that real devaluation had an expansionary effect on GDP. Real devaluation had a positive effect on both imports and exports. Ghana being an import-dependent economy, the inflow of external resources will be expected to have a positive relationship between imports and devaluation. Accompanying capital inflow led to the growth in imports and the growth of GDP was positively influenced by the imports. They however, opined that depending on the level of increase, the trade balance could worsen.

Kocy and Rosenweig (1990) studied the dynamics between the dollar and components of the U.S. trade. They employed time series specification tests and Granger tests of casual priority to identify the J-Curve phenomenon. Two of the four components

portrayed dynamic relationships that are weaker and more delayed than the standard J-Curve.

Orden, (1986) in his research "Exchange Rate effects on Agricultural Trade" observed impact of exchange rate on agricultural trade. He realized exchange rate movements determine the gap between prices of traded goods in the domestic and foreign markets. He noted it performs an equilibrating role when there is the need for a methodical movement in the relative prices of tradables and non tradables. Movements in exchange rate, he maintained, depends on inflow of capital and that factors that determine the capital inflows include monetary policy. He asserted that monetary policies have biased effects, which justifies the lack of consistency in prices of agricultural products. Macroeconomic conditions are key in determining domestic policies implemented on agriculture hence they is competition in the world market and tension in trade relations among trading partners.

Moshen Bahmani-Oskooee (1985) was a pioneer in introducing a method that tested the J-Curve. In his research paper "Devaluation and the J-Curve: Some Evidence from LDCs" he tested for the J-Curve by directly linking the trade balance to exchange rate and other variables of four developing countries (Greece, Korea, Thailand and India), using quarterly data on these relevant variables from 1973 – 1980. He noticed that there was a J-Curve phenomenon with all the countries he selected except Thailand. Also, he discovered that the effect of devaluation in the long run is the same as its short-run effects. Trade balance in the short run and the long run after a devaluation declines.

Stephen Magee (1973) was among the first people to observe and study the J-Curve phenomenon. In his research work "Currency Contracts, Pass-Through, and Devaluation", observed that although the US Dollar was devalued in 1971, its trade balance still deteriorated in 1972. He postulated that trade balance deteriorates initially due to some adjustment lags but after some time, it begins to improve. He characterized this phenomenon with the fact that a quick increase in domestic activity (measured by real income) relative to activity abroad may overwhelm any positive effects the devaluation might have generated. This has caused researchers to pose a question as to how long it will take trade balance to experience an improvement after devaluation.

Bahmani-Oskooee M. and Ratha A. in their work "The Bilateral J-Curve: Sweden versus her 17 Major Trading Partners", assessed the effect of real depreciation on the Swedish Krona on their bilateral trade balances. The VAR estimation technique was employed in this study. Data was gathered quarterly from 1980 – 2005. They discovered that there was an existence of the J-Curve phenomenon after devaluation for some trading partners (United Kingdom, Netherlands, Italy, Austria and Denmark).

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter focuses on the econometric tools and techniques used in the study. This chapter is categorized into three different segments. The first segment talks about the model specification, the second segment focuses on the empirical strategy and the third segment captures the type of data and data sources.

3.2 Research Design

The study is a quantitative study that investigates the effect of exchange rates on the Ghanaian trade balance from 1983 to 2016. The unit of analysis in this study is the trade balance, real effective exchange rate, GDP and the consumer price index. Secondary data is used in this study and is sourced from the World Bank's World Development Indicator. The model specified in the study is

$$TB_t = \beta_0 + \beta_1 YD_t + \beta_2 YF_t + \beta_3 REER_t + \beta_4 CPI_t + U_i \ldots\ldots\ldots (3.1)$$

The OLS regression will be used to establish the long run relationship between the dependent variable and the independent variables. The Johansen Co-integration Test and the Error Correction models will be used in determining the short run relationships.

3.3 Model Specification

To access the effect of exchange rates of trade balance in Ghana, the study uses models that specify the trade balance approach to exchange rate and income modeling with a little bit of adjustment, using other macroeconomic variables that have an impact trade balance.

Variable	Description
Trade Balance (TB)	the difference between exports and imports of the country
Real GDP of Ghana (YD)	Real GDP based on constant LCU
Real GDP of India (YF)	Real GDP based on constant LCU
Real Effective Exchange Rate (RER)	Nominal Effective Exchange Rate divided by price deflator
Consumer Price Index (CPI)	Changes in cost to the average consumer of acquiring a basket of goods and services

The specified model is used to estimate the impact of exchange rate, GDP, REER and CPI on the trade balance in Ghana.

The functional form of the model specified is as follows:

$TB_t = f(YD_t, YF_t, REER_t, CPI_t)U_i$.....(3.2)

Equation (1) above is specified in functional form where,

TB_t = Trade Balance of Ghana

YD_t = GDP of Ghana

YF_t = GDP of India to proxy foreign income

$REER_t$ = Ghana's Real Effective Exchange Rate

CPI_t = Ghana's Consumer Price Index

U_t = Error term

Expressing equation (1) in a more explicit form, we derive

$TB_t = \beta_0 + \beta_1 YD_t + \beta_2 YF_t + \beta_3 REER_t + \beta_4 CPI_t + U_i$……(3.3)

We perform a logarithmic transformation to derive on 3.2 above to derive,

$InTB_t = \beta_0 + \beta_1 InYD_t + \beta_2 InYF_t + \beta_3 InREER_t + \beta_4 InCPI_t +$

$\mathcal{E}_t$……..(3.4)

This is done in other to account for the non-linearity in the variables that were selected. All the variables are measured in millions of dollars with the exception of Real Effective Interest Rate, which is measured in percentage. Also, the log-log model also known as the log-liner model has an interpretation as elasticities unlike the linear model that has an interpretation as marginal effects. The log-linear model assumes a constant elasticity over all values of the data set. The log-linear model decreases the magnitude of the variables. This reduces the possibility of heteroscedasticity in the model (Gujarati and Sangeetha, 2007).

Due to the objectives behind this research work, we further transform this equation to show changes in trade balance (dependent variable) caused by changes in the stated independent variables.

$In \Delta TB_t = \beta_0 + \beta_1 \Delta InYD_t + \beta_2 \Delta InYF_t + \beta_3 \Delta InREER_t + \beta_4 \Delta InCPI_t + \mathcal{E}_t$

…… ……(3.5)

3.3.1 Justification of selected independent variables

A country's GDP is a macroeconomic variable that is essential in determining a country's trade direction. If domestic consumers spend more on foreign products than

domestic producers sell to foreign consumers, there exists a trade deficit. The GDP of India was selected for this study because India is one of Ghana's major trading partners. Exports to India constitute about 5.49% of total imports, making it the 3rd leading country to which Ghana exports to. Imports to India make up about 4.35% of total imports, making it the 6th leading economy we import from. This fact makes it essential for the GDP of India to be included in the study. Moreover, previous studies conducted used the GDP of U.S.A as the proxy for the GDP of the foreign country so selecting the GDP of another major trading partner will provide a new perspective for this research.

CPI is also an essential macroeconomic variable in this study. The rate of inflation in a country can have a major impact on the value of the country's currency and the rates of foreign exchange it has with the currency of other nations. Also, the exchange rate of a country determines the direction of its trade. When its currency is devalued or depreciates, it makes its exports cheaper and imports expensive. Thus improving upon its trade balance.

3.4 Empirical Strategy

This section presents empirical strategy used in deriving the preliminary tests carried out on the stated variables in order to ensure that the estimated parameters from the models specified are consistent with the data set selected. Unit roots in the series are examined using the Augmented Dickey-Fuller (ADF) Test to ensure that results generated are not spurious and then the Phillip-Perron (PP) Test is used to check for robustness of the results derived from the ADF test. The study employs Johansen

Cointegration test in order to check for long run equilibrium in the variables. ECM is also used to provide an approximation of short run parameters and the OLS regression is used to approximate the long run parameters of the model.

3.4.1 Augmented Dickey-Fuller (ADF) Test

Stationarity tests are administered to estimate whether the variables employed in the model have unit roots. To avoid spurious regression results, the unit root tests are applied to assess the time series attributes of the selected variables.

When conducting the Dickey-Fuller test, the error term ε_t is assumed to be uncorrelated. In cases where the error term is correlated, we apply the ADF test. We conduct this test by enlarging the equation by adding the lagged value of the dependent variable to the equation.

In the equation below, $\Delta\, TB_t$ is the dependent variable. In conducting the ADF test we use:

$$\Delta\, TB_t = \beta_0 + \beta_1 + \partial\, \Delta\, TB_{t-1} + \sum_{i=1}^{m} \gamma_i\, \Delta\, TB_{t-1} + \varepsilon_t \dots\dots\dots\dots\dots (3.6)$$

Where $\Delta\, TB_{t-1}$ is the dependent variable, β_i are the estimated parameters, γ_i the estimated parameters of the differenced values of the lagged variables. The study tests the null hypothesis of the existence of a unit root $(H_0: \beta = 0)$ against null hypothesis of non-existence of a unit root. If we fail to reject the null hypothesis, then the variable is non-stationary. If we reject the hypothesis then the variable is stationary at levels [I(0)].

3.4.2 Phillip-Perron (PP) Test

In conducting the PP test to check for stationarity in the variables, we are expected to fit this regression model:

$\Delta\, TB_{t-1} = \beta_0 + \beta_1 TB_{t-1} + \varepsilon_t$…….....(3.7)

Where we may exclude the constant or include a trend term. There are two statistics, $Z_\rho \; and \; Z_\tau$, calculated as

$$Z_\rho = n(\hat{\rho}_n - 1) - \frac{1}{2}\frac{n^2\hat{\sigma}^2}{s_n^2}\left(\hat{\lambda}_n^2 - \hat{\gamma}_{0,n}\right) \text{…….(3.8)}$$

$$Z_\tau = \sqrt{\frac{\hat{\gamma}_{0,n}}{\hat{\lambda}_n^2}}\frac{\hat{\rho}_n - 1}{\hat{\sigma}} - \frac{1}{2}\left(\hat{\lambda}_n^2 - \hat{\gamma}_{0,n}\right)\frac{1}{\hat{\lambda}_n}\frac{n\hat{\sigma}}{s_n} \text{…….(3.9)}$$

$$\hat{\gamma}_{j,n} = \frac{1}{n}\sum_{i=j+1}^{n} \hat{u}_i \hat{u}_{i-j} \text{……..(3.10)}$$

$$\hat{\lambda}_n^2 = \hat{\gamma}_{0,n} + 2\sum_{j=1}^{q}\left(1 - \frac{j}{q+1}\right)\hat{\gamma}_{j,n} \text{……..(3.11)}$$

$$s_n^2 = \frac{1}{n-k}\sum_{i=1}^{n} \hat{u}_i^2 \text{……..(3.12)}$$

where u_i is the OLS residual, k is is the number of covariates in the regression, q is the number of Newey-West lags to use in calculating $\hat{\lambda}_n^2$ and $\hat{\sigma}$ is the standard error of $\hat{\rho}$.

$\frac{\hat{\rho}_n - 1}{\hat{\sigma}}$ represents the equivalent in the t stat in the Dickey Fuller Test and s_n^2 represents the unbiased OLS estimator of the variance of the error terms.

q in (3.11) represents the number of lagged covariance looked at.

When there is no autocorrelation between error terms, when the covariances are equal then the second term in the Phillips Perron statistics collapses to zero because $\hat{\lambda}_n^2 = \hat{\gamma}_{0,n}$.

Equation 3.8 becomes $Z_\rho = n(\hat{\rho}_n - 1)$ which equals the Dickey Fuller test.

3.4.3 Co-integration Test

Johansen (1991) discovered that cointegration could be used to test for cointegration among variables. It is used to establish long-term linear relationships among variables. He argued that co-integration allows specification for a procedure of modification among cointegrated factors. Asteriou (2007), also noted that when there are more than two variables in a given model, there is a probability of having more than one cointegrating variable. The tests of co-integration are based on eigenvalues of transformations of the data, and this represents linear combinations of the data that have maximum correlation (Dwyer, 2015).

3.4.4 Error Correction Model

Cointegrating regression accounts for the long-run property of the model, but does not account for the short-run dynamics explicitly. A good time series modeling must consider the long-run equilibrium and the short-run dynamics simultaneously.

An error correction model (ECM) can be used in determining these relationships.

Given,

$$\Delta z_t = \alpha_0 + \alpha_1 \Delta z_{t-1} + \beta_0 \Delta y_t + \beta_1 \Delta y_{t-1} + u_t \ldots\ldots\ldots\ldots\ldots\ldots (3.13)$$

where u_t has a mean of zero(0) given $\Delta y_t,\ \Delta z_{t-1}, \Delta y_{t-1}$ and more lags. This equation is in first differences.

If z_t and y_t are cointegrated with a parameter γ, then additional I(0) variables can be included in equation (3.13) above.

Let $s_t = y_t - \gamma_t$, so that s_t is I(0), and assume that s_t has a mean of zero(0).

Including the lags of s_t in the equation at lag 1, we have

$$\Delta z_t = \alpha_0 + \alpha_1 \Delta z_{t-1} + \beta_0 \Delta y_t + \beta_1 \Delta y_{t-1} + \delta s_{t-1} + u_t \ldots\ldots\ldots\ldots..(3.14)$$

$$\Delta z_t = \alpha_0 + \alpha_1 \Delta z_{t-1} + \beta_0 \Delta y_t + \beta_1 \Delta y_{t-1} + \delta(z_{t-1} - \gamma y_{t-1}) + u_t \ldots\ldots(3.15)$$

where $E(U|I_{t-1}) = 0$, where I_{t-1} contains information on Δy_t and previous values on y and z. The term $\delta(z_{t-1} - \gamma y_{t-1})$ is called the error correction term. Equation (3.15) is an example of an error correction model.

3.4.5 OLS Regression

The simple regression model can be used to study the relationship between two variables. Although the simple regression model has limitations as a general tool for empirical analysis, it sometimes appropriate as an empirical tool. Applied econometric analysis begins with explaining a variable *y* in terms of *x*. In doing so, some questions pop up. Since there is never an exact relationship between two variables, how do we allow for other factors to affect *y*? What is the functional relationship between *y* and *x*?

How can we be sure to capture the ceteris paribus relationship between *y* and *x*? This questions are solved by writing down an equation relating *y* to *x*. A simple equation can be written as

$$y = \beta_0 + \beta_1 x + u \text{.....(3.16)}$$

The equation above is referred to as the simple linear regression model. The variable *y* is called the dependent variable while *x* is called the independent variable. They are also termed the explained and the explanatory variables respectively. The variable *u* is called the error term or disturbance in the relationship which represents factors other than *x* that affect *y*. Equation 3.16 also addresses the issue of the functional relationship between *y* and *x*. If the other factors in *u* are held fixed, so that the change in *u* is zero, $\Delta u = 0$, then *x* has a linear effect on y. This can be represented as:

$$\Delta y = \beta_1 \Delta x \text{ if } \Delta u = 0 \text{.....(3.17)}$$

The change in y is simply β_1 multiplied by the change in x. β_1 becomes the slope parameter in the relationship between y and x, holding the other factors in u is fixed. β_0 is referred to as the intercept parameter of the constant term.

3.5 Data Description, Sources and Prior Sign Expectations

The study employs secondary time series data from 1980 – 2016. The sample period is selected because of availability of data at the time of research. All data were gathered from the World Bank's World Development Indicators (WDI, 2016).

The GDP of Ghana was divided by hundred million and that of India was divided by ten billion. This was done to reduce the figures of the GDPs since they were in hundreds of millions and billions. A logarithmic transformation was applied on the variables in the model with the exception of trade balance, which had negative figures.

3.5.1 Exchange Rate

There are many types of exchange rate amongst which we have effective and nominal exchange rate. Nominal exchange rate denotes the exchange rate set by a country's monetary authorities or central banks while effective exchange rate refers to the multilateral rate that is used in measuring the gross nominal value of a currency in the foreign exchange market. Real exchange rate, which is also a type of exchange rate, is calculated by multiplying the country's price index with the quotient of dividing the nominal exchange rate by the trading partner's price index (Krueger, 1990). Real exchange rate is the relative price of tradables to non-tradables (Roderick, 2008).

Real effective exchange rate is the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs.

3.5.2 Gross Domestic Product

GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant local currency (WDI).

3.5.3 Inflation

Inflation is the persistent increase in the general price levels of goods and services over a period of time. It also accounts for the persistent fall in the purchasing power of the home currency. This study uses the changes in the Consumer Price Index to account for inflation.

3.5.4 Prior Sign Expectations

Variable	Positive Relationship	Negative Relationship	Insignificant Relationship
REER	-	Petrovic and Gligoric (2008), Mduduzi Biyase (2014), Anning L. et al (2015), Moshen Bahmani-Oskooee (1985), Jebuni et al. (1991), Armah M. & Bhattarai K.R., (2013)	-
GDP	Mduduzi Biyase (2014)	Thorbecke W. (2006)	-
CPI	-	Stucka (2004)	-

CHAPTER FOUR

EMPIRICAL RESULTS AND ANALYSIS

4.1 Introduction

This chapter focuses on the specified functions and an analysis of their regression results. The analysis was carried out using data from 1980 to 2016 on GDP of Ghana and one of its trading partner; India, exchange rate and inflation which is measured by the CPI. It presents the stationarity test results on the variables, the OLS regression and the ECM, which depicts the long run and short run relationship of the specified variables

4.2 Descriptive Test Results

Table 4.1 Descriptive Test Results

	TB (GHS)	RGDP (GHS)	RGDP_INDIA (RUPEES)	REER	CPI
Mean	-1.82 B	15.6 B	462 000 B	351.23	43.17
Median	-0.962 B	12.7 B	351 000 B	118.79	15.01
Maximum	0.0144 B	36.1 B	122 000 B	3 660.64	210.53
Minimum	-6.35 B	6.25 B	134 000 B	69.45	0.06
Std. Dev.	1.9 B	8.91 B	313 000 B	705.99	56.68
Skewness	-0.96	1.02	0.95	3.54	1.40
Kurtosis	2.55	2.88	2.74	15.38	4.02
Observations	37	37	37	37	37

Source: E-views Econometric Software

NB: The figures are denominated in trillions and billions of local currency units

The sample selected for the study has 37 observations. The central tendency defined by the mean of the Ghanaian GDP is about 15.6 billion Ghana Cedis and the mean

GDP of India is around 46.2 trillion rupees for the selected period. The mean values for the real exchange rate, consumer price index and the trade balance of Ghana for the selected period is around 351.23, 43.17 and deficit of 1.82 billion Ghana Cedis. The standard deviations of the variables are high thus suggesting that the data points are scattered over a wide range of values. The middle point of the data sets defined by the median for the trade balance, GDP of Ghana, GDP of India, REER and CPI are 962 million Ghana Cedis in deficit, 12.7 billion Ghana Cedis, 35.1 trillion rupees, 118.79 and 15.01 respectively.

The mean values for the trade balance GDP figures for Ghana and India, the real effective exchange rate and the CPI are bigger than their respective median values thus the data for these variables are skewed to the right. The maximum and minimum values for each respective data on the variables are not too close to their respective means hence the variables show some level of fluctuations from the mean.

4.3 Unit Root Test Results

The unit root results are conducted on the variables stated in the models in order to avoid spurious regression results. The test results help in determining the short run and long run relationships among the variables. The Augmented Dickey-Fuller (ADF) Test was conducted to check stationarity in the variables and the Phillips-Perron (PP) Test was conducted to check for the robustness of the ADF test.

All the variables experience an upward trend with the exception of Real Effective Exchange Rate that experiences a downward trend. The unit root tests were conducted

using both trend and intercept at levels and 1st difference to determine stationarity of the variables.

Table 4.2 Stationarity Test at Level

VARIABLES	ADF AT LEVEL t-stats	Prob	PP AT LEVEL t-stats	Prob	Order of Integration
TB	-3.5530	0.3396	-3.5403	0.2119	I(0)
LNRGDP	-3.5443	0.1460	-3.5443	0.2061	I(0)
LNRGDP_INDIA	3.54033	0.9237	3.5403	0.9565	I(0)
LNREER	3.5443	0.3881	3.5403	0.6780	I(0)
LNCPI	3.5443	0.7022	-3.5443	0.1073	I(0)

Source: E-views Econometric Software

Table 4.3 Stationarity Test at 1st Difference

VARIABLES	ADF AT 1ST DIFF t-stats	Prob	PP AT 1ST DIFF t-stats	Prob	Order of Integration
TB	-3.5443	0.0000*	-3.5443	00000*	I(1)
LNRGDP	-4.2523	0.0359*	-3.5443	0.0000*	I(1)
LNRGDP_INDIA	-3.5443	0.0002*	-3.5443	0.0000*	I(1)
LNREER	-3.5443	0.0000*	-3.5443	0.0000*	I(1)
LNCPI	-3.5443	0.0000*	-3.5443	0.0000*	I(1)

* denotes significance at 5%

Source: E-views Econometric Software

From Table 4.1, the probability values of the variables are higher than 5% at level hence we fail to reject the null hypothesis that the variables have unit root. From Table 4.2 the probability values of the variables at first difference are lower than 5%, therefore we reject the null hypothesis of the variables having unit roots. The Augmented Dickey-Fuller Test and the Phillip-Peron Test respectively show that the all variables in the model have unit roots. The variables are not stationary at levels but are stationary at first difference.

4.4 Johansen Cointegration Test

Table 4.4 Trace Test

Hypothesized No. of CE(s)	Trace Eigenvalue	Statistic	0.05 Critical Value	Prob.**
None *	0.846262	139.8091	95.75366	0.0000
At most 1 *	0.652206	74.27142	69.81889	0.0211
At most 2	0.450070	37.30631	47.85613	0.3332
At most 3	0.285606	16.37758	29.79707	0.6855
At most 4	0.122147	4.606349	15.49471	0.8491
At most 5	0.001333	0.046697	3.841466	0.8289

* denotes significance at 5%
Source: E-views Econometric Software

Table 4.5 Maximum Eigenvalue Test

Hypothesized No. of CE(s)	Max-Eigen Eigenvalue	Statistic	0.05 Critical Value	Prob.**
None *	0.846262	65.53768	40.07757	0.0000
At most 1 *	0.652206	36.96511	33.87687	0.0207
At most 2	0.450070	20.92873	27.58434	0.2806
At most 3	0.285606	11.77123	21.13162	0.5704
At most 4	0.122147	4.559652	14.26460	0.7961
At most 5	0.001333	0.046697	3.841466	0.8289

* denotes significance at 5%

Source: Computation using Eviews Econometric Software

From Table 4.3 and Table 4.4 there exist at most 2 cointegration equations. The Trace and Maximum Eigenvalue tests have probability values lesser than 5% at none and at most 1. Although this is true, the statistics for both tests are bigger than their respective critical values at none and at most 1. This validates the test results and proves cointegration between the variables. The test results show that there is a long run association between the variables as confirmed by positions of Nyarko F. (2016) and Anning et al (2015).

4.5 Long Run Results

The long run relationship from the specified model is presented as:

Table 4.6 Long Run Equation

LONG RUN EQUATION
Dependent Variable: D(TB)
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.1894	0.4614	0.4104	0.6843
D(LNRGDP)	-9.8446	4.6758	-2.1054	0.0435
D(LNRGDP_INDIA)	-2.2388	7.4386	-0.3010	0.7654
D(LNREER)	-0.6513	0.4307	-1.5122	0.1406
D(CPI)	0.0457	0.0200	2.2840	0.0294

Source: Computation using Eviews Econometric Software

The equation specified above explains the long run effects of variables such as GDP, REER and CPI on trade balance.

All other things equal holding the various independent variables at zero (0) the trade balance of Ghana improves approximately by 0.19.

The real effective exchanger rate (REER) of Ghana has negative effects on its trade balance in the long run. This proves that as the REER decreases, trade balance improves. A 1% devaluation of the Ghana Cedi will lead to a 0.65 unit improvement in its trade balance. A devaluation of a currency leads to an improvement in the country's trade balance (Riti, 2012). This outcome is consistent with the findings of Nyarko F. (2016) and Anning et al (2015). The theories and expectations of the Marshall Lerner condition are consistent with this finding.

The GDP of Ghana has a negative impact on its trade balance in the long run. A 1% increase in the GDP of Ghana in the long run will lead to a 9.84 unit decrease in its trade balance. Ghana having an import dependent economy means that an increase in economic growth will lead to an increased patronization of imported goods by its citizens. This will lead to a trade deficit since imports will exceed exports. An

increase in the value of a country's currency relative to another's currency will make goods and services of the other country to become cheaper. Mankiw (2007), an appreciation of a currency will make domestic goods more expensive than foreign goods thus leading to an increase in imports. This agrees with the finding of Jebuni et al (1991), that an increase in the level of capital inflow and the growth of GDP could worsen the trade balance. The GDP of Ghana's trading partner, India has a negative coefficient meaning, a 1% increase in the GDP will worsen the trade balance of Ghana by a unit of about 2.24.

Inflation, which is measured by the CPI, impacts positively on the trade balance. A 1% rise in the inflation rate leads to a 0.046 unit improvement of the trade balance. This is however inconsistent with theory because an increase in the prices of goods and services, makes the price of producing a unit of product higher than the prices in that of a country not experiencing inflation. This would make the prices of exports expensive and ultimately affect the trade balance in a negative way.

4.5.1 Validity of the Marshall Lerner Condition

The real exchange rate is found to have a negative impact on the Ghanaian trade balance. A devaluation of the Ghana Cedi will lead to an improvement in its trade balance in the long run. However, the absolute value of the coefficient of REER is less than unity (1), which is not consistent with the Marshall Lerner Condition. Hence, the Marshall Lerner condition does not exist for Ghana.

4.6 Short Run Results

Table 4.7 Short Run Estimates

SHORT RUN ESTIMATES
Dependent Variable: D(TB)
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.7536	1.2606	0.5978	0.0375
D(LNRGDP)	-18.9628	8.8115	-2.1520	0.0445
D(LNRGDP(-1))	16.9805	9.7760	1.7370	0.0986
D(LNRGDP_INDIA)	3.8713	7.5633	0.5119	0.6146
D(LNRGDP_INDIA(-1))	-6.7961	8.0728	-0.8418	0.4103
D(LNREER)	-0.7010	0.6880	-1.0190	0.3210
D(LNREER(-1))	0.2331	0.5826	0.4001	0.6936
D(LNCPI)	1.0942	1.6902	0.6474	0.5251
D(LNCPI(-1))	-0.1382	1.6093	-0.0860	0.9325
ECM(-1)	-0.6431	0.1987	-3.2310	0.0024

Source: E-views Econometric Software

The co-efficient and the probability of the Error Correction Term (ECM) determine the long run causality of the independent variables on the dependent variable. If the co-efficient of the ECM is negative and it's probability is significant; less than 5%, then the independent variables have long run causality on the dependent variable.

From the table above, it can be viewed that the co-efficient of the ECM carries a negative sign and it's significant. Meaning that, there is a long run causality running through the independent variables of LNRGDP, LNRGDP_INDIA, LNCPI and LNREER to the dependent variable, TB.

Also, the coefficient estimated for the ECM is -0.6431. The size of the coefficient of the ECM denotes that 64 percent of the disequilibrium caused by previous year's

shock eventually returns to equilibrium in the long run, in the current year. In other words, 64.31% of the deviation in the long run equilibrium are corrected annually.

The impact of the GDP of Ghana on trade balance was not significant in the previous period but a 1% increase in the GDP brought about a 16.98 unit appreciation on trade balance. In the current short run, GDP impacts negatively on trade balance in a significant way. A 1% decrease in GDP leads to a 16.98 unit appreciation in the trade balance. The GDP of India is not significant in the current short run but a 1% increase in the GDP figures will bring about a 3.87 unit appreciation in the trade balance. The impact of the GDP of India however, had a non-significant effect on trade balance in the previous period.

The CPI in the previous year had a non-significant negative effective on trade balance. A 1% increase in the consumer price index brought about a 0.138 unit decline in trade balance. The CPI however, had a positive non-significant effect on the trade balance of Ghana. A 1% increase in the general prices of goods and services leads to a 1.09 unit appreciation in trade balance.

4.6.1 Proving existence of the J-Curve Effect

The coefficient of REER in the previous year (at lag 1) is positive and insignificant. This means that during that period a 1% appreciation of the Ghana Cedi leads to an insignificant 0.23 unit appreciation in trade balance. In the current short run period, REER impacts negatively on trade balance but not in a significant way. A 1% decrease in the value of the Ghana Cedi will also lead to an insignificant 16.98 unit appreciation in trade balance. A devaluation of the Cedi will lead to an improvement of the trade balance in the current short run but the effect of the devaluation is not

significant. This however, is not consistent with the J-Curve phenomenon, which states that devaluation may not make trade balance improve in the immediate period, but will significantly impact on the trade balance hence making trade balance improve in subsequent periods.

4.7 Regression Diagnostic Results

The results of the diagnostic tests show that all models are correctly specified and the parameters are correctly estimated. The tests do not fail the serial correlation, the heteroscedasticity, and normality checks (see Table 3, Table 4 and Table 5 in Appendix). The graph of cointegration, which shows the stationarity of the cointegration equations, maintains a stable pattern hence they are within the 95% confidence interval. Moreover, the remaining eigenvalues do not appear close to the unit circle (see Figure 1). The test results also indicate that the model specified is equally distributed. They all exhibit probability values greater than the significant level of 5%.

Diagnostic	Statistic	P-Value	Conclusion
Serial Correlation: VEC Residual Heteroscedasticity Tests: No Cross Terms	LM Stat: 46.68222	0.0553	No serial correlation
Normality: Jarque-Berra	0.761938	0.6832	Errors are normally distributed
Heteroscedasticity: VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)	Chi Square : 327.4279	0.5297	No heteroscedasticity

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents an overview of the study. It gives a summary of this study, the conclusions drawn from the study and recommendations for policy consideration and implantations.

5.2 Summary

This research work sought to determine of exchange rates on trade balance in Ghana. It made use of annual time series data from 1980 to 2016, simple OLS regression and the Error Correction Model tests to determine the long run and short run relationships between exchange rates and trade balance in Ghana.

Trends in the trade balance have indicated a declining pattern, where the trade balance of Ghana is in deficit and has been declining at an alarming rate over the years. Economic growth represented by GDP however, has experienced surges in recent years. Estimates from the OLS have shown that variables like GDP and REER and the GDP of the trading partner (India) have negative effects on the trade balance while the CPI have positive impacts on trade balance. Ghana's GDP's negative effect on trade balance confirms the position of the Ghanaian economy as one that is import dependent. An increase in GDP leads to an increase in import will ultimately worsen the trade balance. Inflation, which is measured by the CPI, has a positive effect on

trade balance in the long run. This however seems to be unlikely and not consistent with theory since an increase in prices will lead to a decrease in exports hence a worsening trade balance. The negative impact of REER on trade balance confirms the possibility of the existence of the Marshall Lerner Condition (MLC) in Ghana. However, the coefficient of the REER is less than unity (1) thus the MLC is not met in Ghana. Although the condition is not met, a depreciation or devaluation of the Ghana Cedi will lead to an improvement in its trade balance in the long run.

In the short run, a devaluation of the Ghana Cedi will lead to an improvement in its trade balance. The coefficient of the REER in the previous period is positive and that at the current period is negative which is not consistent with the J-Curve effect. Showing that the J-Curve effect doesn't occur in Ghana.

5.3 Conclusion

The main objective of the study is to determine the impact of exchange rates on trade balance. Various empirical and theoretical foundations were applied to ensure that estimates from the analysis were consistent and robust. Findings from the study reveal that exchange rates have effect on trade balance in Ghana. A devaluation of the Ghana Cedi will lead to improvement in its trade balance in the long run.

5.4 Recommendation

The following recommendations are made, given the findings from the study:

The negative impact of the real effective exchange rate on the trade balance indicates that a devaluation of the Cedi will improve trade balance. Since Ghana practices the managed float exchange rate system, with regards to this finding, it will be prudent

for monetary authorities to participate in the markets to attempt to influence the value of the Ghana Cedi in the sense of depreciating it in order to improve on its trade balance. This should be done in addition to implementing other policies that will help improve upon the welfare of the citizens since a depreciation of the Ghana Cedi will lead to detrimental consequences on the welfare of Ghanaians on the international market.

The findings from the study also suggest that an increase in the GDP will lead to a worsening trade balance. This is due to the Ghanaian economy being dependent on imports. The study suggests that government implement policies that are directed towards the patronization of locally produced goods. Subsidies should be given to local manufacturers and tariffs should be levied on imports. These policies will ensure that Ghanaians switch from spending on imports to spending on locally produced goods (Made-in-Ghana) since the locally produced goods will become cheaper than imports. A switch from imports will improve the trade balance since excess imports over exports results in trade deficit. This will lead to an improvement in the trade balance.

The main limitation of this study is that they it based on linear specification. However, the relationship between the trade balance and the real exchange rate and other selected macroeconomic variables may be nonlinear. For example, Bahmani-Oskooee and Fariditavana (2016) argued that the trade balance may adjust to equilibrium in a nonlinear pattern. Engel and West (2005) noted that while exchange rates are good predictors of economic fundamentals, the reverse is not true. These arguments suggest that a linear model cannot adequately capture the complex

relationship between exchange rates and economic fundamentals including the trade balance. Therefore, in order to arrive at a more convincing conclusion, research conducted in the future should use nonlinear specification in their studies.

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APPENDICES

TABLE 1: LONG RUN EQUATION

LONG RUN EQUATION
Dependent Variable: D(TB)
Method: Least Squares
Date: 09/21/17 Time: 17:19
Sample (adjusted): 1981 2016
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.189362	0.461399	0.410408	0.6843
D(LNRGDP)	-9.844597	4.67579	-2.105440	0.0435
D(LNRGDP_INDIA)	-2.238800	7.438562	-0.300972	0.7654
D(LNREER)	-0.651295	0.430675	-1.512267	0.1406
D(CPI)	0.045739	0.020026	2.283927	0.0294

R-squared	0.200394	Mean dependent var	-0.083616
Adjusted R-squared	0.097219	S.D. dependent var	0.851472
S.E. of regression	0.809024	Akaike info criterion	2.542271
Sum squared resid	20.29013	Schwarz criterion	2.762204
Log likelihood	-40.76087	Hannan-Quinn criter.	2.619033
F-statistic	1.942272	Durbin-Watson stat	3.135995
Prob(F-statistic)	0.128236		

TABLE 2: SHORT RUN ESTIMATES

Dependent Variable: D(TB)
Method: Least Squares
Date: 09/22/17 Time: 21:14
Sample (adjusted): 1983 2016
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.7536	1.2606	0.5978	0.0375
D(LNRGDP)	-18.9628	8.8115	-2.1520	0.0445
D(LNRGDP(-1))	16.9805	9.7760	1.7370	0.0986
D(LNRGDP_INDIA)	3.8713	7.5633	0.5119	0.6146
D(LNRGDP_INDIA(-1))	-6.7961	8.0728	-0.8418	0.4103
D(LNREER)	-0.7011	0.6880	-1.0190	0.3210
D(LNREER(-1))	0.2331	0.5827	0.4000	0.6936
D(LNCPI)	1.0942	1.6902	0.6474	0.5251
D(LNCPI(-1))	-0.1382	1.6093	-0.0859	0.9325
ECM (-1)	-0.6431	0.1987	-3.2310	0.0024

R-squared	0.564303	Mean dependent var	-0.089858
Adjusted R-squared	0.243264	S.D. dependent var	0.876474
S.E. of regression	0.76245	Akaike info criterion	2.595871
Sum squared resid	11.04527	Schwarz criterion	3.269266
Log likelihood	-29.12981	Hannan-Quinn criter.	2.825518

F-statistic	1.757737	Durbin-Watson stat	1.848816
Prob(F-statistic)	0.12525		

TABLE 3: AUTOCORRELATION TEST

VEC Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Date: 09/20/17 Time: 19:54
Sample: 1980 2016
Included observations: 34

Lags	LM-Stat	Prob
1	46.68222	0.0553
2	35.37681	0.0816

Probs from chi-square with 25 df.

TABLE 4: HETEROSKEDASTICITY TEST

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)

Date: 09/20/17 Time: 19:55
Sample: 1980 2016
Included observations: 34

Joint test:

Chi-sq	df	Prob.
327.4279	330	0.5297

TABLE 5: NORMALITY TEST (CHOLESKY (LUTKEPOHL))

VEC Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 09/20/17 Time: 00:36
Sample: 1980 2016
Included observations: 34

Component	Skewness	Chi-sq	df	Prob.
1	0.826145	3.867586	1	0.0492
2	1.031222	6.026036	1	0.0141
3	-0.446759	1.131029	1	0.2876
4	0.127356	0.091910	1	0.7618
5	0.192913	0.210887	1	0.6461
Joint		11.32745	5	0.0453

Component	Kurtosis	Chi-sq	df	Prob.
1	5.237065	7.089651	1	0.0078
2	5.635033	9.836479	1	0.0017
3	3.332914	0.157011	1	0.6919
4	1.770515	2.141482	1	0.1434
5	3.623680	0.551050	1	0.4579

	Joint	19.77567	5	0.0014

Component	Jarque-Bera	df	Prob.
1	10.95724	2	0.0042
2	15.86251	2	0.0004
3	1.288041	2	0.5252
4	2.233392	2	0.3274
5	0.761938	2	0.6832
Joint	31.10312	10	0.0006

TABLE 6: DESCRIPTIVE STATISTICS

	TB1	RGDP	RGDP_INDIA	REER	CPI
Mean	-1820000000	15600000000	46200000000000	351.33	43.17
Median	-962000000	12700000000	35100000000000	118.79	15.01
Maximum	14379085	36100000000	122000000000000	3660.64	210.53
Minimum	6350000000	6250000000	13400000000000	69.45	0.06
Std. Dev.	1900000000	8910000000	31300000000000	705.99	56.68
Skewness	-0.96	1.02	0.95	3.54	1.40
Kurtosis	2.55	2.88	2.74	15.38	4.02
Jarque-Bera	6.03	6.44	5.67	313.51	13.65
Probability	0.05	0.04	0.06	0.00	0.00
Observations	37	37	37	37.00	37.00

FIGURE 1: AR ROOTS GRAPH

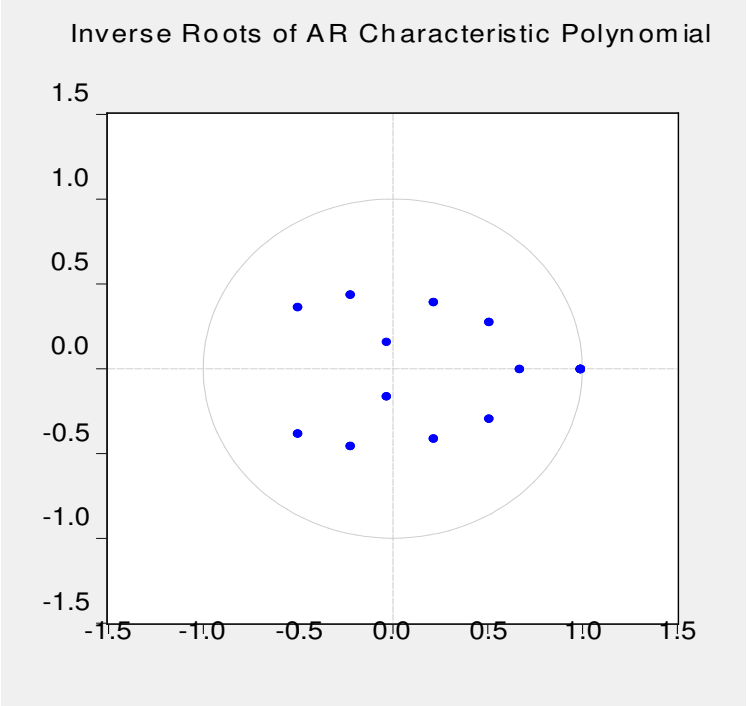

FIGURE 2: COINTEGRATION GRAPH

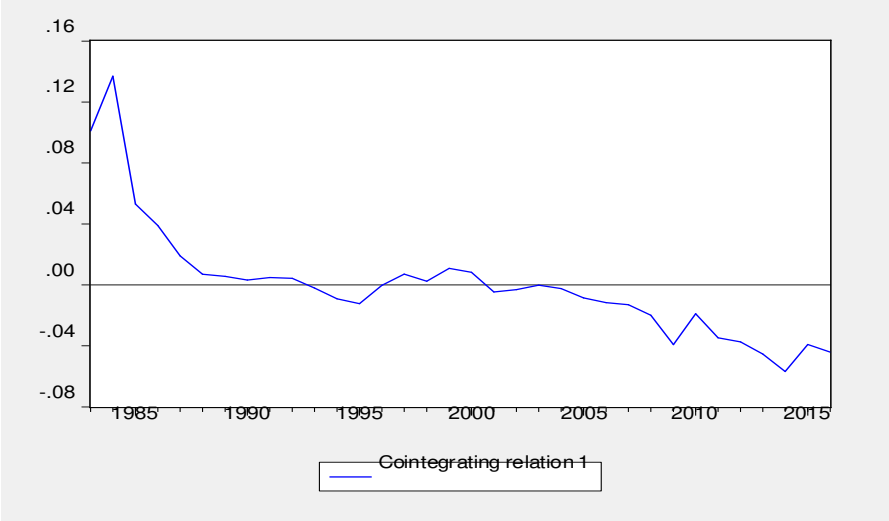

FIGURE 3: GRAPHS OF VARIABLES