UNIVERSITY OF CAPE COAST

EFFECT OF EXCHANGE RATE VOLATILITY ON BALANCE OF PAYMENT: EVIDENCE FROM GHANA

BY

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DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original research and that no part of it has been presented for another degree in this University or elsewhere.

Candidate's Signature..... Date.....

Name: Danabsin Naandam

Supervisor's Declaration

I hereby declare that the preparation and presentation of this dissertation was supervised in accordance with the guidelines on supervision of dissertation laid down by the University of Cape Coast.

Supervisor's Signature..... Date….....

Name: Dr. Isaac Dasmani

ABSTRACT

The need for the government to maintain macroeconomic stability is becoming increasingly crucial in the era of slow economic growth, growing unemployment and high debt. However, the trend of Balance of Payment over the years reveals an unstable pattern. One key factor that has been overlooked in terms of the determinants of Balance of Payment is exchange rate volatility. Coming from the background of volatility/instability in the Ghana's exchange rate, could it be the reason for the instability in the trend of Balance of Payment? This question is essentially the subject matter of this study. In order to estimate the effect of exchange rate volatility on Balance of Payment, the Auto Regressive Distributed Lag (ARDL) technique was employed after the yearly exchange rate volatility had been calculated using the GARCH approach.

The results of the study suggest that exchange rate volatility has a deleterous effect on Balance of Payment both in the short run and long run but the effect is more pronounced in the long run than the short run. Moreover, with the exception of inflation which was only significant in the short run, GDP growth and interest rate all had a favourable effect on Balance of Payment in both short run and long run. The study recommends that Bank of Ghana intensifies its exchange rate stabilization measures to reduce the exchange rate risk imposed on trade players.

KEY WORDS

Auto-Regressive Distributed Lag (ARDL)

Balance of Payment

Exchange rate volatility

Ghana

Trade Openness

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DEDICATION

To my mother, Yaabot Kwakwa Naandam.

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LIST OF ACCRONYMS

ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criterion
AID	Foreign Aid
ARCH	Auto Regressive Conditional Heteroskedasticity
ARDL	Autoregressive Distributed Lag
BoG	Bank of Ghana
BOP	Balance of Payment
BW	Bandwidth
CPI	Consumer Price Index
CUSUM	Cumulative Sum of Recursive Residuals
CUSUMSQ	Cumulative Sum of Square Recursive Residuals
DF	Dickey-Fuller
ECM	Error Correction Model
ECT	Error Correction Term
ERP	Economic Recovery Programme
EXV	Exchange Rate Volatility
DW	Durbin-Watson
GARCH	Generalised Auto Regressive Conditional Heteroskedasticity
GDP	Gross Domestic Product
GPC	Gross Domestic Product Per Capita
HQ	Hannan-Quinn Information criterion
IMF	International Monetary Fund
INF	Inflation
INT	Interest Rat

LBOP	Log of Balance of Payment
LDCs	Less Developed Countries
LINF	Log of Inflation
LINT	Log of Interest Rate
LMS	Log of Money Supply
LGDPG	Log of Gross Domestic Product Growth
LOPN	Log of Trade Openness
MS	Money Supply
OECD	Organization of Economic Co-operation and Development
OLS	Ordinary Least Square
PP	Phillips-Perron
RER	Real Effective Exchange Rate
SAP	Structural Adjustment Programme
SBC	Schwartz-Bayesian Criterion
SIC	Schwarz Information Criterion
US	United States
VAR	Vector Auto Regressive
VECM	Vector Error Correction Mechanism
WAMZ	West Africa Monetary Zone
WDI	World Development Indicator

CHAPTER ONE

INTRODUCTION

The speedy nature of globalization in the contemporary times has made all countries of the world to live interdependently on one another. Thus, no country of the world is entirely an island of itself without having anything to do with other countries. In view of this, trade has increasingly rendered the world borderless. This situation has broadened the consumption choice bundles of consumers in various countries because a variety of goods and services are available to them as a result of international trade. Due to this, trade has unarguably become one of the vital sources of growth and development. The state of demand for Ghana's exportable products in the international market in particular is an injection into the economy as financial resources are received into the domestic economy; hence it is responsible for increasing the level of external reserve of the country.

Historically, the Ghana's exchange has been very unstable, as the cedi falls against major trading currencies and this have implications for the balance of payment, through the functioning of relative import and export prices, foreign direct investment, financial outflows and national reserves, Danquah (2008).

Background to the Study

Since the 1970s, large proportions of Ghana's exports have been dominated by the agricultural sector and it was a major source of foreign revenue. Ghana has been recognized as the major exporter of timber, cocoa, palm oil and other agricultural products. However, this trend has tilted in favour of oil though trade in gold, diamond, bauxite and manganese still persist. The incomes expected from the

earnings from exports are strongly affected by the incessant nature of the changes in the real effective exchange rate. Unpredictable changes in real exchange rate, which is normally dubbed as exchange rate volatility, have pervasive effects on the performances of the export sector of the country.

The focus of Ghana, like other countries in the Sub-Saharan Africa was on the erstwhile Import Substitution Industrialization (ISI) where increased production of goods that were largely imported were encouraged as a means for achieving high level of economic growth. Coming from the background that the Ghanaian economy was predominantly agrarian, the ISI policy was to encourage the productive capacity of the agricultural sector of the economy with the realization that exports could spur economic growth. The growth of the Ghanaian economy was encouraging as the volume of exports resulting from cocoa, palm oil, timber and other agricultural produces were high as a result of the fact that exchange rate of the cedi relative to other currencies of the trading partners of Ghana was deliberately kept stable.

Several economic reforms in the country which was associated with the adoption of different exchange rate regime partly resulted in the macroeconomic challenges the country encountered in the 1970s and early 1980s. However, with the Bretton wood system, exchange rates of various developing countries, including Ghana were encouraged to be devalued as part of the Structural Adjustment Programme (SAP) recommended by the International Monetary Fund (IMF) and World Bank (IBRD) as one of the best economic policies if not the best for economic growth. With this development, unpredictable nature of volatilities in

exchange rate, oil prices and commodity prices at the international markets which imply low profitability from exports were the consequences. Thus, there have been dismal performances of both agricultural and the oil sector due to fluctuations of prices, which are believed to be caused by incessant volatilities of exchange rate at the international market.

Exchange rate plays a key role in international economic transactions because no nation can remain in self-sufficient due to varying factor endowment. Movements in the exchange rate have ripple effects on other economic variables such as interest rate, inflation rate, unemployment, money supply, etc. These facts underscore the importance of exchange rate to the economic well-being of every country that opens its doors to international trade in goods and services.

The significance of exchange rate stem from the fact that it connects the price systems of two different economies making it conceivable for international trade to make direct comparison of traded goods. In other words, it links domestic prices with international prices. Through its effects on the volume of imports and exports, exchange rate exerts a powerful influence on a country's balance of payments position. Consequently, nations in the pursuit of the macroeconomic goals of healthy external balances as reflected in their Balance of Payments (BOP) position, find it imperious to develop an exchange rate policy.

Exchange rate is often regarded as a key determinant of the country's BOP position. If the exchange rate, often regarded as the barter of country's currency and a chief determiner of international competiveness is carefully utilized, it can serve as nominal anchor for price stability. Fluctuations in exchange rate have direct

effect on demand and supply of goods, investment, employment as well as distribution of income and wealth. When Ghana started experiencing huge BOP deficits and very low level of foreign reserve in the 1980s, it was felt that a depreciation of the cedi would relieve pressures on the BOP. Subsequently, the cedi was devalued. The irony of this policy instrument is that the foreign trade structure

The figure 1 is a graph of exchange rate volatility for Ghana over the study period.

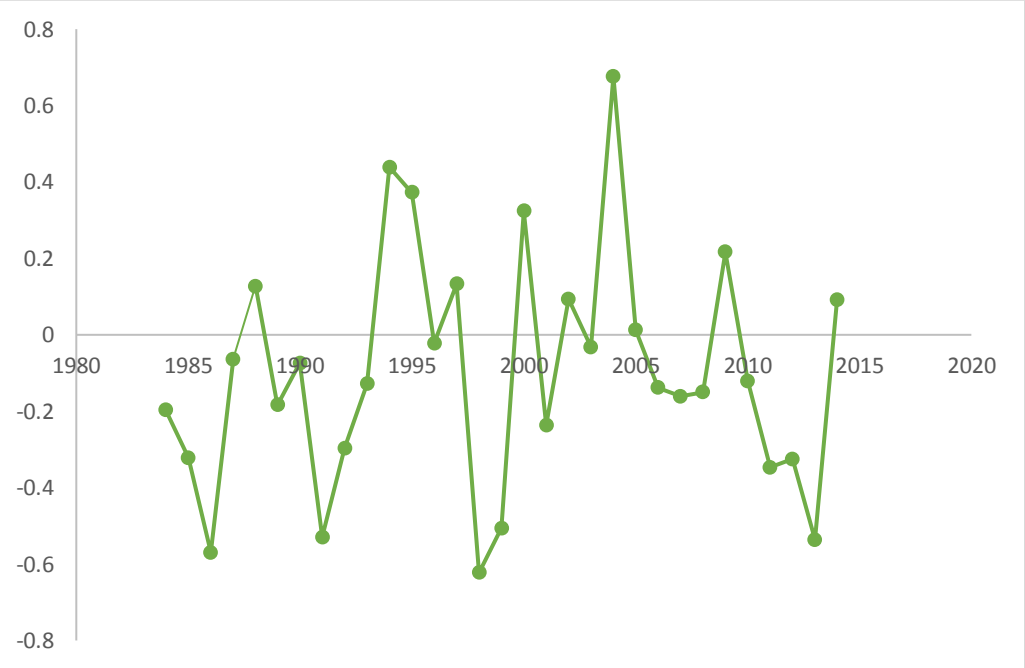

Figure 1: Trend of Exchange Rate Volatility in Ghana, 1984 – 2015

Source: Data from WDI, 2017

Since the adoption of the flexible exchange rate regime in Ghana, the cedi has depreciated against major currencies especially the US Dollar (US$), although, not monotonically, as the Ghana Cedi recorded a bit of stability between 2002 and 2007. Ghana redenominated her currency on 1st July 2007 where US$1 was exchanged for 93 pesewas. This move has partly resulted in the depreciation of the cedi overtime and by the end of July 2009, the US$ was exchanged for GH¢1.49 (Alagidede & Ibrahim, 2017). However, between August 2009 to March 2010, the Cedi marginally appreciated by 3% and was consequently exchanged for US$= GH¢1.49 in April 2010. Most recently, the Cedi has been very volatile. For instance, at the beginning of January 2014, a dollar was exchanged for GH¢2.21 and by the end of September 2014, the Cedi–Dollar exchange rate stood at GH¢3.20 – denoting about 44.65% depreciation.

Arguably, this level of depreciation contributed to a rise in consumer price inflation which stood at 17% in December 2014 from 13.8% in January 2014. Increased exchange rate instability especially in the last two decades (1995 – 2015) has affected Ghana's openness to trade by making trade riskier and by extension its implication on Balance of Payment Alagidede & Ibrahim (2017). A more pronounced, downward volatility in the two decades as seen in the Figure 1 are volatilities in 1998, 1999, 2001, and 2006 to 2014 with the exception of 2010. However, stabilisation of the Ghanaian economy in 2010 (improved fiscal balance, low inflation, and stable exchange rate) led to the increase in BOP from minus GHS 5. 7billion in 2013 to minus GHS0.09million in 2015. This clear association between exchange rate volatility and BOP is interesting and worth investigating.

Statement of the Problem

Ghana's involvement in international trade continues to increase drastically. As a result, Ghana has currently engaging in a much wider range of cross-border transactions with different countries and products. Due to this, Ghana has witnessed foreign exchange fluctuations and the unpredictability of exchange rates affects the country's export earnings, investment and Balance of Payments. Exchange rate volatility signifies one of the chief sources of macroeconomic risk for Ghana's trade and by extension BOP performance. In the long run, exchange rate volatility influences a country's volume of foreign trade. Theoretically, costs of exports and foreign purchases alter the country's domestic and international competitiveness and as a result the country's BOP. Exporting companies are continually engaging in a much wider range of cross border transactions with different countries and products. Such oscillations expose exporting companies to foreign exchange risk.

However, the need to improve and sustain Ghana's Balance of Payment is not only a major concern of the economic policy makers, and administrators but has long been of interest to academics. Over the years, the trend of Ghana's BOP has been unstable. For instance, BOP decreased from negative GHS 3.8 billion in 2012 to negative GHS 5.7 billion in 2013 and improves thereof to minus GHS 3.8 billion in 2014 to minus GHS.91 million by 2015.

Theoretically and empirically, efforts have been made to establish the main determinants of Balance of Payment. These include; the general level of economic development (reflected in GDP growth and levels of literacy, urbanization, communication, etc.), the administrative and political constraints on the fiscal

system, social-political values, indigenous institutional arrangements, popular desires for government spending, plus other factors which condition overall willingness to export, import and invest. However, the effect of GDP per capita, inflation, trade openness, foreign aid, debt, corruption, and exchange rate are mostly explored. For instance, studies by De Grauwe (1988) and Hooper and Kohlhagen (1978) which considered exchange rate volatility, a risk factor to trade, did not estimate the effect on Balance of Payment.

However, critical to the unstable Balance of Payment performance in Ghana could be due to the instability that characterises the Exchange Rate which has become more prevalent in recent years. For example, at the commencement of January 2014, 1 US dollar was exchanged for GH¢2.21 and by the end of September 2014, the Cedi–Dollar exchange rate stood at GH¢3.20 – signifying about 44.65% depreciation. This stem from the fact that once trade become riskier due to exchange rate volatility, the effect is felt on Balance of Payment.

This study is motivated by the need to empirically determine the effect of exchange rate volatility on Balance of Payment in Ghana.

Purpose of the Study

The main objective of the study was to determine the impact of exchange rate volatility on Ghana's Balance of Payment. In specifics, the following were the research objectives:

1. To present a trend analysis of Balance of Payment and Exchange Rate Volatility over the study period (1984 – 2015)
2. To estimate the effect of exchange rate volatility on Balance of Payment.

Hypotheses

In this study, the researcher aims to respond following hypotheses:

1. H_0: exchange rate volatility has no long run effect on Balance of Payment

   H_A: exchange rate volatility has long run effect on Balance of Payment
2. H_0: exchange rate volatility has no short run effect on Balance of Payment

   H_A: exchange rate volatility has short run effect on Balance of Payment

Significance of the Study

The study seeks to inform policymakers and academics alike. In specifics, the study will show how exchange rate fluctuations affects Ghana Balance of Payment. It will help policy makers to consider the alternative means of controlling exchange rate and its effects on foreign trade and the economy in general. It will show the impact of the exchange rate fluctuations on Ghana's Balance of Payments. It will also add to available knowledge on effect of exchange rate fluctuation regimes on import, export and Balance of Payments.

Scope of the Study

Generally, this study seeks to estimate the effect of exchange rate volatility on Balance of Payment in Ghana. It includes theoretical and empirical discussions of exchange rate volatility and Balance of Payment. The study considered a thirty-three-year period spanning from 1984 to 2015. This period saw Ghana adopt a flexible exchange rate regime while trade was as well largely liberalised.

Based on economic theory, data on several time series variables: Balance of Payment, trade openness, foreign aid, inflation, share of industry to GDP were

selected for this study to test the hypotheses. Exchange rate volatility was however calculated. Moreover, the Auto Regressive Distributed Lagged (ARDL) technique was used to estimate the short run and long run relationship between Balance of Payment and exchange rate volatility.

Organization of the Study

The study is organized into five main chapters with each chapter further divided into sections and sub-sections. The first chapter which is the introductory chapter presents a background to the study, problem statement, objectives of the study, hypotheses, scope of the study as well as organization of the study. Chapter two focuses basically on the overview of the Ghanaian economy with regards to theoretical as well as empirical literature on Balance of Payment and exchange rate volatility. Chapter three focuses on the specification of the empirical model and estimation technique employed in conducting the study. The results from the estimation were analyzed and discussed in chapter four. Chapter five presents the summary of findings, conclusion, policy implications and recommendations of the study.

Chapter Summary

This chapter basically provided an introduction of the study. The background, problem statement, hypothesis, significance of the study as well as how the study was conducted was also provided.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The main aim of this chapter was to present the review of relevant literature on the relationship between Balance of Payment and exchange rate volatility. The first section looks at the Balance of Payment and the historical perspective of exchange rate in Ghana. This was followed by the theoretical literature review which encompassed theory and models on exchange rate and Balance of Payment. The second section reviews literature on exchange rate volatility, and other determinants of Balance of Payment. The last section deals with empirical literature review with particular emphasis on Balance of Payment in general.

The Concept of Exchange Rate

According to Azid, Jamil, Kousar, and Kemal (2005) exchange rate is the price of one currency in relation to another. In slightly different perspective, it expresses the national currency's quotation in respect to foreign ones. In other words, exchange rate refers to the price of one currency (the domestic currency) in terms of another (the foreign currency). Movements in exchange in the exchange rate have ripple effects on other economic variables such as interest rate, inflation rate, unemployment, money supply, etc. These facts underscore the importance of exchange rate to the economic well-being of every country that opens its doors to international trade in goods and services. Exchange rates can be fixed, managed floating and free floating or flexible or fluctuating rates.

Real exchange rate is commonly known as a measure of international competitiveness. It is also known as index of competitiveness of currency of any country and an inverse relationship between this index and competitiveness exists.

Types of Exchange Rate

According to Onyinye and Enugu, (2012) the foreign exchange marketplace at a fastidious instance, near survived, not single distinguish exchange rate other than the diversity of rates depending in the guide of credit appliances exploited in the transmit purpose.

Spot rate: Spot rate of exchange is the rate at which foreign exchange is made available on the spot. It is also known as cable rate or telegraphic transfer rate because at this rate cable or telegraphic sale and purchase of foreign exchange can be arranged immediately. The spot rate is quoted differently for buyers and sellers. This discrepancy is due to the transport charges, insurance charges, dealer's commission, etc. These costs are to be borne by the buyers.

Forward rate: Forward rate of exchange is the rate at which the future contract for foreign currency is made. The forward exchange rate is settled now but the actual sale and purchase of foreign exchange occurs in future. The forward rate is quoted at a premium or discount over the spot rate.

Long rate: Long rate of exchange is the rate at which a bank purchases or sells foreign currency bills which are payable at a fixed future date. The basis of the long rate of exchange is the interest on the delayed payment. The long rate of exchange is calculated by adding premium to the spot rate of exchange in the case

of credit purchase of foreign exchange and deducting premium from the spot rate in the case of credit sale.

Fixed rate: Fixed or pegged exchange rate refers to the system in which the rate of exchange of a currency is fixed or pegged in terms of bullion or another currency.

Flexible rate: Flexible or floating exchange rate refers to the system in which the rate of exchange is determined by the forces of demand and supply in the foreign exchange market. It is free to fluctuate according to the changes in the demand and supply of foreign currency.

Multiple rates: Multiple rates refer to a system in which a country adopts more than one rate of exchange for its currency. Different exchange rates are fixed for importers, exporters, and for different countries.

Two-tier rate system: Two-tier exchange rate system is a form of multiple exchange rate system in which a country maintains two rates, a higher rate for commercial transactions and a lower rate for capital transactions.

Brief Overview of Exchange Rate Regimes in Ghana

Numerous exchange rate regimes are practiced globally, ranging from the extreme case of fixed exchange rate system to a freely floating regime. In practice, countries tend to adopt an amalgam of regimes such as adjustable peg, crawling peg, target zone/crawling bands, and managed float, whichever suit their peculiar economic conditions.

The fixed exchange rate regime

It entails the pegging of the exchange rate of the domestic currency to either unit of gold, a reference currency or a basket of currencies with the primary objective of ensuring a low rate of inflation. The advantages and disadvantages of the fixed regime include amongst others, the reduction of transaction cost in trade, increased macroeconomic discipline, possibility of increased credibility due to stability in the exchange rate and increased response to domestic nominal shocks. A major drawback of the fixed/pegged regimes, however, is that it implies the loss of monetary policy discretion (or monetary policy independence).

The floating exchange rate regime

This regime on the other hand, implies that the forces of demand and supply will determine the exchange rate. The regime assumes the absence of any visible hand in the foreign exchange market and that the exchange rate adjusts automatically to clear any deficit or surplus in the market. Consequently, changes in the demand and supply of foreign exchange can alter exchange rates but not the country's international reserves.

Thus, the exchange rate serves as a "buffer" for external shocks, hence allowing the monetary authorities full discretion in the conduct of monetary policy. That is, monetary policy independence, defined in terms of a country's ability to control its monetary aggregates and influence its domestic interest rate and inflation. This is the greatest advantage of the floating regime. The disadvantages of the freely floating regime include persistent exchange rate fluctuations, high inflation and transaction cost.

Managed floating regime:

This exists when government intervenes in the foreign exchange market in order to influence the exchange rate, but does not commit itself to maintaining a certain fixed exchange rate or some narrow limits around it. The bank gets its hands dirty by manipulating the market for foreign exchange. Depending on the central bank's intervention, changes in the demand and supply of foreign exchange might then be associated with changes in the exchange rates and/or changes in international reserves. Under the system, fiscal and monetary policies are used to promote internal and external balance (Ekaette, 2002).

Theoretical Framework

The theoretical basis for this study is provided by those theories, which deal with the instruments for correcting balance of payments deficits. Such theories have existed in international trade theory as far back as 1752 when Hume (1752) in his work on the balance of trade made a case for the automatic equilibrating mechanism provided by inflows and outflows of money stock in balance of payments adjustments in both the long-run and short-run.

Agenor, 1991 proposes that a country can offset adverse trends in its balance of payments by a change of financial policies. A policy of price adjustments, which involves changes in money wage and changes in the exchange rate, is devaluation. This is presently called expenditure – switching policy. The aim of expenditure reducing policies is to reduce domestic expenditure on consumption and investment and thereby releases goods for export, while leaving aggregate output unchanged. On the other hand, the aim of expenditure switching policy is to switching domestic

demand from imported to home made goods (Komolafe, 1996). The extent to which the switching is achieved depends on elasticity of supply and demand for tradeable goods.

Balance of payments equation

To express our balance of payments function, we look at various approaches used to analyze the effects of exchange rate volatility on the balance of payments. These approaches include the elasticity approach, the absorption approach and the monetary approach. Among these three approaches, the monetary approach describes the current state of art in the analysis of exchange rate fluctuations/effects on balance of payment (Ozumba, 1978). We now consider these approaches.

The elasticity approach

The elasticity approach focuses on the trade balance. It studies the responsiveness of the variables in the trade and services account, constituting of imports and exports of merchandise and services relative price changes induced by devaluation. The elasticity approach to balance of payments is built on the Marshall Learner condition (Sodersten, 1980), which states that the sum of elasticity of demand for a country's export and its demand for imports has to be greater than unity for a devaluation to have a positive effect on a country's balance of payments. If the sum of these elasticities is smaller than unity, then the country can instead improve its balance of trade by revaluation. This condition can be expressed mathematically as follows:

This approach essentially detects the condition under which changes in exchange rate would restore balance of payments (BOP) equilibrium. It focuses on the current account of the balance of payment and requires that the demand elasticity be calculated, specifying the conditions under which a devaluation would improve the balance of payments. Crockett (1977) sees the elasticity approach to balance of payments as the most efficient mechanism of balance of payments adjustments and suggests the computation of demand elasticity as the analytical tool by which policies in the exchange field can be chosen, so as to form the equilibrium.

In contrast, Dhliwayo (1996) is of the view that most less developed countries who are exporters of raw materials or primary products, and importers of necessities may not successfully apply devaluation as a means of correcting balance of payments disequilibrium, because of the low values for the elasticity of demand.

The absorption approach

This approach summarily postulates that devaluation would only have positive effects on the balance of trade if the propensity to absorb is lower than the rate at which devaluation would induce increases in the national output of goods and services. It therefore advocates the need to achieve deliberate reduction of absorption capacity to accompany a currency devaluation. The basic tenet of this approach is that a favourable computation of price elasticity may not be enough to produce a balance of payments effect resulting from devaluation, if devaluation does not succeed in reducing domestic expenditure.

The approach dwells on the national income relationship developed be Keynes and it tries to find out its implication on balance of payments (Machlup, 1955). It begins with the national income identity as shown below.

$Y = C + I + G + X – M$ …….3

where,

Y = National income

C = Private consumption of goods and services

I = Total investment by firms and government

G = Government expenditure on goods and services

X = Export of goods and services

M = Import of goods and services.

The difference between national income (Y) and domestic absorption (C + I + G), gives the trade balance (X – M) which depends on exchange rate, a measure of internal competiveness.

The monetary approach

The monetary approach focuses on both the current and capital accounts of the balance of payments. This is quite different from the elasticity and absorption approaches, which focus on the current account only. As pointed out by Crockett (1977) the general view of monetary approach makes it possible to examine the balance of payments not only in terms of the demand for goods and services, but also in terms of the demand for the supply of money. This approach also provides a simplistic explanation to the long run devaluation as a means of improving the

balance of payments, since devaluation represents an unnecessary and potentially distorting intervention in the process of equilibrating financial flows.

Dhliwayo (1966) emphasizes that the relationship between the foreign sector and the domestic sector of an economy through the working of the monetary sector can be traced by Humes David's price flow mechanism. The emphasis here is that balance of payments disequilibrium is associated with the disequilibrium between the demand for and supply of money, which are determined by variables such as income, interest rate, price level (both domestic and foreign) and exchange rate.

The approach also sees balance of payments as regards international reserve to be associated with imbalances prevailing in the money market. This is because in a fixed exchange rate system, an increase in money supply would lead to an increase in expenditure in the forms of increased purchases of foreign goods and services by domestic residents. To finance such purchases, much of the foreign reserves would be used up, thereby worsening the balance of payments. As the foreign reserve flows out, money supply would continue to diminish until it equals money demand, at which point, monetary equilibrium is restored and outflow of foreign exchange reserve is stopped.

Conversely, excess demand for money would cause foreign exchange reserve inflows, domestic monetary expansion and eventually balance of payment equilibrium position is restored. The monetary approach is specifically geared towards an explanation of the overall settlement of a balance of payments deficit or surplus. If the supply of money increases through an expansion of domestic credit,

it will cause a deficit in the balance of payments, an increase in the demand for goods and various assets and decrease in the aggregate in the economy.

Modern Theory of Balance of Payment

According to Onyinye (2012), The BOP is a systematic record of all economic transactions, visible as well as invisible in a period between one country and the rest of the world. It illustrates the attachment between a nation's in whole payments to rest of the countries and its complete accounts as of them. Bop, therefore is a description of expenses with invoices and global transactions.

In the same way if the requirement for a nation's currency increases at a given amount of return, we can talk of excess in its stability of expenses. A lack stability of transaction results in a reduction on the external worth of the nation's exchange. An excess stability of transaction results in a raise in the external worth of the nation’s currency.

Components of Balance of payment

Current account

According to Antiam (1996), the current account shows the net amount a nation is earning, if it is in surplus or spending if it is in deficit. The sum of the balance of trade (net earnings on exports minus payments for imports), factor income (earnings on foreign investments minus payments made to foreign investors) and cash transfers. It is called the current account.

Capital account

The Capital Account is (also known as financial account) is one of two primary components of the balance of payments, the other being the current account. Whereas the current account reflects a country's net income, the capital account reflects net change in ownership of national assets. A surplus in the capital account means money is flowing into the country, but unlike a surplus in the current account, the inbound flows will efficiently represent borrowings or sales of assets rather than payment for work.

A deficit in the capital account means money is flowing out the country, and it suggests the nation is increasing its ownership of foreign assets. The term "capital account" is used with a narrower meaning by the International Monetary Fund (IMF) and affiliated sources. The IMF splits what the rest of the world calls the capital account into two top level divisions: financial account and capital account, with by far the bulk of the transactions being recorded in its financial account.

Official reserve account

The financial account of the balance of payments includes official reserves. Central banks, like the United States Federal Reserve System, maintain reserves of foreign currency or official reserves. The purpose of official reserves is to provide a stabilizing influence in the foreign exchange market. If a balance of payments deficit occurs, the Federal Reserve reduces its foreign reserves in order to zero out the balance. In the case of a balance of payments surplus, the Federal Reserve acquires additional foreign reserves to zero out the balance.

Volatility

Volatility is defined as "instability, fickleness or uncertainty" and is a measure of risk, whether in asset pricing, portfolio optimization, option pricing or risk management, and presents a careful example of risk management which could be the input to a variety of economic decisions.

Volatility of exchange rates describes uncertainty in international transactions both in goods and in financial assets. Exchange rates are modelled as forward- looking relative asset prices that reflect unanticipated change in relative demand and supply of domestic and foreign currencies, so exchange rate volatility reflects agent's expectations of changes in determinants of money supplies, interest rates and incomes (Azid, Jamil, Kousar, & Kemal, 2005).

Empirical Literature Review

There are number of empirical studies on the impact of exchange rates on BOP, albeit with mixed results. While some studies have found a contractionary effect of depreciation of exchange rate on domestic output which consequently impacts the BOP position negatively (Agenor, 1991; Alejandro, 1963; Kandil, 2004), others find expansionary effects of exchange rate depreciation on output (Adewuyi, 2005; Bahmani-Oskooee & Kandil, 2007).

It was revealed from a study by Akpansung (2013), when the balance of payment of Nigeria and some other countries were indiscriminately chosen and reviewed by him. The study stated that most of the empirical studies of monetary approach reviewed established stability of money demand functions and also

showed evidence of causal relationships that exist between domestic credit and balance of payments.

Ahmed, Awan, Sial, and Sher (2012) in this study is to examine how the trade balance between the United States and Mexico is influenced by the Peso/Dollar exchange rate as well as US and Mexican GDP. This study also briefly examines the Marshall-Lerner condition and J-curve phenomena. Quarterly GDP and real exchange rate data are analyzed using a statistical regression where the independent variables are domestic GDP, foreign GDP, and real exchange rates.

Fang-Yuan and Jun-Guo (2013) in a similar study, used data spanning 1985 to 2010. Relying on quintile regression model, Fang-Yuan and Jun-Guo (2013) determined the effect of GDP and exchange rate on on BOP. Based on the relevant data from 1985 to 2010, this study uses a quintile regression model to make an empirical research about the effect of GDP and exchange rate on foreign exchange reserve. The findings show that: Both GDP and exchange rate have a remarkable influence on the size of foreign exchange reserve and the effect of exchange rate on foreign exchange reserve is higher than GDP at mean place and middle and lower quintile, smaller than GDP at higher quintile.

Danjuma (2013) determine whether excess money supply has played a significant role in the disequilibrium of balance of payment in Nigeria during the period 1986-2010. Using Johansen Cointergration, Vector Error Correction Mechanism and the Impulse Response Function and Variance Decomposition the results confirm that balance of payment in Nigeria is not a purely monetary

phenomenon and the monetary authority in the country should seriously monitor budget deficit because this also cause domestic credit increase.

Tijani (2014) empirical Analysed Balance of Payment Adjustment Mechanisms using Monetary Channel in Nigeria from 1970–2010. The regression analysis found a positive relationship between the BOP and Domestic Credit, Exchange Rate and Balance of Trade while Inflation Rate and Gross Domestic product have a negative effect and concluded that monetary measures constitute immensely to the position of BOP, cause disturbances and also serve as adjustment mechanism to bring BOP to equilibrium depending on it application and policy mix by monetary authority.

Imoisi, Olatunji, and Ekpenyong (2013) study the efficacy of monetary policy in achieving Balance of Payments stability in Nigeria from 1980 to 2010 using an Ordinary Least Squares (OLS) technique of multiple regressions. The estimated result shows a positive relationship between the BOP and the monetary variables of Money Supply, Exchange Rate and Interest Rate. Specifically, Money Supply and Interest Rate had significant relationship with BOP, whereas Exchange Rate was not statistically significant. They concluded that the government should promote the exportation of Nigerian products especially the Non-oil products, as this will bring in more foreign exchange earning into the country, boost productive activities and improve the balance of payments position of the country.

Gagnon, Raskin, Remache, and Sack (2011) in this study based on the relevant data from 1985 to 2010, in this study uses a quintile regression model to make an empirical research about the effect of GDP and exchange rate on foreign

exchange reserve. The findings show that both GDP and exchange rate have a remarkable influence on the size of foreign exchange reserve and the effect of exchange rate on foreign exchange reserve is higher than GDP at mean place and middle and lower quintile, smaller than GDP at higher quintile.

Ahemed et al. (2011) analysed the impact of exchange rate on macroeconomic aggregates in Nigeria. Based on the annual time series data for the period 1970 to 2009, the research examines the possible direct and indirect relationship between the real exchange rates and GDP growth. The estimation results show that there is no evidence of a strong direct relationship between changes in the exchange rate and GDP growth.

Khundrakpam (2008) in this study analyzed India after the reforms initiated in the early 1990. Unlike observed in several countries, it finds a rise in exchange rate pass-through to domestic prices until recent years. Based economic factors typically associated with economic liberalization, the persistence of higher inflation is an important factor for the rise in pass-through.

Broda and Romalis (2003) also analyzed a model of international trade in which trade depresses real exchange rate volatility and exchange rate volatility impacts trade in products differently according to their degree of differentiation. Using disaggregate trade data for a large number of countries for the period 1970-1997 they find strong result supporting the prediction that trade dampens exchange rate volatility. They find that once we address the reverse-causality problem, the large effects of exchange rate volatility on trade found in some previous literature are greatly reduced.

Alawattage (2009) while examining the effectiveness of exchange rate policy of Sri Lanka in achieving external competitiveness since liberalization of the economy in 1977, shows that the real effective exchange rate does not have a significant impact on improving the trade balance particularly in the short run. Even though the cointegration tests reveal that there is a long-run relationship between trade balance and the real effective exchange rate, it shows very marginal impact in improving trade balance in the long run. Crowe (2000) reveals that maintenance of strict exchange rate control has been central to continued BOP positions on Barbados and a fixed exchange rate is thus recommended in order to maintain macroeconomic balance.

Patricia and Osi (2010) examine the BOP equilibrium in the West African Monetary Zone. Using panel data analysis, the results of within-country effects indicate that interest rate and growth in output play a significant role in achieving a favourable BOP, while the cross-country effects show similar results. They therefore consider a tight rein on domestic credit creation as a necessary condition for maintaining stability in the BOP. Imoisi (2012) examines the trends in Nigeria's BOP. The results indicate a significant relationship between BOP, exchange rate and interest rate; the author therefore recommends an increase in non-oil export through a diversified productive base as a vehicle to correct the deficit in the current account section of the BOP.

In other countries, Dhliwayo (1996) tests the monetary approach to Zimbabwe's balance of payments during the period 1980 to 1991 using multivariate co-integration and error-correction modelling, the results suggest that money

played a significant role in determining the balance of payments and concluded that balance of payments disequilibrium can be corrected through appropriate financial programming and monetary targeting.

Boateng and Ayentimi, (2013) examined monetary approach to Balance of Payment in Ghana using annual data set that covered 1980-2010. The ordinary least squares empirical results showed that the balance of payments in Ghana is not wholly a monetary phenomenon and found that monetary variables of domestic credit, inflation, interest have a significant impact on balance of payment proxy by net foreign assets.

Ali (2010) examined the monetary approach to the Pakistan Balance of Payments for the period 1990–2008 employing the reserve flow equation, it tests whether excess money supply played a significant role as a disturbance by using co-integration tests and error-correction modelling. The empirical results showed that monetary variables do not play an overwhelming role in determining Pakistan's balance of payments. The study also revealed that balance of payments is not a purely monetary phenomenon. Therefore, disequilibrium in the Balance of Payments cannot be corrected only through monetary actions by the authorities.

In the study of Fleermuys (2005) Namibia monetary approach to balance of payments for the period 1993–2003, the empirical results showed that monetary variables do not play an overwhelming role in determining Namibian balance of payments. The results showed that, although some variables suggested by the monetary approach play significant roles and balance of payments disequilibrium can, therefore, not be corrected only through monetary actions by the authorities.

Furthermore, Umer, Abro, and Ghazali (2010) in their study which examines the monetary approach to Pakistan's balance of payments for the period 1980-2008 using Co- integration test and error correction modelling. The empirical results revealed that showed that monetary variable does not play an overwhelming role in determining Pakistan's balance of payments and conclude that the balance of payments is not a purely monetary phenomenon.

Bahmani-Oskooee and Kantipong (2001) when testing on disaggregated quarterly ARDL co integration between Thailand and the main five trading partners for period 1973-1990, find evidence of the J-curve in bilateral trade with US and Japan only. Bahmani-Oskoose (2001) as cited in Trinh (2012) investigate the long-run response of Middle Eastern countries' trade balance to devaluation by applying the Engle-Ganger and Johansen-Juselius co integration methodology and find a favorable long-run effect of a real depreciation on the trade balance for seven countries.

Serrat (2000), in this paper examined the exchange rate behavior in a multilateral target zone. Introduces a new class of stochastic processes in economics, namely multidimensional reflected diffusion processes. The restriction on interventions imposed by cross-currency constraints. Cooperation in sharing the intervention burden in general, the exchange rate between any two countries will depend on the fundamentals of third countries in a multilateral target zone model.

Parsley and Popper (1998) examined Central Banks that are primarily concern with the behavior of prices will use monetary policy to try insulating prices from exchange rate changes. Prices than appear unresponsive to changes in the

exchange rate. Obstfeld and Rogoff (1995) they develop an analytically tractable two country model that marries a full account of global macro-economic dynamics to a supply framework based on monopolistic competition and sticky nominal prices.

Vergil (2002) empirically investigated the impact of real exchange rate volatility on the export flows of Turkey to the United States and its three major trading partners in the European Union for the period 1990:1-2000:12. The standard deviation of the percentage change in the real exchange rate is employed to measure the exchange rate volatility. Co integration and error-correction models are used to obtain the estimates of the co integrating relations and the short-run dynamics, respectively.

Chapter Summary

This chapter reviewed relevant literature putting the study into perspective. Specifically, historical perspective of exchange rate, forms and types of exchange rate as well as theories of Balance of Payment and exchange rate volatility were reviewed. Also, the channels and relationship between Balance of Payment exchange rate volatility as well other several macroeconomic variables were reviewed. The empirical literature made it clear the effects of exchange rate volatility and the control variables on Balance of Payment are illusive both at country and cross-country level, one reason this study is important.

CHAPTER THREE

RESEARCH METHODS

Introduction

This chapter discusses the methodology that is used for this study. It provides a comprehensive description of the research design, theoretical and empirical models used for the study as well as a detailed description of variables and estimation techniques used in the study.

Research Design

Consistent with the objectives of the study, quantitative research design was employed to investigate the relationship between Balance of Payment (the dependent variable) and exchange rate volatility (the independent variable) in Ghana. As compared to qualitative design, the major strength of research design is how it take full advantage of replicability, objectivity, and generalisability of findings. Therefore, this design ensures that the researcher sets aside his experiences, discretions or perceptions, and biases to ensure objectivity in the conduct of the study and deductions that would be drawn. Interestingly, quantitative research designs are either descriptive, where subjects usually measured once or experimental, subjects measured before and after a treatment.

Data Source and Data Analysis

The data for this study were secondary obtained from the 2016 edition of the World Development Indicators (WDI). Annual Time Series data on these selected macroeconomic variables Government Expenditure (GE), Exchange Rate

Volatility (EXV), Real Gross Domestic Product Growth (GDPG), Money Supply (M2) and Interest Rate (IR) and Trade openness (OPN). The data for this work was sourced from the databases of world bank (WDI, 2017). Eviews 9.0 was the statistical and econometric package employed in all the regression analysis (unit root test, cointegration and impact analysis).

Theoretical Model Specification

Finding an appropriate model for the balance of payments stem from theoretical considerations. Following a review of the theoretical literature and empirical approach for Ghana, this study adopts a general framework described by Magee (1976). In Magee's work, he examines the effect of monetary variables such as, price level, interest rate and nominal domestic credit on the balance of payment (BOP). The Balance of Payments function adopted in this study is a combination of monetarist, structuralists and fiscalists factors. The functional form expresses Balance of Payment as vector of trade openness, exchange rate, money supply, interest rate, exchange rate volatility and inflation.

$$BOP = f\ (INF, INT, GDPG, OPN, EXV, MS) \qquad (1)$$

Empirical Model Specification

By augmenting the models used by Dhliwayo (1996) and Ali (2010), the study estimated a model in which Balance of Payment was functionally related to level of economic growth and several macroeconomic variables. The specification of econometric model for this study considers the relevant influential variables discussed previously, and presents a slight deviation from the existing literature.

To explore the dynamic association among Balance of Payment and the six main macroeconomic variables namely GDP Growth (GDPG), Trade Openness (OPN), Inflation rate (INF), Interest Rate (INT), and Money Supply (MS) were controlled for. In addition, since exchange rate volatility (EXV) is not an economic variable, it was calculated (generated) and incorporated in the model. The specification of the functional model is shown in equation 2 below:

BOP=f (INF, INT, GDPG, OPN, EXV, MS) (2)

Equation (2) was transformed to a structural model as seen in equation (3) below:

$$BOP_t = f(.) = INF_t^{\beta_1} INT_t^{\beta_2} GDPG_t^{\beta_3} MS_t^{\beta_4} OPN_t^{\beta_5} EXV_t^{\beta_6} e^{\varepsilon} \quad (3)$$

Using the logarithmic transformation of the variables in equation (3), the empirical specification of the model above was written as seen in equation (4) below:

$$\ln BOP_t = \beta_0 + \beta_1 lnINF_t + \beta_2 lnINT + \beta_3 lnMS_t + \beta_4 lnGDPG_t + \beta_5 lnOPN_t + \beta_6 lnEXV_t + \varepsilon_t \quad (4)$$

where; *BOP* = Balance of Payment, β_0 = Balance of Payment intercept, GDPG= Gross Domestic Product Growth, OPN = Trade Openness, INT = Lending Rate, INF = Inflation rate, EXV = Exchange Rate Volatility, while ε is the error term.

Modeling Exchange Rate Volatility

The chief explanatory variable of this study was exchange rate volatility. Since exchange rate volatility is not observable, it had to be generated. Since real exchange rate is sometimes characterised by high-time-varying volatility, the assumption of constant variance is inappropriate hence linear models are unable to explain a number of important features of exchange rate related impacts. It is

therefore appropriate to use models that allow the variance to depend upon its history to examine the real exchange rate volatility.

Various methods have been employed to generate exchange rate volatility in the literature. These include the moving average, standard deviation, autoregressive conditional heteroscedasticity (ARCH) and generalized autoregressive conditional heteroscedasticity (GARCH) developed by Bollerslev (Brooks, Smith, Hill, & O'Dowd, 2002). There are several versions of the GARCH model but this study settled on the GARCH (1,1) model as defined in equation (9) below, because of its parsimony and ability to capture volatility in time series

The study considered Generalised Autoregressive Conditional Heteroskedastic (GARCH) models which allow variances of errors to be time dependent. However, it was important to test for the presence of time varying effect (ARCH Effect). If the test results show evidence of heteroscedasticity, then (GARCH) models are appropriate for estimating the series and if the results prove that there are no ARCH Effect, then (GARCH) models cannot be used.

The GARCH (1,1) modeling process commences with mean equation (5) which expresses changes in the real effective exchange rate, RER, as a function of its lagged value. The error term, e_t is normally distributed with zero mean and a variance, h_t. The variance, h_t is then used to specify the GARCH (1,1) model of interest as in equation (6).

$$\Delta(lnRER)_t = c_1 + \beta\Delta(lnRER)_{t-1} + e_t \quad (5)$$

$$e_t \approx N(0, h_t)$$

$$h_t = c_2 + e_{t-1}^2 + h_{t-1} \quad (6)$$

where: $\Delta(lnRER)$= difference log of the real effective exchange rate from period t to $t-1$

h_t = variance of the error term e_t

e_{t-1}^2= the ARCH term

h_{t-1}= the GARCH term

From equation 9, the variance equation has one ARCH term (i.e.ε_{t-1}^2) and one GARCH term (h_{t-1}). The dependent variable (h_t) represents the conditional variance, α and β represent the lagged squared error term (ARCH effect) and conditional volatility (GARCH effect) respectively. Both α and β measure the overall volatility. A large error coefficient, α indicates that volatility reacts intensely to internal movements, while a large GARCH coefficient, β indicates that shocks to conditional variance take a long time to die out, which means that volatility is persistent (Brooks, Smith, Hill, & O'Dowd, 2002). If ($\alpha + \beta$) in the variance equation is very close to one, that means high persistence in volatility and implies inefficiency in the market. It is expected to be detrimental to Ghana's BOP position.

Justification of the Inclusion of the Variables

Balance of payments

The Balance of Payments is a record of a country's transactions with the rest of the world. It shows the receipts and payment from trade. It consists of the current and financial account. If country's inflation rate will increase relative to foreign country with which it trades its current account will expected to decrease

due to increase in imports, and decrease in export, that have negative effect on the development of economy.

Inflation rate

According to Melberg (1992), inflation describes a general and persistent increase in the prices of goods and services in an economy. Price stability exists when average prices are constant over time, or when they are rising at a very low and predictable rate. Price inflation occurs when average prices are rising above this low and predictable rate leading to high cost of living within the economy. The monetarists, following from the Quantity Theory of Money (QTM), have propounded that the quantity of money is the main determinant of the price level, or the value of money, such that any change in the quantity of money produces an exactly direct and proportionate change in the price level (Umaru & Zubairu, 2012).

Inflation not only creates problem within the economy but also in the sphere of external trade of a country, that is, country's trade balances with the rest of the world. A country's trade relations with other countries involve exports and imports of goods and services, how much a country will export and import depends amongst other things on the domestic price level and variation in it influenced by inflation rate. The variable was proxied of period inflation averages. The data was obtained from the 2017 edition of the World Development Indicators (WDI). It is expected to have a positive effect on Balance of Payment.

GDP growth

GDP growth is a measure of the sophistication and growth of the economy over time. An increase in the level of domestic income increases the demand for all goods and services, including imports and it results in an increased supply of the domestic currency. A high rate of economic growth and a sizeable GDP growth favour the state's capacity to produce more thereby improving the trade balance. Several studies including but not limited to Bahmani-Oskooee and Kantipong, (2001) support this claim.

However, Bird and Vaillancourt (2008) have also claimed that Balance of Payment decline in low income countries even though nominal value of GDP growth improves because it does not realistic depict the improvement in the productive capacity of most imported goods. The data was obtained from the 2017 edition of the World Development Indicators (WDI). It is expected to have a positive effect on Balance of Payment.

Trade liberalization (OPN)

The impact of trade liberalization on Balance of Payment is investigated in more detail in terms of the performance of the overall economy. Trade openness may either improve or deteriorate Balance of Payment, depending on many different factors. On one hand, fiscal revenue can be improved if trade liberalization is accompanied by such supportive situations as a large expansion in international trade volume, economic growth, employment, a rise in income level, and devaluation of exchange rate.

On the other hand, fiscal revenue could fall if trade liberalization is associated with a shrink in trade volume, job losses, and deterioration in corporate profit. The variable was proxied by trade openness which is the sum of total export and import to GDP. The data was obtained from the 2017 edition of the World Development Indicators (WDI). It is expected to have a negative effect on Balance of Payment.

Interest rates

Mundell (1963), existence of interest rates differences between home country and abroad leads to capital mobility. The relationship between interest rate and the balance of payment becomes more evident by looking at country's capital account. Capital account deals with monetary flows into and out of a nation's financial markets. The most important determinant of financial flows is interest rates, which determine the rate of return on savings/investments.

The potential return on financial assets such as real estate and equities will have important effects in the capital market. The higher a country's interest rates, the more attractive its financial markets are to both domestic and foreign idle fund (Kenen, 1960). This leads to an increased inflow of money through the capital account and less money leaving a country in search of higher returns in the international market. Sustained inflow will lead to increased supply of foreign currency and a high demand for the domestic currency, consequently, the domestic currency will appreciate over time affecting both the exchange rate in the market and the country's balance of payment (Suranovic, 2012). The variable was proxied by the lending rate. The data was obtained from the 2016 edition of the World

Development Indicators (WDI). It is expected to have a positive effect on Balance of Payment.

Unit Root Test

It is very important to test for the statistical properties of variables when dealing with time series data. Time series data are rarely stationary in level forms. Regression involving non-stationary time series often lead to the problem of spurious regression. This occurs when the regression results reveal a high and significant relationship among variables when in fact, no relationship exist. Moreover, Stock and Watson (1988) have also shown that the usual test statistics (T, F, DW, and R^2) will not possess standard distributions if some of the variables in the model have unit roots. A time series is stationary if its mean, variance and auto-covariance are independent of time.

The study employed a several unit root tests. This was done to ensure reliable results of the test for stationarity due to the inherent individual weaknesses of the various techniques. The study used the Philips-Perron (PP) and Augmented Dickey Fuller (ADF) tests. These tests are similar except that they differ with respect to the way they correct for autocorrelation in the residuals. The PP nonparametric test generalizes the ADF procedure, allowing for less restrictive assumptions for the time series in question. The null hypothesis tested was that the variable under investigation had a unit root against the stationarity alternative. In each case, the lag-length was chosen using the Akaike Information Criteria (AIC) and Schwarz Information Criterion (SIC) for both the ADF and PP test. The sensitivity of ADF tests to lag selection renders the PP test an important additional

tool for making inferences about unit roots. The basic formulation of the ADF was specified as follows:

$$X_t = \mu + \alpha X_{t-1} + \gamma t + \varepsilon_t \quad (7)$$

Subtracting X_{t-1} from both sides gives:

$$\Delta X_t = \mu + (1-\alpha)X_{t-1} + \gamma t + \varepsilon_t \quad (8)$$

The t-test on the estimated coefficient of X_{t-1} provides the Dickey Fuller test for the presence of a unit-root. The Augmented Dickey Fuller (ADF) test is a modification of the Dickey Fuller test and involves augmenting the above equation by lagged values of the dependent variables. It is made to ensure that the error process in the estimating equation is residually uncorrelated, and also captures the possibility that X_t is characterized by a higher order autoregressive process. Although the DF methodology is often used for unit root tests, it suffers from a restrictive assumption that the errors are independent and identically distributed. Therefore, representing $(1-\alpha)$ by ρ and controlling for serial correlation by adding lagged first differenced to equation (8) gives the ADF test of the form:

$$\Delta X_t = \mu + \rho X_{t-1} + \gamma \tau + \sum_{i=1}^{\rho} \emptyset_i \Delta X_{t-i} + \varepsilon_t \quad (9)$$

Where X_t denotes the series at time t, Δ is the first difference operator, μ, γ, $\emptyset$ are the parameters to be estimated and ε_t is the stochastic random disturbance term.

The ADF and PP test the null hypothesis that a series contains unit root (non-stationary) against the alternative hypothesis of no unit root (stationary).

That is:

$H_0: \rho = 0$ (X_t is non-stationary)

$H_0: \rho \neq 0$ (X_t is stationary)

Estimation Technique

Autoregressive Distributed Lag (ARDL) Model

In order to establish and analyse the long-run relationships as well as the dynamic interactions among the variables of interest empirically, the autoregressive distributed lag cointegration procedure developed by Pesaran, Shin, and Smith (2001) was used.

The basis for using the ARDL to estimate the model centred on the following reasons: First, the ARDL cointegration procedure is comparatively more effective even in small sample data sizes as is the case in this study. This study covers the period 1984–2015 inclusive. Hence, the total observations for the study is 32 which is relatively small. Second, the ARDL enables the cointegration to be estimated by the Ordinary Least Square (OLS) technique once the lag of the model is known. This is however, not the case of other multivariate cointegration procedures such as the Johansen Cointegration Test developed by Johansen (1991). This makes the ARDL procedure relatively simple. Lastly, the ARDL procedure does not demand pretesting of the variables included in the model for unit roots compared with other methods such as the Johansen approach. It is applicable regardless of whether the regressors in the model are purely I(0), purely I(1) or mutually cointegrated.

Following Pesaran, Shin, and Smith (2001) as summarized in Choong, Yusop, and Liew (2005), an expression of the relationship between the variables under study using the ARDL approach to cointegration was expressed as follows:

$$\Delta lnBOP_t = \delta_0 + \emptyset lnBOP_{t-1} + \alpha_1 lnINF_{t-1} + \alpha_2 lnINT_{t-1} + \alpha_3 lnMS_{t-1} + \alpha_4 lnGDPG_{t-1} + \alpha_5 lnOPN_{t-1} + \alpha_6 lnEXV_{t-1} + \sum_{i=1}^{\rho} \beta_1 \Delta lnBOP_{t-i} + \sum_{i=0}^{\rho} \beta_2 \Delta lnINF_{t-i} + \sum_{i=0}^{\rho} \beta_3 \Delta lnINT_{t-i} + \sum_{i=0}^{\rho} \beta_4 \Delta lnMS_{t-i} + \sum_{i=0}^{\rho} \beta_5 \Delta lnGDPG_{t-i} + \sum_{i=0}^{\rho} \beta_6 \Delta lnOPN_{t-i} + \sum_{i=0}^{\rho} \beta_7 \Delta lnEXV_{t-i} + \varepsilon_t \quad (10)$$

Where, $\emptyset$ and α_i represent the long run elasticities while β_i are the short run elasticities.

Test for Cointegration

The Autoregressive Distributed Lag (ARDL) Cointegration Test, otherwise called the Bounds Test developed by Pesaran, Shin and Smith (2001) was used to test for the cointegration relationships among the series in the model. Two or more series are said to be cointegrated if each of the series taken individually is non-stationary with I(1), while their linear combination are stationary with I(0). In a multiple non-stationary time-series, it is possible that there is more than one linear relationship to form a cointegration.

Having satisfied the criteria that the variables were a mixture of I(0) or I(1), the ARDL bounds test for cointegration was carried out. The ARDL Bounds testing procedure essentially involves three steps. The first step in the ARDL bounds testing approach was to estimate equation (10) by OLS in order to test for the existence or otherwise of a long-run relationship among the variables. This was done by conducting an F-test for the joint significance of the coefficients of lagged levels of the variables. The corresponding hypotheses would be:

$H_0: \theta_0 = \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = \theta_6 = 0$

$H_1: \theta_0 \neq \theta_1 \neq \theta_2 \neq \theta_3 \neq \theta_4 \neq \theta_5 \neq \theta_6 \neq 0$

The test which normalizes Balance of Payment (BOP) was denoted by

$F_{BOP}\,(BOP, GDPG, INF, OPN, EXV,\ INT, MS)$.

Two asymptotic critical bounds values provide a test for cointegration when the independent variables are I(d) (where $0 \leq d \leq 1$): a lower value assuming the regressors are I(0) and an upper value assuming purely I(1) regressors.

Given that the F-statistic is above the upper critical value, the null hypothesis of no long-run relationship is rejected regardless of the orders of integration for the time series. On the flip side, if the F-statistic falls below the lower critical values, the null hypothesis is accepted, implying that there is no long-run relationship among the series. However, if the F-statistic falls between the lower and the upper critical values, the result becomes inconclusive.

In the second stage of the ARDL bounds approach, once cointegration is established, the conditional ARDL (p, q_1, q_2, q_3, q_4, q_5,), the long-run model for BOP_t was estimated as:

$$\Delta lnBOP_t = \gamma + \sum_{i=l}^{\rho} \beta_{li}\, \Delta lnBOP_{t-i} + \sum_{f=1}^{n} \beta_{2f} \Delta lnINF_{t-f} +$$

$$\sum_{g=1}^{n} \beta_{3g} \Delta lnINT_{t=g} + \sum_{k=1}^{n} \beta_{4k} \Delta lnMS_{t-k} + \sum_{j=1}^{n} \beta_{5j} \Delta lnGDPG_{t-j} +$$

$$\sum_{t=r}^{n} \beta_{6r} \Delta lnEXV_{t-r} + \sum_{q=1}^{n} \beta_{7q} \Delta lnOPN_{t-q} + \mu_t \qquad (11)$$

This involved selecting the orders of ARDL (p, q_1, q_2, q_3, q_4, q_5) model in the variables using Akaike Information Criterion (Akaike, 1973).

The third and the last step in the ARDL bound approach is to estimate an Error Correction Model (ECM) to capture the short-run dynamics of the system given a shock or disequilibrium.

Error-Correction Model (ECM)

The concepts of Error Correction Models(ECM) and cointegration are closely associated in time series analysis and often used together to characterize the relationships between the series being studied. In essence, it can be shown that, with re-parameterization, the error-correction model is a standard VAR in first differences augmented by error-correction terms. An Error-Correction Mechanism (ECM) is a way of combining the long run, cointegrating relationship between the levels variables and the short-run relationship between the first differences of the variables. The principle behind the error-correction model is that often, there exists a long-run equilibrium relationship between two economic variables. In the short run, however, there may be disequilibrium. With the error-correction mechanism, a proportion of the disequilibrium is corrected in the next period.

According to Kremers, Ericsson, and Dolado (1992) and Bahmani-Oskooee (2001), a relatively more efficient way of establishing cointegration is through the error correction term. Thus, the study discerns that the variables in the model show evidence of moderate response to equilibrium when shocked or disturbed in the short-run. Theoretically, it is debated that an error correction mechanism exists whenever there is a cointegrating relationship among two or more variables. The error correction term is thus obtained from the negative and significant lagged residual of the cointegration regression. The error-correction process is thus a means to reconcile short-run and long-run behaviour. The ECM generally provides the means of reconciling the short-run behaviour of an economic variable with its long-run behaviour.

The ECM was specified as follows:

$$\Delta lnBOP_t = \gamma + \sum_{i=l}^{\rho} \beta_{li}\, \Delta lnBOP_{t-i} + \sum_{f=0}^{n} \beta_{2f} \Delta lnINF_{t-f} +$$

$$\sum_{g=0}^{n} \beta_{3g} \Delta lnINT_{t-g} + \sum_{k=1}^{n} \beta_{4k} \Delta lnMS_{t=0} + \sum_{j=1}^{n} \beta_{5j} \Delta lnGDPG_{t=0} +$$

$$\sum_{t=r}^{n} \beta_{6r} \Delta lnEXV + \sum_{q=0}^{n} \beta_{7q} \Delta lnOPN_{t=0} + \rho ECM_{t-1} + \mu_t$$

(12)

From equation (13), $\boldsymbol{\rho}$ represents the short-run dynamics coefficients of the model's convergence to equilibrium. ECT_{t-1} is the Error Correction term. The coefficient of the Error Correction term, ρ measures the speed of adjustment to obtain equilibrium in the event of shocks to the system. The absolute size of the error term, ECT_{t-1}, determines the speed of adjustment of the model to long-run equilibrium when it is shocked.

Data Analysis

The study employed both descriptive and quantitative analysis. Graphs and tables were employed to aid in the descriptive analysis. Unit root test procedures were specified. Furthermore, the study adopted the bounds testing approach of cointegration to obtain both the short and long-run estimates of the variables involved. All estimations would be carried out using Econometric software Eviews 9.0 package.

Chapter Summary

This chapter developed and presented the methodological framework appropriate for conducting the study. The model was developed from the theoretical formulations of the neo-classical theory. Annual time-series data on Real GDP,

Gross Fixed Capital Formation, Foreign Direct Investment, Inflation, and Labour Force capita from 1984 to 2012 was employed for the study. Stationarity test was conducted using ADF and PP tests. Moreover, the bounds testing approach to cointegration was used to determine the existence or otherwise of long run relationship between government expenditure and economic growth.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This section presents and discusses the results of the study. The purpose is to understand the empirical relationship between Balance of Payment and exchange rate volatility in Ghana. The study first tested for unit root in order to determine the stationarity status of the variables using the Augmented Dickey-Fuller (ADF) and Phillips Peron (PP) tests and further tested for cointegration using the Autoregressive Distributed Lagged (ARDL) bounds testing approach.

Descriptive Statistics

In this section, the study presented descriptive statistics of the variables involved. The descriptive statistics is based on the true values (level) of the variables. The descriptive statistics include mean, median, maximum, minimum, standard deviation, skewness, kurtosis, sum, sum squared deviation and number of observations.

Table 1: Descriptive Statistics of the Series

	BOP	EXV	MS	INT	INF	GDPG	OPN
Mean	-1.19×10^9	-0.0934	37.728	24.788	21.968	5.5394	69.426
Median	-4.01×10^8	-0.1248	39.128	23.135	17.276	4.8478	71.594
Maximum	-24420000	0.6766	56.534	78.720	59.461	14.046	116.04
Minimum	-5.70×10^9	-0.6229	13.301	18.320	8.7268	3.3000	18.814
Std. Dev.	1.52×10^9	0.3066	12.323	10.031	12.382	2.2246	25.308
Skewness	-1.355535	0.3438	-0.2217	5.0654	1.1807	2.1092	5-0.1477
Kurtosis	3.724593	2.9123	2.0239	27.829	3.9708	7.9386	2.1498
J. Bera	10.49991	0.6407	1.5326	958.85	8.6918	56.246	1.0463
Prob	0.005248	0.7258	0.4647	0.0000	0.0129	0.0000	0.5926
Sum	-3.80×10^{10}	-2.9896	1207.3	793.23	702.99	177.26	2152.2
SS Dev.	7.20×10^{19}	2.9143	4707.7	3119.6	4753.0	153.41	19215.8
Obs	32	32	32	32	32	32	32

Note: SS Dev. represents Sum of Squared Deviation, Std Dev. represents Standard Deviation, J. Bera represents Jarque Bera, Prob represents Probability, while Obs stands for Observation.

Source: Author's Construct, 2019.

It could be observed from Table 1 that all the variables have positive average values and median with the exception of exchange rate volatility and BOP. This is normal considering the series involved. For instance, the mean Balance of Payment (BOP) is approximately a deficit of GHS1.9 billion while the average inflation rate is also 22 percent. The average GDPG of Ghana over the study period was also approximately 6 percent. Also, the minimal deviation of the variables from their means as shown by the standard deviation gives indication of slow growth rate (fluctuation) of these variables over the period of consideration. The Jarque-Bera statistic which shows the null hypothesis that all the series are drawn from a normally distributed random process cannot be rejected for all the variables.

Moreover, in terms of skewness, the descriptive statistics shows that all the variables are positively skewed (BOP and MS) implying that the majority of the values are less than their means. Furthermore, the standard deviation of the

variables from their means are quite low when compared to their respect means with the exception of exchange rate volatility This is normal considering the fact that the variables change easily depending on the nature and extent of instability in the goods market at any point in time.

Evidence of Real Exchange Rate Volatility in Ghana

Appendix A shows the result which provides evidence of ARCH Effect in the exchange rate series used for the study. The coefficient of the squared residuals for the series is significant at 1 percent. The implication of this result is that the real exchange rate contains time varying effect, hence linear models cannot realistically explain its behavioural pattern. There is therefore a justification for adopting GARCH models for estimating the volatility in real exchange rate.

The result in Appendix B provides evidence of high and persistent volatility in the exchange rate. The coefficient, β, which captures the influence of new shocks on volatility, and parameter, α, which measures the persistence of volatility shocks, are both significant at 1 percent. The sum coefficients of α and β is approximately equal to one indicating that the volatility is highly persistent suggesting the presence of volatility clustering – a period where large (small) changes in exchange rate shock is followed by large (small) changes over a longer period. This creates a trend in the market that participants can follow in order to make excessive profit in a violation of market efficiency hypothesis. Moreover, the ARCH [1] which is the serial LM test shows the absence of serial correlation in the residuals.

Trend Analysis on BOP and Exchange Rate Volatility (1984 – 2015)

In order to respond to the first objective, a trend analysis of the Exchange rate volatility and BOP from 1984 to 2015 is shown in Figure 2.

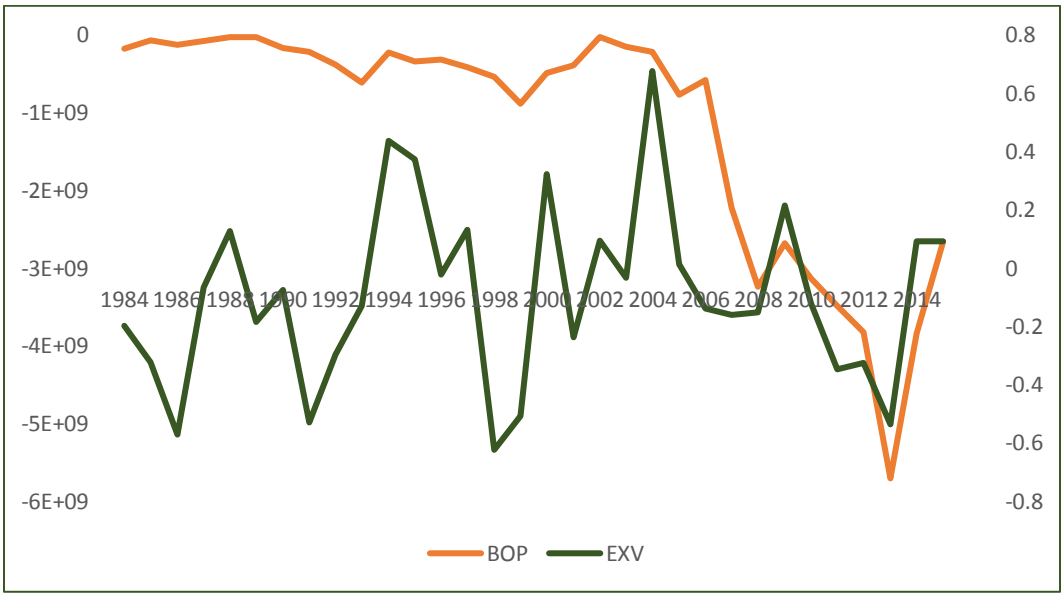

Figure 2: Trend of BOP and Exchange Rate Volatility (1984 – 2015)

Source: Data from WDI, 2017

Figure 2 shows the overall trend of Balance of Payment to GDP over the study period. The BOP summarizes the flow of economic transactions between Ghana and the rest of the world. A close look at Figure 2 reveals a slight increase in BOP from 1985 but started declining thereafter to 1993. This is the period where vigorous programs of trade liberalization and general programme to create an enabling environment for trade and investment promotion and development leading to a rise in the BOP in 1986 but the economy started exhibiting a decline in BOP to 1993. From 1993, the BOP began to rise again from minus GHS 6 billion to minus GHS 3.4 in 1994.

Subsequently, Ghana's BOP witnessed a sharp rise from 1999 to 2002 however reduced thereof to 0.48 in 2005. From 2006 to 2009, there has been decrease in the trend of BOP to GDP. From 2006 to 2014 as low as 0.2 in 2006. From 2009 to 2015, there has been fluctuations in the trend of BOP to GDP. From the period of 2013, the BOP recovered from the lower trend to an increasing trend to 2015 which means that the country has improve on its trade with the rest of the world within these years.

Figure 2 above also shows annual volatility of Ghana's real effective exchange rate over the study period. There is a negative volatility as indicated in the descriptive statistics. A careful look at the figure clearly shows a more downward volatile nature in both the first and second decades of the study period. The economy experienced a high rate of volatility in exchange rate from 1985 to 1995. This had a negative consequence on the BOP as it reduced from minus GHS 2.5 billion to minus GHS 3.4 billion in 1995.

Moreover, there was an upward trend in volatility in exchange rate in 2001 implying an improved strength of currency causing a corresponding rise in the BOP. This was very impressive but the figure declined sharply 2004 to -0.2 in 2006 before rising from 2008. From 2009, the exchange rate volatility has generally been downward (decreasing strength of the local currency). Over the period of 2009 to 2013, where the volatility of the exchange rate seems prevalent, the BOP also declined sharply from minus GHS 0.12 million in 2010 to minus GHS5.7 billion in 2013 as a result of the decrease in strength of the local currency but from 2013, where the exchange rate was volatile upward, the BOP also begins to rise sharply

to 2015. This emphasized a clear dependency of Ghana's BOP performance on exchange rate volatility.

Unit Root Test Results

Even though the cointegration technique used for this study does not require the pre-testing of the variables for unit roots, it is however imperative to perform this test to verify that the variables are not integrated of an order higher than one. The purpose is to ascertain the absence or otherwise of $I(2)$ variables to extricate the results from spurious regression. Thus, in order to ensure that some of the variables are not integrated at higher order, there is the need to complement the estimated process with unit root tests.

Unit root tests were conducted to investigate the statistical properties of the variables. As a result, the ADF and PP tests were applied to all the variables in levels and in first difference in order to formally establish their order of integration. To be certain of the order of integration of the variables, the test was conducted with intercept and time trend in the model. The optimal number of lags included in the test was based on automatic selection by Schawrtz-Bayesian Criteria (SBC), and Akaike Information Criteria (AIC). The study used the P-values in the parenthesis to make the unit root decision, (that is, rejection or acceptance of the null hypothesis that the series contain unit root) which arrived at similar conclusion with the critical values.

The results of ADF and PP tests for unit root with intercept and trend in the model for all the variables are presented in Table 2 and Table 3 respectively. The null hypothesis is that the series is non-stationary, or contains a unit root. The

rejection of the null hypothesis is based on the MacKinnon, Lockwood, and Williams (2004) critical values as well as the probability values.

Table 2: Results of Unit Root Test with Trend and constant: ADF Test

Level			First Difference			
Variables	ADF-Statistics	Lag	Variables	ADF-Statistics	Lag	*I(0)*
LBOP	-2.4886[0.1281]	1	ΔLBOP	-7.3034[0.0000]***	0	I(1)
LOPN	-2.0136[0.2797]	1	ΔLOPN	-5.0645[0.0003]***	1	I(1)
LINF	-3.4767[0.0159]**	1	ΔLINF	-4.5805[0.0012]***	0	I(0)
LINT	-3.0981[0.0375]**	1	ΔLINT	-6.3926[0.0000]***	0	I(0)
LMS	-1.08972[0.7066]	1	ΔLMS	-5..3079[0.0002]***	0	I(1)
LGDPG	3.5970[1.0000]	1	ΔLGDPG	-3.0170[0.0450]***	1	I(1)
EXV	-4.3886[0.0016]***	0	ΔEXV	-7.3652[0.0000]***	1	I(0)

Source: Author's Construct, 2019.

Table 3: Results of Unit Root Test with constant and trend: PP Test

Levels			First Difference			
Variables	PP-Statistics	BW	Variables	PP-Statistics	BW	*I(0)*
LBOP	-3.1706[0.1093]	2	ΔLBOP	-7.4866[0.0000]***	4	I(1)
LOPN	-1.3894[0.8434]	3	ΔLOPN	-3.5787[0.0495]***	3	I(1)
LINF	-4.0251[0.0186]**	11	ΔLINF	-15.7639[0.0001]***	28	I(0)
LINT	-2.8745[0.1842]	1	ΔLINT	-6.1668[0.0001]***	2	I(1)
LMS	-1.7776[0.6903]	5	ΔLMS	-6.2502[0.0001]***	5	I(1)
LGDPG	0.4542[0.9986]	2	ΔLGDPG	-3.7210[0.0368]***	2	I(1)
LEXV	-4.1935[0.0127]**	7	Δ*L*EXV	-19.858[0.0000]***	28	I(0)

Note: ***, **, * indicates the rejection of the null hypothesis of non- stationary at 1%, 5%, 10% level of significance respectively, Δ denotes the first difference, BW is the Band Width and I(0) is the lag order of integration. The values in parenthesis are the P-values.

Source: Author's Construct, 2019.

From the unit root test results in Table 2, the null hypothesis of the presence of unit root for some of the variables in their levels cannot be rejected since the P-

values of the ADF statistics were not statistically significant at any of the three conventional levels of significance with the exception of log of industry (LINT), exchange rate volatility (EXV) and inflation (LINF) which were stationary at 5 percent or 10 percent significant levels. However, at first difference, the variables became stationary. This is because the null hypothesis of the presence of unit root (non-stationary) is rejected at 1 percent significant levels for all the estimates accept Per capita income which was stationary at 5 percent.

The PP test results for the presence of unit root with trend and intercept in the model for all the variables are presented in Table 3. From the unit root test results in Table 3, the null hypothesis of the presence of unit root for majority of the variables in their levels cannot be rejected since the P-values of the PP statistics were not statistically significant at any of the three conventional levels of significance with the exception of exchange rate volatility (EXV), and inflation (LINF) which were stationary at 5 percent significant levels. However, at first difference, the variables become stationary. This is because the null hypothesis of the presence of unit root (non-stationary) was rejected at 1 percent significant levels for all the estimates but Per capita income and trade openness which were significant at 5 percent level. The PP unit root test results in Table 3 are in line with the ADF test in Table 2, suggesting that most of the variables are integrated of order one, I(1), when intercept and time trend are in the model.

It was therefore clear from the unit root results discussed above that all the variables were integrated of order zero, I(0), or order one, I(1). Since the test results

have confirmed the absence of I(2) variables, the estimation technique was thus appropriate for estimation.

Cointegration Analysis

This section presents the long run relationship between Balance of Payment, exchange rate volatility and the other control variables.

Table 4: Bounds test results for cointegration

Critical Value Bound of the F-statistic: intercept and no trend						
K	90% Level		95% Level		99% Level	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
6	1.99	2.94	2.27	3.28	2.88	3.99

Source: Author's Construct, 2019.

Since the focus of this study was to establish the relationship between exchange rate volatility and Balance of Payment, it was important to test for the existence of long-run equilibrium relationship between these two variables within the framework of the bounds testing approach to cointegration. Given that the study employed annual data, a lag length of 2 for annual data was used in the bounds test. Pesaran et al. (2001) suggested a maximum lag of two for annual data in the bounds testing to cointegration. After the lag length was adopted, an F-test for the joint significance of the coefficients of lagged levels of the variables was conducted. Thus, each of the variables in the model was taken as dependent variable and a regression was run on the others.

Pesaran, Shin, & Smith, (2001) indicates that "this OLS regression in the first difference are of no direct interest" to the bounds cointegration test. It is however, the F-statistics values of all the regressions when each of the variables is normalized on the other which are of great importance. This F-statistics tests the joint null hypothesis that the coefficients of the lagged levels are zero. In order words, there is no long run relationship between them. The essence of the F-test is to determine the existence or otherwise of cointegration among the variables in the long run. The results of the computed F-statistics when LBOP is normalized (that is, considered as dependent variable) in the ARDL-OLS regression are presented in Table 4.

From Table 4, the F-statistics that the joint null hypothesis of lagged level variables (i.e. variable addition test) of the coefficients is zero was rejected at 5 percent significance level. Further, since the calculated F-statistics for F_{LBOP} (.) = 3.9257 exceeded the upper bound's critical value of (3.2) at 5 percent level of significance. Therefore, null hypothesis of no cointegration (i.e. long run relationship) between Balance of Payment and its determinant was rejected.

F_{LBOP}(LBOPLEXV, LMS, LINT, LINF, LGDPG) = 3.9257**

This result indicates that there is a unique cointegration relationship among the variables in Ghana's Balance of Payment and that all the determinants of Balance of Payment can be treated as the 'long-run forcing' variables for the explanation of Balance of Payment in Ghana. Therefore, there is existence of cointegration among the variables in the Balance of Payment performance equation and hence we therefore proceed with the Balance of Payment equation.

Long-Run Results (Balance of Payment is the Dependent Variable)

Table 5 shows the long run estimate based on the Schwartz Bayesian criteria (SBC). The selected ARDL (0, 1, 0, 0, 0, 0, 1) passes the standard diagnostic test (serial correlation, functional form, normality and heteroscedasticity) as can be seen at Table 7. The coefficients indicate the long run elasticities.

Table 5: Estimated Long Run Result

ARDL (0, 1, 0, 0, 0, 0, 1) selected based on SBC Dependent Variable: LBOP

Regressor	Coefficient	Standard Error	T-Ratio
LINF	0.0927	0.0641	1.4473
LINT	0.7641***	0.1641	4.6541
LMS	-0.3393***	0.0836	-4.0576
LGDPG	0.1027***	0.0104	9.8588
LOPN	0.2382**	0.0963	2.4717
LEXV	-0.5084***	0.1655	-3.0703
CONS	-0.1929***	1.1245	-1.5496

Note: ***, **, and * represent 1%, 5% and 10% level of significance in respective terms. Source: Author's Construct, 2019.

The long run results reveal that exchange rate volatility is disadvantageous to Balance of Payment in Ghana. The coefficient of exchange rate volatility is negative and statistically significant at 1 percent. With a coefficient of -0.5084, it means that an increase in the volatility of real effective exchange rate of Ghana by 1 percent leads to approximately 0.51 percentage points reduction in Balance of Payment. Exchange rate volatility is considered in this perspective as risk to trade. Ideally, exchange rate volatility affects Balance of Payment through trade. The result has theoretical underpinning in that the more the real exchange rate of a

country becomes volatile, the more trade becomes riskier and for small open economy like Ghana, its consequence is felt on Balance of Payment, foreign exchange and real output.

The result concurs that of Eichengreen (2008), Adamu (2005), Mordi (2006) and Ahortor, Conte, Sissoho, and Tarawalie (2013) as cited in Obeng (2017). Adamu (2005), for instance, explores the impact of exchange rate volatility on private investment which is component of the BOP and confirms an adverse effect. Mordi (2006) employing GARCH model argues that failure to properly manage exchange rates can induce distortions in consumption and production patterns and that excessive currency volatility creates risks with destabilizing effects on the economy. This result implies that exchange rate volatility is an important factor explaining the BOP performance and therefore cannot be overlooked. It also shows that in investigating the effect of international trade and investment on expected Balance of Payment, it is imperative to consider the impact of exchange rate volatility. The result however, contradicts the findings of (Pindyck, 1982) who asserts that volatility could be profitable to firms, an economy and therefore expected gains Balance of Payment.

From the result in Table 5, a conventional result was obtained for openness to trade. The coefficient of trade openness of -0.2382 shows that a 1 percent increase in openness to trade results in decline in Balance of Payment by approximately 0.24 percent in the long run, ceteris paribus. The result is statistically significant at 5 percent. Trade openness is ambiguous in terms of its relationship with Balance of Payment depending on the level of economic development among

others. Openness to trade is often theorized to raise Balance of Payment due to its impact on economic growth through channels such as access to advanced technology from abroad, greater access to a variety of inputs for production and access to broader markets that raise the efficiency of domestic production through increased specialization. However, the results indicate the opposite. Openness to trade rather has a deleterious effect on Balance of Payment revealing the import depending nature of the Ghanaian economy.

Also, the coefficient of GDP growth carried an expected positive sign and is statistically significant at 1 percent. With a coefficient of 0.1027, it means that as GDP growth improves by 1 percent, the Balance of Payment rises by approximately 0.1 percent, ceteris paribus. It is expected that as real GDP increases, the BOP position improves. A plausible explanation is that with increase in real output, prices generally fall, a situation that engenders higher demand for domestic products in both the internal as well as the international markets. This result is hardly surprising, giving that real output in the Ghanaian economy has largely improved due to inflation and crude oil exploration. This is because real output has been helped more by the dynamics of the price of international crude, crude oil, cocoa and timber which are externally determined than by local dynamics of production in all its ramifications. Consequently, the trade balance improves leading to improved performance on the Balance of Payment. A review of Balance of Payment performance in developing countries reveal a positive relationship between growth in income and Balance of Payment.

A higher economic development supposing a lower average citizens' resistance to pay their taxes, because of their lower money marginal utility and a greater proportion of them who surpass an exempt income level. In addition, a high rate of economic growth and a sizeable GDP growth favour the state's capacity to produce more thereby improving the trade balance. Several studies including but not limited to Chelliah (1971), Teera (2004), and Gupta (2007) support this claim. However, Bird and Vaillancourt (2008) have also argued that Balance of Payment decline in low income countries even though nominal value of GDP growth improves because it does not realistic depict the improvement in the productive capacity of most imported goods. The finding supports that of Joseph et al (2011) who found that GDP growth exert a significant influence on BOP and foreign exchange reserves.

In addition, the results show that the coefficient of money supply is positive and statistically significant signaling a favourable influence on Balance of Payment. Money supply is and statistically significant at 1 percent with a coefficient of -0.3393 indicating a decrease in Balance of Payment of approximately 0.34 percent if there is a 1 percent increase in money supply. The result concurs in the findings of Imoisi et. al. (2013) who found a positive and significant effect of monetary policy proxied by money supply on Nigeria's BOP. In contrast, Umer et al. (2010) found that money supply does not play an overwhelming role in determining Pakistan's BOP and concluded that the BOP is not a purely monetary phenomenon. Same can be said about Fleermuys (2005) who concluded that money supply has insignificant effect on Namibia's Balance of

payment. The result also contradicts that of Tijani (2014) and Danjuma (2013) who determined whether excess money supply has played a significant role in the disequilibrium of Balance of Payment in Nigeria during the period 1986-2010. He found that money supply has an insignificant impact on Nigeria's Balance of Payments.

Also, the coefficient of interest rate carried an expected positive sign and is statistically significant at 1 percent. With a coefficient of 0.7641, it means that as interest rate increases by 1 percent, the Balance of Payment rises by approximately 0.76 percent, ceteris paribus. Although an increase in interest rate is expected to improve the BOP position, the result is not surprising, giving the nature and trajectory of production in Ghana, which is dominated by primary commodities of cocoa, gold, diamond, and recently crude oil, which is largely dictated by external forces. Interest rate has been on the increase in Ghana over time and while other activities in the real sector of the economy (such as agriculture and manufacturing) have been badly hit due to the trend in interest rate, the oil sector has tended to be resilient, with the consequence that oil production does not appear to have been reflective of the dynamics of rising interest rates.

The interest rate was expected to be positive since an increase in domestic interest rate would have yielded an improved BOP position on account of the capital inflow, but the effect would also be set off by what happens to the current account in the context of interest cost becoming more and having a negative impact on the BOP account through reduced productive capacity. There is a reasonable expectation that the instantaneous impact of interest rate will be felt through the

capital account rather than the current account, thus making the positive effect of interest rates on BOP plausible. The finding is in line with that of Imoisi, Olatunji and Ekpenyong (2013) also found a positive and significant effect of interest rate on Nigeria's Balance of Payment.

The long-run results indicate that any disequilibrium in the system as a result of a shock can be corrected in the long run by the error correction model (ECM). Hence, the ECM that estimated the short-run adjustments to equilibrium is presented as follows.

ECM = LBOP – [0.0927*LINF - 0.7641*LINT + 0.3393*LMS - 0.1027*LGDPG - 0.2383*LOPN +0.5084*M +0.1929]

The ECM stands for the rate of adjustment to restore equilibrium in the dynamic model following a disturbance.

Short Run Results (DLBOP is the Dependent Variable)

The existence of a long run relationship among Balance of Payment and its exogenous variables allows for the estimation of long run estimates. The short-run estimates also based on the Schwartz Bayesian Criteria (SBC) employed for the estimation were reported in Table 6.

Table 6: Estimated Error Correction Model

ARDL (0, 1, 0, 0, 0, 0, 1) selected based on SBC. Dependent Variable: dLBOP

Regressors	Coefficient	Standard Error	T-Ratio
D(EXV)	-0.2611**	0.0988	-2.6424
D(LOPN	-0.1376***	0.0311	-4.4158
D(LINT)	0.3797***	0.1197	3.1710
D(LINF)	0.7607***	0.2298	3.3105
D(LGDPG)	0.8054**	0.3499	2.3019
D(MS)	-0.1577***	0.0520	-3.0288
D(MS(-1))	-0.1314***	0.0369	-3.5520
ECM(-1)	-0.6083***	0.1104	-5.5079

R-Squared	0.9118	R-Adj.-Squared	0.8580
S.E. of Regression	0.0710	F-stat. F (9, 20) 16.9358***	[0.000]
Mean of Dependent Variable	2.6529	S.D. of Dependent Variable	0.1854
Residual Sum of Squares	0.0909	Equation Log-likelihood	44.407
Akaike Information. Criterion	-2.1605	Schwarz Bayesian Criterion	-1.6000
DW-statistic	1.9605		

Note: ***, **, and * represent 1%, 5% and 10% level of significance in respective terms.

Source: Author's Construct, 2019.

Some descriptive statistics (standard regression results) can be obtained from Table 6. From Table 6, it can be observed that the adjusted R^2 is approximately 0.86. It can therefore be explained that approximately 86 percent of the variations in Balance of Payment is explained by the independent variables. Also, a DW-statistics of approximately 1.96 reveals that there is no autocorrelation in the residuals.

The negative coefficient of the Error Correction Term (ECT) is an indication that any shock that takes place in the short-run will be corrected in the

long-run. The rule of thumb is that, the larger the error correction coefficient (in absolute terms), the faster the variables equilibrate in the long-run when shocked (Acheampong, 2007). The result showed that the coefficient of the lagged error correction term, ECT (-1), exhibits the expected negative sign (-0.6083) and is statistically significant at 1 percent. This indicates that approximately 61 percent of the disequilibrium caused by previous year's shocks converges back to the long run equilibrium in the current year.

The short run dynamics reveal that exchange rate volatility is detrimental to Balance of Payment mobilisation in Ghana. The study sort to examine the relationship between exchange rate volatility and Balance of Payment. The result answers the first hypothesis. The short run dynamics reveal that the coefficient of exchange rate volatility is negative and statistically significant at 5 percent level of significance. With a coefficient of -0.2611, it means that an increase in the volatility of real effective exchange rate of Ghana by 1 percent leads to approximately 0.54 percent decline in Balance of Payment.

In this study, exchange rate volatility affects Balance of Payment through merchandized trade and investment. Theoretically, the result shows that the more the real exchange rate of a country becomes volatile, the more trade become riskier and for small open economies like Ghana, its implication is felt on Balance of Payment, and foreign exchange and real output. By employing the GARCH model, Mordi (2006) argues that failure to properly manage exchange rates can induce distortions in consumption and production patterns and that excessive currency volatility creates risks with destabilizing effects on the economy. This result implies

that exchange rate volatility is an important factor in explaining the Balance of Payment efforts and cannot be overlooked. It also shows that in investigating the effect of international trade on expected Balance of Payment, it is imperious to consider the impact of exchange rate volatility since it has implications for trade.

The coefficient of GDP growth had the expected sign and is statistically significant at 5 percent. With a coefficient of 0.8054, it follows that as GDP growth improves by 1 percent, the Balance of Payment increases by approximately 0.8 percent, everything else held constant. This reaffirms the quest for developing countries like Ghana to improve its GDP growth by ensuring a sustained economic growth while controlling population growth. A review of BOP in developing countries reveal a positive association between GDP growth and total Balance of Payment. The finding offers support to the assertion that as countries develop, Balance of Payment develop more than proportionately to the growth in income.

Furthermore, the short run dynamics as presented in Table 6 indicate that trade openness has a suppressing effect on Balance of Payment. The coefficient of trade openness of -0.1376 demonstrates that a 1 percent increase in openness to trade in merchandize or non-merchandize will result in decline in Balance of Payment by approximately 0.14 percent in the short term. The result is statistically significant at 5 percent. Openness to trade is often theorized to raise Balance of Payment and by extension growth through trade from channels such as access to innovative technology from abroad, greater access to a variety of inputs for production and access to broader markets that raise the efficiency of domestic production through increased specialization. However, the results in this study is

contradictory and as such point to the ambiguous nature of trade openness in terms of its effect. Openness to trade rather has a harmful effect on Balance of Payment. The result is not surprising in the Ghanaian case as most businesses are unable to expand because of keen competition as trade liberalisation encourages the importation of cheaper commodities into the economy relative to locally manufactured ones.

The results suggest that, in the interim or medium term, domestic producers in response to the increased foreign competition might have adopted some skill-biased technical change. This finding is in line with Agbeyegbe, Stotsky, and WoldeMariam (2004); Bonaglia and Fukasaku (2003); Khattry and Rao (2002); (2011); Matlanyane and Harmse (2002), and (Brafu-Insaidoo, Obeng, & others, 2008). Agbeyegbe, Stotsky, and WoldeMariam (2004) argues that for small open economies, a reduction in import tariff associated with trade liberalisation often leads to a drop in trade Balance of Payment. Ebrill, Stotsky, and Gropp, (1999) provide a clear-cut explanation of the effect of trade liberalization on Balance of Payment. They state that the revenue implications depend largely on the volume of imports after trade is liberalized. Therefore, due to the elasticity of imports for developing countries, a reduction in tariff other than quantitative restriction leads to a decline in Balance of Payment from trade. The findings of this study contradicts that of Pupongsak (2010) and Nwosa, Saibu, and Fakunle, (2012) who concluded that trade liberalization accompanied by the appropriate macroeconomic policies can be undertaken to enhance overall BOP performance in the short run.

Furthermore, the short run dynamics reveal that inflation has a positive relationship with total Balance of Payment performance. The coefficient is statistical significant at 1 percent level of significance. The result shows that an increase in inflation by 1 percent induces total Balance of Payment by approximately 0.76 percent, all other things being equal. However, it is widely argued that high levels of inflation affect the economy as well as the society significantly and adversely mainly due to its effect on macroeconmic stability.

In addition, the results show that the coefficient of money supply is positive and statistically significant signaling a favourable effect Ghana's BOP. Money supply is and statistically significant at 1 percent with a coefficient of -0.1577 indicating a decrease in Balance of Payment of approximately 0.16 percent if there is a 1 percent increase in money supply. The coefficient of money supply in the previous year is negative and statistically significant at 1 percent. The coefficient of -0.1314 reveals that an increase in money supply rate of Ghana by 1 percent leads to approximately 0.13 percent decline in Balance of Payment. The result concurs that of Danjuma (2013) who determined whether excess money supply has played a significant role in the disequilibrium of Balance of Payment in Nigeria during the period 1986-2010. He concluded money supply as monetary variable has a significant impact on Nigeria's Balance of Payments. Imoisi, Olatunji and Ekpenyong (2013) also found a positive and significant effect of monetary policy proxied by money supply on Nigeria's BOP. On the flip side, Umer, et al. (2010) found that money supply does not play an overwhelming role in determining Pakistan's BOP and concluded that the BOP is not a purely monetary phenomenon.

Same can be said about Fleermuys (2005) who concluded that money supply has insignificant effect on Namibia's Balance of payment.

The coefficient of interest rate had the expected sign and is statistically significant at 1 percent. With a coefficient of 0.3797, the result shows that as interest rate increases by 1 percent, the Balance of Payment rises by approximately 0.38 percent. Intuitively, the coefficient means that an increase in domestic interest rate would have yielded an improved BOP position on account of the capital inflow, but the effect would also be set off by what happens to the current account in the context of interest cost becoming more and having a negative impact on the BOP account through reduced productive capacity. There is a reasonable expectation that the instantaneous impact of interest rate will be felt through the capital account rather than the current account, thus making the positive effect of interest rates on BOP plausible. The finding is in line with that of Imoisi, Olatunji and Ekpenyong (2013) also found a positive and significant effect of interest rate on Nigeria's Balance of Payment.

Post Estimation (Model Diagnostic) Tests

Diagnostic tests were conducted for the model. Table 7 below presents the summary of the results of the various tests.

Table 7: Diagnostic Tests

Test	Chi/F Version
Serial Correlation	F (2, 16) = 0.6610[0.5484]
Functional Form	F (1, 17) = 0.0225 [0.8821]
Normality	CHSQ(2) = 0.6320[0.7290]
Heteroscedasticity	F (11, 18) = 0.3705[0.9359]

Source: Author's Computation, using Eviews 9.0 (2019)

The tests as reported in Table 7 indicate that the estimated model passes the Langrangean multiplier test of residual serial correlation among variables. Also, the estimated model passes the tests for functional form misspecification using square of the fitted values. The model also passed the normality test based on the skewness and kurtosis of the residuals. Thus, the residuals are normally distributed across observations. Finally, the estimated model passes the test for heteroscedasticity test based on the regression of squared residuals on squared fitted values.

Specifically, The Table 7 shows the Breusch-Goddfrey Serial Correlation LM test for the presence of autocorrelation. The result of the test shows that the p-value of 0.5284 which is approximately 53 percent is greater than the critical value of 0.05 (5%). This shows the non-existence of autocorrelation. The white heteroscedasticity test above shows that the p-value of about 0.9359 which is approximately94 percent is more than the critical value of 0.05 or 5 percent. That is, we accept that there is no heteroscedasticity. This shows that there is no evidence of heteroscedasticity since the p-value is considerably in excess of 0.05 and conclude the errors are not changing over time. Table 7 also shows that the Ramey RESET test shows that the p-value of approximately 88 percent (0.8821) and this is greater than the critical value of 0.05 or 5 percent. This shows that there is no apparent non-linearity in the regression equation and it would be concluded that the linear model is appropriate.

Stability Tests

Pesaran, Smith, and Yeo, (1985) suggests that the test for the stability for parameters using cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) plots be conducted after the model is estimated. This is done to eliminate any bias in the results of the estimated model due to unstable parameters.

The results for CUSUM and CUSUMSQ are depicted in Figures 3 and 4 respectively. The null hypothesis is that coefficient vector is the same in every period and the alternative is that it is not Bahmani-Oskooee and Nasir, (2004). The CUSUM and CUSUMSQ statistics are plotted against the critical bound of 5 percent significance level. According to Bahmani-Oskooee and Nasir (2004), if the plot of these statistics remains within the critical bound of the 5 percent significance level, the null hypothesis that all coefficients are stable cannot be rejected.

Figure 3 depicts the plot of CUSUM for the estimated ARDL model. The plot suggests the absence of instability of the coefficient since the plots of all coefficients fall within the critical bounds at 5 percent significance level clearly showing convergence. Thus, all the coefficients of the estimated model are stable and therefore we can say that the coefficients are not changing systematically over the period of the study.

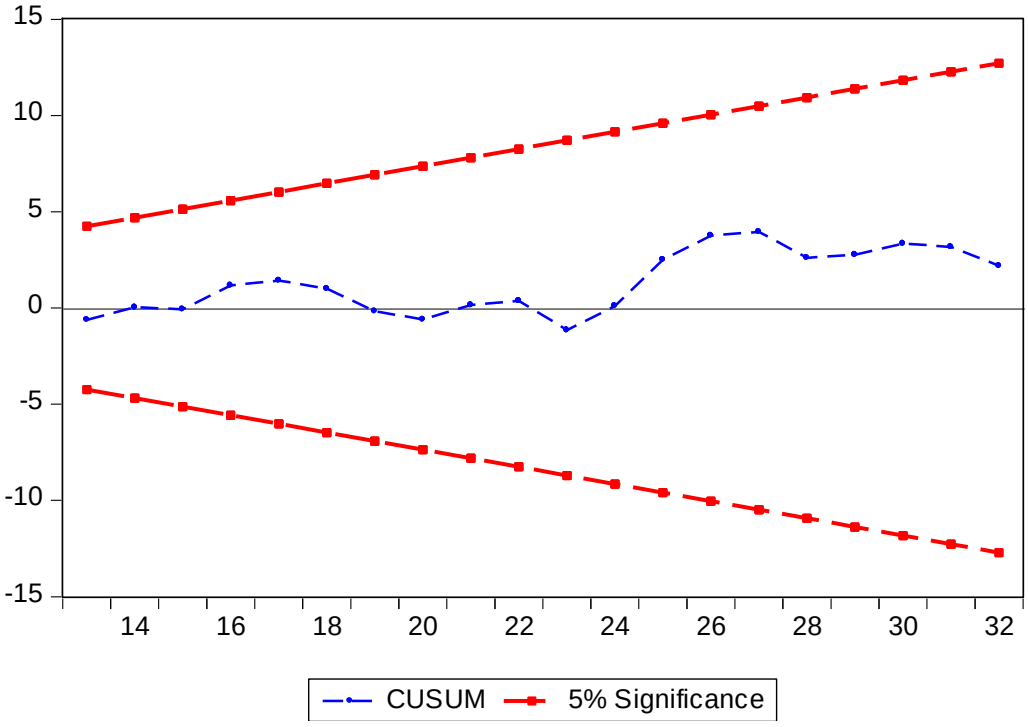

Figure 3 Graph of Cumulative Sum of Recursive Residuals

Source: Author's Computation, using Eviews 9.0 (2019)

Figure 4 also depicts the plot of CUSUMSQ for the estimated ARDL model. The plot also suggests the absences of instability of the coefficients since the plots of all coefficients fall within the critical bounds at 5 percent significance level. Thus, all the coefficients of the estimated model are stable over the period of the study in the sense that they are not changing erratically.

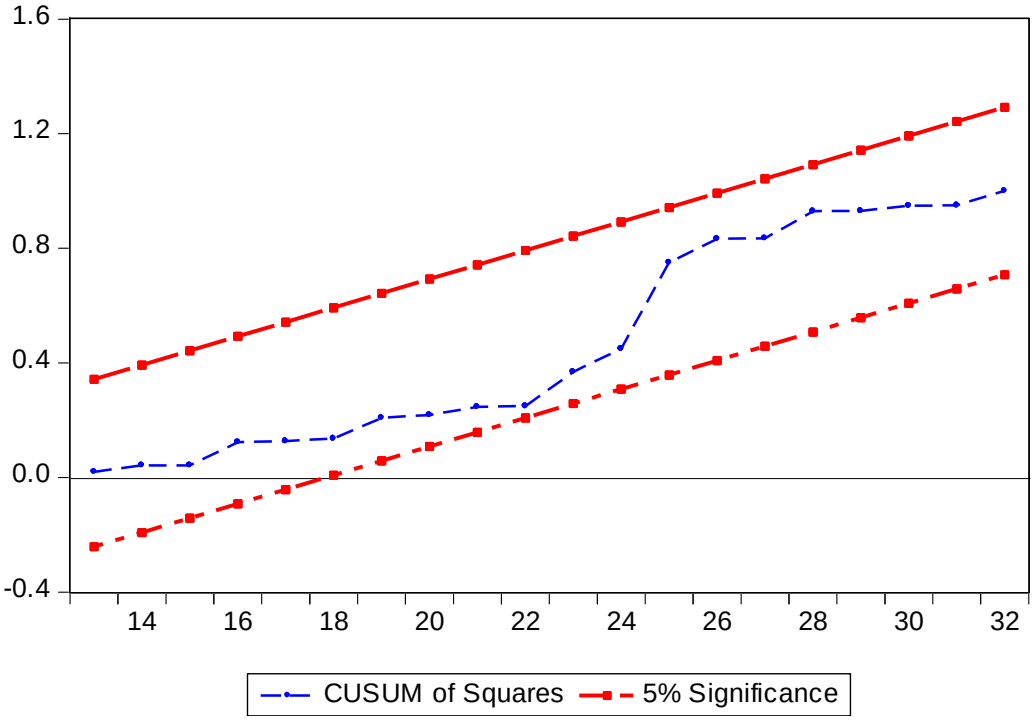

Figure 4: Graph of Cumulative Sum of Square Recursive Residuals

Source: Author's Computation, using Eviews 9.0 (2019)

Chapter Summary

This chapter examined the time series properties of the data used for estimation and also presented and discussed the results. Unit root test was conducted by employing both the ADF and the PP techniques which showed that some of the series had to be differenced once to achieve stationarity. The implication is that all the series were integrated of order zero $I(0)$ and one, $I(1)$. The presence of non-stationary variables implies the possibility of the presence of a long-run relationship, which the study verified using bounds testing approach to cointegration. Given the findings, the implication is that volatility-BOP nexus should be estimated in a single equation framework.

The results indicated the presence of cointegrating relationship between Balance of Payment and exchange rate volatility. Whereas GDP growth, interest rate and inflation exerted positive and statistically significant impact on Ghana's BOP, a negative effect was realized from trade openness, exchange rate volatility and money supply to BOP. The results of the ECM showed that the error correction term for BOP did carry the expected negative sign.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Introduction

This chapter summarizes, concludes and gives policy recommendations emanated from the study for the consideration of planners and managers of the economy. The aim is to show the major findings in the study and also suggest policy recommendations as to give the way forward to ensure a steady and sustainable Balance of Payment. The target of the research was to empirically investigate the relationship between exchange rate volatility and Balance of Payment in Ghana.

Summary

The focus of this study was to investigate the relationship between exchange rate volatility and Balance of Payment to determine if a long run or short run relationships exist among variables. In totality, the study examined exchange rate volatility together with some control variables and Balance of Payment using an Auto Regressive Distributed Lag Model that was developed by Pesaran, Shin and Smith (2001).

The results revealed that in the long-run, only exchange rate volatility, trade openness and money supply exerted a statistically significant negative effect on Balance of Payment. This shows that per the findings, exchange rate volatility and money supply are detrimental to Balance of Payment in Ghana. Nonetheless, GDP growth, and interest rate proved Balance of Payment inducing.

The short-run results, in conformity to what was found in the long run, revealed that GDP growth, inflation, and interest rate have a positive and significant influence on Balance of Payment. However, the short run dynamics also revealed that trade openness, money supply and the variable of interest, exchange rate volatility, have deleterious effect on Ghana's BOP.

The existence of a long-run relationship among exchange rate volatility and Ghana's Balance of Payment is further confirmed by a negative and statistically significant coefficient of the lagged error correction term and the size of this coefficient suggest that, any disequilibrium caused by previous year's shocks converges back to the long-run equilibrium in the current year at a rate of 61 percent.

Conclusions

The study empirically determined the relationship between exchange rate volatility and BOP in Ghana using data set for the period 1984 to 2015. The theoretical and empirical evidence revealed the following:

In order to estimate the long-run relationship and short-run dynamic parameters of the model, the Autoregressive Distributed Lagged Model (bounds testing) approach to cointegration was employed. The study proceeded with the estimation process by testing for the stationarity properties of the variable using the Augmented-Dickey Fuller (ADF) and Phillips-Peron test statistics. The unit root results suggest that all the variables were stationary after taking first difference with a constant and trend under the ADF test and Philip Peron test statistics. The study

then proceeded to examine the long-run and short-run relationships between exchange rate volatility and Balance of Payment.

Both the long-run and short-run results found statistically significant positive effects of GDP growth, and interest rate on Balance of Payment. Inflation was positive and statistically significant only in the long run. However, the chief variable of interest, exchange rate volatility, money supply and trade openness had a negative effect on Ghana's BOP both in the long run and short run.

The diagnostic test results showed that the model passes the test of serial correlation, non-normal errors, and heteroscedasticity as well as the functional form. The graphs of the cumulative sum of recursive residual (CUSUM) test and cumulative sum of squares of recursive residual (CUSUMSQ) test showed that there exists a stable relationship between Balance of Payment and the selected macroeconomic variables used for the study.

Recommendations

Based on the findings, the study offers the following recommendations to policy makers, investors, financial institutions regulators and future researchers. Generally, the study suggests that policy makers should come up with adequate strategic policy that will stabilize the foreign exchange rate as well as other major macro-economic variable so as to achieve growth and development in the economy. In specifics, the recommendations are that:

- On macroeconomic stability and particularly on exchange rate, one policy implication of our results is that, domestically, the Bank of Ghana need step-up its exchange rate stabilization drives to minimize the exchange rate risk

imposed on trade players. In addition, the Bank of Ghana should sensitize trade players on the need to patronise forward contracts. This will ensure steady flow of trade and improved BOP performance. Long-term foreign exchange measures should be put in place in order to help in appropriate determination of the value of the exchange rate. This will in the long-run help to strengthen the value of the Cedi and ensure a stable BOP.

- Though interest rate had positive impact on Ghana's Balance of Payment position, it is economically imperative for monetary authorities to ensure sound monetary policy management practices. Closely related to money supply is the interest rate and as such care must be taken in using unexpected expansionary fiscal policies to increase interest rate due the potency of such policies to stifle or crowd-out investment, growth and hence BOP.
- Realistically, the high dependence on imported goods cannot be discouraged by the impositions of stern tariffs. Thus, the government needs to formulate policies that would create an enabling environment/confidence for investors to boost investment in the productive sectors. In addition, the government should improve exports of goods and services among the major trading partners and other countries by substituting for imports. This would help reduce the usual trade deficits the country records.
- There is the need for active participation in terms of production on the part of the government in the Ghanaian economy. Productive involvement of the government in manufacturing, construction and infrastructural development needs to be step-up to attract both indigenous and foreign investors thereby

spurring growth. This will in turn lead to job creation, employment opportunities and at the long run improve the BOP and economic growth at large.

Limitations

The major drawback to this study was the unavailability of data which is common to Sub-Saharan African countries. We could not use large sample size because missing values for some of the variables in the 1970s. Moreover, this study used the ARDL approach to cointegration and one major limitation with the method is that it is sensitive to both model specification and lag length selection. The selected lag length has implications for the outcome of the cointegration,

In all, notwithstanding these limitations, the findings of this study retain a considerable degree of reliability and exactness that render this thesis suitable for academic reference and formulations of policies.

Future Direction of Research

It is suggested that for future research on this work, other researchers can expand the sample size and include other macroeconomic variables that are not considered in this model. This can help improve and identify some variables that are crucial to BOP performance in Ghana.

Finally, instead of looking at the impact of exchange rate volatility on Balance of Payment as a whole, one could study the comparative impact of exchange rate volatility on various components of Ghana's Balance of Payment.

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APPENDIX A: ARCH Test Result on Real Effective Exchange Rate

SERIES	ARCH RESID^2	F-Statistics	R-Squared	P-Values
RER (-1)	0. 9166***	4872.17	359.51	0.0000
ARCH [1]		0.0556	0.0559	0.8137

Note: *** implies 1% level of significance while ARCH [1] is the ARCH LM test.

Source: Author's Computation, using Eviews 9

APPENDIX B: GARCH (1, 1) Results for Volatility in the Exchange Rate

Variable	Coefficient	Std. Error	Z-Statistic	Prob
CONS	0.0001	2.17E-05	5.1166	0.0000
ARCH (α)	0.4597***	0.0727	6.3233	0.0000
GARCH (β)	0.5869***	0.0417	14.057	0.0000
(α + β)	1.0466			

Note: *** implies 1% level of significance.

Source: Author's Construct, 2019.