KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

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DEPARTMENT OF ECONOMICS

"EMPIRICAL ANALYSIS OF EXCHANGE RATE IN GHANA"

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DECLARATION

I hereby declare that this submission is my own work towards the award of Master of Science (Economics) and that, it contains no material previously published by another person nor material which has been accepted for the award of any degree by this university or any other university, except where due acknowledgment has been made in the text.

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ABSTRACT

The inherent aim of this study was to investigate the factors that influence exchange rate movements in Ghana. The frequent exchange rate volatility poses a serious challenge to economic agents in their decision making process. The study covers the period of thirtyfour years (1980 – 2013). Both primary and secondary data were used in arriving at the findings of the study. Qualitative and quantitative analysis were done to serve as means of presenting the findings of the research work. An Augmented Dickey-Fuller unit root test was conducted after which the ARDL cointegration analysis was performed. Other approaches adopted were the Granger causality test, impulse response, and variance decomposition. The findings indicates that imports, public debt, nominal GDP, and inflation affect exchange rate movement in the Ghanaian economy. Also, exchange rate depreciation was found to have significant impacts on the economy as it can trigger inflation, worsening the external debt position of government, and deteriorating the nation's trade balance. As ways of tackling the depreciation of the Cedi and mitigating the attendant adverse repercussion on the Ghanaian economy, creation of imports substitutes and appropriate utilization of borrowed funds by government appear to be vibrant measures.

DEDICATION

This work is dedicated to my dear uncle, Osei Kwame George by whose enormous financial support and encouragement I have been able to achieve this feet of academic laurels.

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ABBREVIATIONS AND ACRONYMS

ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criterion
ARCH	Autoregressive Conditional Heteroskedasticity
BoG	Bank of Ghana
BoT	Balance of Trade
CSW	Cross-Section Weights
DEBT	Public Debt
ECM	Error Correction Mechanism
ERP	Economic Recovery Programme
ERR	Exchange Rate Regime
EXCH/ER	Exchange Rate
FDI	Foreign Direct Investment
Flt. Lt.	Flight Lieutenant
FPE	Final Predicted Error
GDP	Gross Domestic Product
HIPC	Highly Indebted Poor Country
HQ	Hannan-Quinn
IFS	International Financial Statistics
IM/imp	Imports
IMF	International Monetary Fund

INFL	Inflation Rate
INT	Interest Rate
M	Money Supply
MS	Market Speculations
NDC	National Democratic Congress
NGDP	Nominal Gross Domestic Product
NPP	New Patriotic Party
OLS	Ordinary Least Squares
PNDC	Provisional National Defense Council
Pp	Pages
PPP	Purchasing Power Parity
REER	Real Effective Exchange Rate
SAP	Structural Adjustment Programme
SC	Schwarz Criterion
SPSS	Statistical Package for Social Sciences
T-Bill	Treasury Bill
UIRP	Uncovered Interest Rate Parity
VAR	Vector Autoregression
Vol.	Volume
WAMZ	West African Monetary Zone

CHAPTER ONE

INTRODUCTION

1.1: Background of the Study

The influence of exchange rate on an economy cannot be over-emphasized. The issue becomes more imperative especially for countries that heavily depend on importation of essential commodities such as raw materials for industrial production, crude oil, consumables like food items and clothing and non-consumables including: television sets, vehicles, refrigerators, and to mention a few. Thus, the importation of these commodities can have a significant effect on the domestic currency. The quantum of empirical studies conducted on this macroeconomic variable attests to this assertion
(Calderon and Duncan, 2003; Diebold, Husted and Rush, 1991; Abuaf and Jorion, 1990; Sarno and Taylor, 1998; Taylor, 1995; Cheung and Lai, 2001; MacDonald, 1993 in Yemidi, 2010).

Due to this, Ghana has embarked on several policies aimed at improving exchange rate situation and for that matter has gone through a number of exchange rate regimes and reforms. The government of Ghana has used two basic exchange rate mechanisms as means of correcting the Cedi overvaluation under its Structural Adjustment Program (SAP). The early stages of the process were characterized by a 'crawling-peg' approach where the government established a fixed rate and adjusted it frequently in response to perceived change in foreign exchange supply and demand. For instance, policy makers in

the 60s and 70s were prompted to maintain a fixed exchange rate coupled with devaluing the Cedi occasionally as a result of inflationary impacts of currency devaluation on the economy (Asuming-Brempong, 1998).

During that period, most governments were adamant to vary the exchange rate due to concerns raised over associated adverse economic and political repercussions should they engage in such practice (Harrigan et al. 2000). However, the Cedi witnessed a devaluation in 1971. This was because the fixed exchange rate led to an unfavourable balance of payments and the deflationary effect on the Ghanaian economy (Dordunoo, 1994). Within six weeks after the devaluation, a military coup overthrew the Busia's government and the Cedi revalued by 29 percent (Osei, 1996).

In the late 1980s, a floating exchange rate mechanism was instituted and private entrepreneurs were allowed to develop a market for foreign exchange. Consequently, private foreign exchange bureaux were established as a way of curbing the parallel foreign exchange market that existed, and also legalizing foreign exchange transactions outside the mainstream banking system (Asuming-Brempong, 1998). During the process, other reforms were introduced including the liberalisation of the determination of exchange rate. The approach adopted in accomplishing this goal was a gradual systematic one due to the political consequences of the devaluation. The early 1990s saw a full liberalisation of exchange rate with the foreign exchange bureaux permitted to operate as legal entities (Bhasin, 2004).

The importance of macroeconomic variables such as inflation, public debt, imports etc. in the determination of exchange rates became evident in 2008. In that year, the domestic currency fell in value by 24.7 percent against the US Dollar. Associated with this was a

substantial growth in government expenditure approximately 42 percent (Yemidi, 2010). Again, one can talk of the recent directive of the Bank of Ghana that the commercial banks and other banks should effect withdrawals by all customers holding foreign currency account in Cedi equivalents.

These scholarly writers and several others have come out with the factors contributing to currency depreciation, impacts and suggested remedies to combating exchange rate instability in the Ghanaian economy. The question one may ask therefore is why exchange rate problems still remain a serious challenge to the economy? This has been a major concern of well-meaning Ghanaians – business executives, those in the academia, consumers, and corporate institutions as well as international bodies such as the International Bank for Reconstruction and Development (the World Bank), International Monetary Fund (IMF), and the likes.

Giancarlo Gandolfo (1998), defines exchange rate as the price of one currency in terms of another. Exchange rate can, therefore, be defined as the price at which a currency can be converted into another. Predominantly, two kinds of exchange rate transactions can be cited – spot and forward. The spot exchange rate transactions involve the immediate (two-day) exchange of bank deposits. On the other hand, forward exchange rate transactions involve the exchange of bank deposits at some specified future date.

Exchange rate is an indispensable economic concept to be analysed due to its vehement impacts on the economy in terms of the relative prices of foreign and domestic goods. The Marshall-Lerner condition holds the view that if the absolute sum of the long run export and import demand elasticities is equal to, or greater than one, a balance of trade improvement will eventually emanate as a result of exchange rate depreciation (Giancarlo

Gandolfo, 1998). Intuitively, if the domestic currency fall in value which implies that foreign goods and services are expensive relative to those domestically produced, there will be a positive quantity effect on the balance of trade. This is due to the fact that both domestic and foreign consumers will increase their demand for locally manufactured goods and services. Invariably, this consumer behaviour will lead to a reduction in the volume of imports and a rise in export.

Counteracting this is a negative cost effect on the balance of trade, since the cost of imports especially industrial raw materials and inputs will be higher. The relative strength of the two scenarios will determine the net effect on the trade balance (being positive or negative); the Marshall-Lerner condition is met if the quantity effect is stronger/greater.

A currency depreciation, therefore, is expected to have a positive impact on trade balance. The net effect on the trade balance will depend on price elasticity. If goods exported are price elastic, their quantity demanded will be more than proportionate increase when price falls, and total export revenue will increase. In the same vein, if goods imported are elastic, total import expenditure will decrease. Both situations will improve the trade balance.

The condition necessary for exchange rate differential is the disequilibrium that may exist between quantity demanded for the said foreign currency and the quantity supplied of it. When the quantity supplied exceeds quantity demanded of say the Dollar in the Ghanaian economy, there will be surplus and the cedi appreciates. On the other hand, a shortage is created when quantity demanded of the foreign currency is over and above the quantity supplied resulting in a depreciation in value of the cedi. Currency depreciation can then be defined as a loss in value (or purchasing power) of a domestic currency as against its major trading foreign currencies. That is to say when it requires much more of a domestic

currency (here, the Cedi) in exchange for the foreign ones to undertake transactions in foreign currency than before.

Several factors come into play to influence exchange rate movements in the Ghanaian economy. Among these contributing factors this study considers are: increasing public debt, interest rate disparities between countries, rate of inflation, growth rate of nominal gross domestic product, rising value of imports, and money market speculations. For instance, the value of the Cedi can be at peril as a result of increase in government borrowing (especially from external sources). This is due to the fact that excessive government borrowing can reduce investors' confidence in the domestic economy. Local investors will consider it prudent to invest abroad. In addition, new foreign investors will not be attracted to channel their funds into the economy and existing ones will rather reduce their volume of assets or retrieve them entirely from the domestic economy. Transferring resources for these reasons will lead to an increase in demand for the foreign currency in question and eventually cause the domestic currency to fall in value due to market forces.

More to the point, consumption increases with income. A rise in gross domestic product implies a rise in national income. Part of this income increase, thus, gets spent on foreign goods and services. Studies have revealed that a good percentage of such increase end up been repatriated by foreign investors from the Ghanaian economy. Profit repatriation and spending on foreign goods and services exerts pressure on the domestic currency as the demand of the underlying foreign currency rises leading to a depreciation of the Cedi.

1.2: Problem Statement of the Study

Throughout the Ghanaian economic history, currency depreciation has, in general, been phenomenal with the rate aggravating in recent years. The Pound Sterling, for instance, was trading at around GH¢ 5.10 in January, 2015 but it sold on an average of GH¢ 6.20 in the mid-year which is an exchange rate rise of about 22%. Also, the Ghanaian cedi lost value against the United States Dollar at a rate of 35.63% selling at GH¢ 3.22 from the beginning of the year and GH¢ 4.36, mid-year. There are noticeable fluctuations within a month, about five times (Bank of Ghana, 2015). Possibly, this state of affairs can be ascribed to increasing debt position, inflation, market speculations, imports among others in the economy in recent years.

The frequency of the exchange rate volatility (phenomenally, depreciation in Ghana's case) makes it difficult for economic agents in their prediction of this macroeconomic variable thereby hampering their decision making which in turn cripples economic growth and development. It is against this background that this study sought to investigate the factors that influence exchange rate depreciation in Ghana.

1.3: Objectives of the Study

The main objective of this study was to investigate the factors that influence exchange rate movement in Ghana.

Specifically, the study sought to:

i. find out the determinants of exchange rate in the Ghanaian economy; ii. examine the effects of the Cedi depreciation on the economy within the years under review.

1.4: Hypothesis of the Study

The following null hypothesis were tested:

H_0: public debt, inflation, interest rate, imports, and nominal GDP each does not influence exchange rate;

H_0: exchange rate depreciation has no repercussion on the Ghanaian economy;

1.5: Scope of the Study

The study employed the Ghana Cedi per US Dollar exchange rate. This is because among the trading currencies such as Pound Sterling, CFA, Swiss Franc, Euro, Canadian Dollar, Japanese Yen, and the rest, transactions in foreign currencies are predominantly done in Dollars in the economy. Globally, it is the common traded foreign currency.

Due to the witnessed adjustment phase of the exchange rate in line with market conditions, secondary data within the time frame of 1980 to 2013 (34 year period) was used in the study. This study took into account all the possible factors accounting for exchange rate depreciation.

1.6: Rationale of the Study

There is the need for such a study because if pragmatic measures are put in place to curtail the depreciation of the Cedi, it will give Ghana a good economic standing among other economies in a continuum of development. In this light, the ability to maintain the value of the local currency, to a large extent, serves as a measure of how well a government is doing. Successive governments, therefore, have done and continue to do their possible best to protect the local currency against depreciation but there seem to be no apparent antidote for this economic predicament.

An in-depth knowledge about the variables that strongly influence the exchange rate movements and the resultant effects on the economy enables policy makers in their control of these variables so as to maintain the value of the Cedi. The outcome of this study will also provide Ghanaian residents with fair idea about how exchange rate movements impact their living standards thereby assisting them in their decision making process.

1.7: Organization of the Study

In entirety, the research work has been divided into five chapters. Each chapter consisting sections and subsections where necessary. Chapter one provides an overview of the entire research work. The second chapter considered studies conducted by other writers and researchers on the subject matter. This chapter sought to find out the theoretical, empirical approaches and the method(s) adopted by earlier studies and identify any knowledge gap. The methodology of the study was explained in the third chapter. Chapter four presents

and analysis of findings of the study. These were done in statistical and mathematical forms not leaving out the economic intuitions and interpretation of the findings. Also, provided in the chapter are the policy implications based on the findings of the study. These implications helped in drawing key recommendations. The fifth chapter provides a summary of findings, make pertinent recommendations and conclusions were drawn on the study conducted.

CHAPTER TWO

LITERATURE REVIEW

2.1: Introduction

The chapter provides a historical account of the move from the fixed exchange rates to the present flexible exchange rate. More so, an overview of the global exchange rate systems

and the Ghanaian experience receive attention in this chapter. Again, theoretical models of exchange rate determination and impacts will not be left unattended to.

2.2: The World Monetary and Exchange Rate Systems

History has it that there have been different exchange rate systems adopted by most countries. According to Case, Fair and Oster (2009), the three conspicuous ones are the Gold Standard (fixed exchange rate), the Bretton Woods System, and the Flexible Exchange Rate System.

2.2.1: The Gold Standard

Many countries, before the 1930s, were on a gold standard where the value of their currencies was tied directly to gold. This is the system of monetary organisation whereby the value of a country's money is legally defined as a fixed quantity of gold and domestic currency takes the form of gold coins and or notes convertible on demand to gold at legally determined rates. The adoption of this system was based on three main motives: one, to facilitate the settlement of international financial and commercial transactions; two, to establish stable foreign exchange rates; and three, to maintain monetary stability in the domestic economy.

As means of ensuring the effectiveness of the gold standard, the country's alacrity to purchase and sell gold at the specified price served as an assurance for engaging in transaction on the gold standard. In spite of the fact that gold was the unit to which all

affiliated gold standard currencies were pegged and for that matter exchange rate between those currencies were fixed, it was not necessarily the means of exchange for international trade. Invariably, the rationale behind the adoption of fixed exchange rate was limiting foreign exchange risk which is the tendency for a fluctuation in the market value of a financial asset held abroad following a variation in the value of a domestic currency. Hence, the gold standard served as a hedge against the possible variations.

As a way of illustration, consider the case where a number of Ghanaian consumers who has developed exquisite taste for American manufactured products is equal to the number of Americans who want to patronise Ghana made goods and/or services, then given the exchange rate, the currencies of the two countries will simply be exchanged. However, should there happen to be inequality in the two markets, say, the demand for imported goods and services by Ghanaians is over and above that of the American, citizens of US will still accept the Ghanaian Cedi for it can be redeemed in gold. This gold can then be immediately converted into US Dollars.

Each country had to meet the following three requirements in order to qualify as member of economies on the gold standard. Firstly, the country must define its currency (or monetary unit) in terms of a certain defined quantity of gold. Secondly, the country must maintain a fixed relationship between its stock of gold and its domestic money. Thirdly, she must allow free-flow of gold into and out of the country (Salvatore, 1995).

Globally, there existed a relationship between the balance of payment and changes in the domestic money supply. The international financial market, under the gold standard, reached its equilibrium through the effect of gold flows on each country's money supply. When a nation suffered a deficit in its balance of payments, more gold would flow out

than in which led to automatic reduction in the domestic currency supply since the domestic money supply was based on gold. The reduction was tantamount to a restrictive monetary policy, which caused national output and price to fall. The resultant effect of the phenomenon was a rise in interest rate, thereby, attracting foreign direct investment (i.e. capital flow). This, without doubt, served as a corrective measure by reducing any deficit in the balance of payment. Imports were discouraged and export were encouraged thereby again increasing net exports.

The gold standard was plagued with two major problems. First, the relinquishment of control on a nation's domestic monetary policy in the quest of varying the value of its currency in response to changes in the quantity of gold. The other challenge was that the world's commerce was at the mercy of gold discoveries. Desired expenditure on goods and services was on ascendency whenever new veins of gold were discovered, throughout history. Inflation was the consequence if production of goods and services do not increased proportionately. Critically, looking at its operations and subsequent demise help us in evaluating the functioning and some of the argument levelled against and in favour of the fixed exchange rate systems.

2.2.2: Bretton Woods System

In 1944, as the Second World War drew to an end, a group of economists from the United States and Europe met in Bretton Wood, New Hampshire – USA to map up new set of rules for exchange rate determination as a way of addressing the difficulties associated with the gold standard. This was an adjustable peg system in which currencies were

pegged to the US Dollar at $35 per ounce of gold. President Harry Truman, on 31st July 1945, signed the Bretton Woods Agreement Act. The two premises on which this system was based are: one, countries were expected to keep a fixed exchange rates with one another within the range of ± 1 percent, and two, countries being confronted by a "fundamental disequilibrium" in their balance of payment were permitted to review their exchange rates which was a means of avoiding recessions that would have resulted from the operation of the gold standard under such circumstances. Due to the inherent flaws of the second premise, the Bretton Woods agreement necessitated the establishment of the International Monetary Fund (IMF) with the aim that it will provide short-term loans to economies experiencing temporary current account deficit before a depression emanates (Madura, 2008).

The Bretton Wood System came with its own drawbacks. First, there was a basic asymmetric built into the rules of international finance. Countries battling with hefty and persistent deficit in their current account – what the Bretton Wood agreement termed "fundamental disequilibria" – were compelled to devalue their currencies and/or map up strategies to cut their deficit by contracting their economies. Devaluation implied a rise in prices and contraction meant a rise in unemployment making these alternatives unpleasant. This led to a loss in the stock of foreign exchange reserves. Secondly, it allowed currency devaluation only when a country suffered a "chronic" deficit in her current account and at the blinks of shortage of foreign exchange reserves. What this means is that devaluations could often be predicted in advance and they normally had to be rather large so as to remedy any serious current account problem. The convertibility of the US Dollar to gold was suspended by President Richard Nixon on August 15,

1971. Officially, the United States of America abandoned the rules laid down by the Bretton Wood Committee on 18th December, 1971 – devalued the dollar relative to the currencies of fourteen major industrial economies. Eventually, the finance minister of European Union (the then European Economic Community) announced their readiness to allow currencies to float against the US Dollar, on March 16, 1973.

2.2.3: The Flexible Exchange Rate System

This is the system of exchange rate determination predominantly implemented by most countries nowadays. In this system, market forces (i.e. the interactions of demand and supply) are allowed to determine exchange in an economy. Two types of flexible exchange rate systems are usually distinguished. These are: the freely floating system and the managed floating system. With the freely floating system, there is no intervention of governments in the exchange rate market. Even if they do, their entry is only to buy and sell foreign exchange for their own needs but not to influence the exchange rate. In a managed floating system, governments intervene if imperfection is believed to be prevailing in the market (i.e. there is fluctuations beyond the level governments perceive to desirable). Moreover, governments intervene in the exchange rate market if they think a currency is increasing or decreasing too much in value even though day-to-day fluctuations may be small (Madura, 2008).

Since the demise of the Bretton Woods System in 1971, the world exchange rate system can be described as "managed floating". One of the features of this system has been times of huge fluctuations in the rate of exchange. For instance, the Japanese Yen per US Dollar

rate rose from 347 (in 1971) to 210 (in 1978), to 125 (in 1988), and to 80 (in 1995) (Case, Fair and Oster, 2009).

2.3: Exchange Rate Policies in Ghana

As an emerging economy, Ghana has formulated and implemented two broad categories. They include the pre Economic Recovery Programme (ERP) era and the Economic Recovery Programme in itself.

2.3.1: The Pre Economic Recovery Programme (ERP) era

The accumulated external reserves of Ghana as at independence was about $269 million. The Nkrumah government embarked on an accelerated development and modernisation projects. Among them was the promotion of import substitution industrialisation and over his tenure in office, the nominal exchange rate was fixed and maintained. This was meant to make the importation of capital goods and industrial raw materials less expensive so as to fulfill the import-substitution industrialisation agenda set (Sowa et al, 1991).

The universal exchange control was, on July 5, 1961, instituted in Ghana to cover the sterling area and the rest of the world. It was required that recipients of foreign exchange sell, at the official exchange rate, their foreign exchange earnings to the Bank of Ghana. With the introduction of the exchange control, licensed imports, which used to be the order of the day prior 1961, were automatically provided with exchange cover, a replacement of Open General Import (Export) cover. Exports to all countries were subject to 6-months

allocation and surrender requirements. The two new regulations introduced in 1965 – the shortening of time exporters were allowed in the collection and surrendering of their proceeds to 60 days, and the regulation that foreign-owned companies sought prior approval from the Exchange Control authorities over domestic loans and overdrafts as a means of squeezing foreign exchange from them. Notwithstanding these controls, an unbalance situation under the fixed exchange rate system occurred in the supply of and the demand for foreign exchange. A cedi was exchanged for one dollar and forty cents in 1961, and by 1967, there had not been any remarkable change in this rate (Baah-Nuakoh, 1997).

Due to overvaluation of the currency, the cedi had to be devalued in 1967, 1971, and 1978. The percentage devaluation of the cedi was 43 in 1967 with the official exchange rate increasing from ¢0.71 per US dollar to ¢1.02 per US dollar. According to the then government, this position was taken because it anticipated balance of payment deficit of over ¢90 million. Again, the cedi felt a devaluation against dollar – the rate of exchange further rising from ¢1.02 to ¢1.82, in 1971. The cedi was revalued by the Acheampong's government which took over from the Busia's administration in 1972 reducing the price of a dollar to ¢1.28. From 12th February, 1973, the exchange rate fell further to ¢1.15. This rate remained until 1978 when authorities, upon critical consideration, reached a decision to abandon the fixed exchange rate system. They adopted a "quasi-float" system. In this system, market forces were permitted in the determination of exchange rate but was to be adjusted periodically by monetary authorities. There was a devaluation of 11.5 percent – a change from ¢1.15 to ¢1.30. Finally, the cedi again depreciate against the dollar with the rate rising to ¢2.75 in August, 1978 (Baah-Nuakoh,

1997

2.3.2: Exchange Rate Policies since 1983

The economic decadence that had existed through to this period gave way to radically different and more market-oriented programmes. Exchange rate reforms pursued were on the grounds of four main objectives: 1) to absorb the parallel market into the legal market; 2) to realign the official exchange rate; 3) to achieve a convergence of official and parallel rates; and 4) to allow market forces (i.e. interactions between demand and supply) in the determination of the rate and allocate foreign exchange (Dordunoo, 1994).

Ghana, in April 1983, under the auspices of IMF and the World Bank embarked on an initiative – Economic Recovery Programme (ERP), aimed at addressing the impediment posed to the Ghanaian economy by the overvaluation of the Cedi through the 1970s to the early 1980s. Early 1980s saw Ghana in serious economic downturn. Current account position was nothing to write home about amidst natural disasters (drought and bush fire). Coincidentally, the Nigerian government deported a very good number of Ghanaian nationals who had found greener pasture in their lands and for that matter were tripping into their country every passing day. Ghanaian government, the Flt Lt Jerry John Rawlings led Provisional National Defense Council (PNDC), was left with no option than to embark on the ERP with stringent conditionalities. During this era, trade with parts of the world was libralised and price controls were removed. Despite the predetermined mindset not to devalue the Cedi, a four-year economic reform was launched which maintained a fixed exchange rate regime but with periodic devaluation. As a result, the Cedi fell in value over 32 times the value at the onset the reform (from GH¢2.75/US$ to GH¢90.00/US$) between October 1983 and January 1986.

A system of multiple exchange rates based on bonuses and surcharges was announced, in April 1983, as a step towards exchange rate liberalisation. The exchange mechanism comprised a multiple exchange rate system of two official rates of which traditional exports and imports of essential raw materials, crude oil, capital goods and basic foodstuffs were subjected to a Cedi-US Dollar exchange rate of 23.375. That for nontraditional exports and other imports was 29.975. Until October 10, 1983 when the exchange rates were merged at ¢30.00 per US Dollar, this scheme was being practiced (Yemidi, 2010).

The devaluation practice witnessed a modification during the second phase of the ERP (1987 – 1989). The control over the Cedi exchange rate described as "vital transactions" was maintained by the government. Such transactions included crude oil purchases, pharmaceuticals, cocoa exports and servicing of government debt, which were referred to as "Window One Transactions". At the same time, the government instituted a Foreign Exchange Auction System under the supervision and control of the central bank because the efforts made earlier to eliminate the overvaluation of the Cedi relative to its supposed "equilibrium" rate and certainly relative to the parallel rate were simply not enough. The main objective was to prevent speculations in foreign exchange. Also, this was referred to as "Window Two Transactions", and covered individuals and organisations operating in priority areas of the Ghanaian economy.

Following window-two agreements, private individuals and commercial banks were given the permit to set up and operate Foreign Exchange Bureaux in the big cities in the country. The principal purpose was to channel foreign exchange transactions on the parallel of black market though the banking system. Real Gross Domestic Product (GDP) rose from

-7 percent to 8 percent in 1984. Although, the economy was performing strongly during the recovery period with the annual growth in the real GDP averaging in excess of 5 per cent and rate of inflation dropped to 25 per cent from 123 per cent at the end of 1989, a build-up of currency outside the banking system was on the ascendency due to less developed nature of the financial market (IMF, 1995).

Moreover, high transaction cost with the banking system led to a rise in demand for foreign exchange in the parallel foreign exchange market. Financial sector reforms geared towards market-orientation system of monetary control based on indirect investments was brought into being by the government. The 90-day, 180-day, 1-year, and 2-year Bank of Ghana Treasury bill among others were introduced under this system.

In 1990, the government saw the need for modification of the Auction system because it failed to bring the two rate to convergence as expected. Since 1992, the market exchange rate of the Cedi against its major trading currencies was determined in an interbank market supported by a weekly wholesale auction. Reduction of excess demand on the auction market, narrowing of the difference between the highest and lowest bid rates in the auction market, and the unification of the marginal auction and the bureau exchange rates were the major impacts of the wholesale auction and the interbank arrangements.

Under the Interbank Market, authorised dealer banks were permitted to trade in foreign exchange among themselves or with their final-user clients. The major provisions with regard to regulating the interbank auction were: one, the foreign exchange traded in the interbank auction should not be subject to surrender requirements; two, authorised dealer banks' working balances was not to exceed a given ceiling; and three, BoG was also allowed to partake in the interbank market as a buyer or seller. The exchange rate in Ghana

has since been quoted using Interbank and foreign exchange bureau rates. The rate continued to increase, depreciating in 1994 by 33.31 percent over the 1993's rate. The rate of depreciation increased further in 1995 but ceased in 1996. The year 2000 witnessed the highest annual depreciation of the Cedi against the US Dollar, 85.8 percent over the period 1993-2000.

The New Patriotic Party (NPP) in 2001, upon assumption of political power and with the determination to ensure stable macroeconomic environment, embarked on various policy initiatives which included the Highly Indebted Poor Countries (HIPC) initiative. Prices of petroleum products and public utilities felt an upwards adjustment. To some extent, stabilization in the economy was realised with these policies. In the same year, the Cedi depreciated against the US Dollar by 12.1 percent. However, the depreciation rate of the Cedi fell consistently from 2003 to 2005 achieving a marginal depreciation of 0.29 percent in 2005. Despite the gains made, excessive government expenditure in 2008 affected the Cedi badly losing its value against the US Dollar by 24.8 percent (AsumingBrempong, 1998).

A study conducted by IMF prior the ERP revealled that the overvaluation of the Cedi was a main source of distortion in the economy. The ERP brought to light some major structural problems of the economy. Subsequently, the bank (1986 - 1991) launched and implemented its own parallel Structural Adjustment Programme (SAP) targeting SubSaharan African countries, not excluding Ghana. In this new programme, issues regarding exchange rate were usually left to the Fund to negotiate or at times team up the central bank (Asuming-Brempong, 1998). Table 2.1 provides a gist of exchange rate policies implemented since the ERP era.

Table 2.1: Summary of Exchange Rate Policies in Ghana since 1983

Date	Exchange Rate Regime
Feb. 1983 – Mar. 1986	Multiple Exchange Rate System
Apr. 1986 – Feb. 1987	Dual Retail Auction System
Mar. 1987 – Apr. 1989	Foreign Exchange Bureaux
Mar. 1990 – Jan. 1992	Wholesale Auction System Feb.
1992 – To Date	Interbank Market

Source: Bank of Ghana, 2013.

2.4: Theoretical Review

The demise of Bretton Woods System gave rise to theories of exchange rate. Notable among these theories are: the Purchasing Power Parity Theory, Uncovered Interest Parity Concept, Capital Mobility and Expectation Concept, Portfolio Balance Approach, and Monetary Model. Before a look at these approaches, a critical analysis of exchange rate dynamism will be of immense benefit to readers.

2.4.1: Analysis of Exchange Rate Dynamism

As noted earlier, exchange rate is a price and its determination is accounted for by several forces in the flexible exchange rate market. The quantity demanded of a currency inversely relates to its price but a direct relationship exists between quantity supplied of a currency and its price. Like any other market, equilibrium is attained when quantity supplied equates the quantity demanded of the currency say the Dollar in the Ghanaian economy.

A change in factors such as productivity, preference, tariffs and quota, investment capital and the rest will cause the rate of exchange to rise or fall.

2.4.2: Purchasing Power Parity (PPP) Theory

Traditionally, the doctrine of Purchasing Power Parity developed by a Swedish economist, Gustav Cassel (1916) constitutes the bedrock of exchange rate analysis. It elaborates an equilibrium exchange rate such that two currencies purchase the same amount of identical goods and services in the two economies. This theory asserts that monetary flows would affect domestic prices until parity is achieved (Rutherford, 2002).

The concept was founded on the Law of One Price - the notion that in the absence of transaction costs, identical basket of goods will have the same price in different markets. The underlying assumptions of this notion are: one, there are no artificial barriers (e.g. quotas or tariffs); two, there are no transport or insurance costs; three, all goods and services are internationally traded; and four, domestic and foreign price indexes have the same commodities with the same weighing.

In the short run, however, there can exit price differentials between countries in that individuals or companies can gain an arbitrage profit but PPP doctrine says that such differentials are not sustainable as market forces will come into play to establish equilibrium in cross country prices and change exchange rates in the long run. PPP theory used in forecasting forward exchange rates, is for reasons ranging from the decision on the currency denomination of long-term debt issues to the determination of siting plants.

Given good ***i*** at time ***t***, PPP holds that:

$$P_t(i) = E_t P_t^*(i) \quad \ldots eqn\ (2.1)$$

Where, $P_t(i)$ denotes the local currency price of good ***i*** at period ***t***; $P_t^*(i)$ represents the foreign currency price of good ***i*** at period, ***t***; and E_t representing the nominal exchange rate between the two currencies at period, ***t***.

Generally, PPP for many goods case can be expressed as:

$$P_t = E_t P_t^* \quad \ldots eqn\ (2.2)$$

Where, P_t is the price index of domestic goods at time ***t***,P_t^* represents the price index of foreign goods at time period, ***t***; and E_t denotes the nominal exchange rate between the two currencies at time ***t.***

It follows from equation (2.2) that:

$$E_t = \frac{P_t}{P_t^*} \quad \ldots eqn\ (2.3)$$

Multiplying the right hand side by arbitrary factor, λ gives:

$$E_t = \lambda\left(\frac{P_t}{P_t^*}\right) \quad \ldots eqn\ (2.4)$$

With $\lambda = 1$, is the absolute version of PPP. If $\lambda \neq 1$, then we have the relative version of PPP.

Taking the natural logarithm of equation (4), gives:

$$lnE_t = ln\lambda + ln\left(\frac{P_t}{P_t^*}\right)$$

$$=> \quad lnE_t = ln\lambda + lnP_t - lnP_t^* \qquad \ldots eqn\ (2.5)$$

Taking total differential of equation (2.5) gives:

$$dlnE_t = dln\lambda + dlnP_t - dlnP_t^* \qquad \ldots eqn\ (2.6)$$

But $dln\lambda = 0$ and the differential of the logarithm of a variable represent the growth of that variable, it follows that:

$$\hat{E}_t = \hat{P}_t - \widehat{P^*}_t \qquad \ldots eqn\ (2.7)$$

Where $\hat{E}_t$denotes the rate of depreciation in the nominal exchange rate; $\hat{P}_t$indicates the inflation rate in time ***t*** in the domestic economy; and $\widehat{P^*}_t$ is the inflation rate in time ***t*** in the foreign economy

Equation (2.7) depicts clearly that variation in exchange rate emanates changes in the relative prices. Therefore, an increase in inflation in the domestic economy relative to that of a foreign economy will results in a rise the exchange rate and vice versa.

Again, from equation (2.4), making lambda the subject gives:

$$\lambda = \frac{E_t P_t^*}{P_t} \qquad \ldots eqn\ (2.8)$$

Equation (2.8) is the real exchange rate expression.

Taking natural logarithm results:

$$ln\lambda = lnE_t + lnP_t^* - lnP_t \qquad \ldots eqn\ (2.9)$$

From equation (2.9), it can be deduced that real exchange rate must be stable for real PPP to hold. In the real world, however, it is not likely for real exchange rate to be constant, hence the need to allow for the possibility of random deviation from real PPP.

2.4.3: The Uncovered Interest Rate Parity (UIRP)

This theory states that discount or premium of one currency against another should reflect the interest differential between the two currencies. In terms of the currency of the country with a higher rate, the currency of the country with a lower interest should be at a forward premium. That is to say if we assume a perfect capital mobility across countries with no transaction cost, interest rate differentials will cause prospective investor to channel resources to economies where they will earn higher rate of return on their investment in the short run. This activity invariably account for the rate of change in the in the nominal exchange rate.

For instance, a Ghanaian investor with a principal of Y_t can decide whether to invest domestically at a rate of $r_¢$ or say in dollar-denominated asset. If the investor decides to invest locally, the annual rate of return will be: $Y_t(1 + r_¢)$. Now, if the investor intends to invest abroad at a rate of $r_\$$ per annum, he/she, in the first place, would have to convert his/her money into the Dollars at the prevailing exchange rate, $E_{¢/\$,t}$. His/her capital denominated in Dollar now is $Y_t/E_{¢/\$,t}$ and return to be realized at the end of the period will be, $Y_t(1 + r_\$)/E_{¢/\$,t}$. Upon receiving this return, the investor would have to

convert his/her money back into the local currency at a spot rate of $E_{¢/\$,t+1}$given a domestic currency equivalent income of, $Y_t(1 + r_\$)E_{¢/\$,t+1}/E_{¢/\$,t}$.

In the long run, however, there will be equal interest rate across countries and hence such an arbitrage opportunity will be wiped off and the rate of return on both investment will be equal. It follows that:

$$Y_t(1 + r_¢) = Y_t(1 + r_\$)E_{¢/\$,t+1}/E_{¢/\$,t} \quad \ldots eqn\ (2.10)$$

Simplifying equation (2.10) gives:

$$(1 + r_¢)/(1 + r_\$) = E_{¢/\$,t+1}/E_{¢/\$,t} \quad \ldots eqn\ (2.11)$$

Subtracting 1 from both sides of equation (2.11) and simplifying further gives:

$$(r_¢ - r_\$)/(1 + r_\$) = (E_{¢/\$,t+1} - E_{¢/\$,t})/E_{¢/\$,t} \quad \ldots eqn\ (2.12)$$

Let ***e*** represent the expression on the RHS

$$(r_¢ - r_\$)/(1 + r_\$) = e \quad \ldots eqn\ (2.13)$$

Cross multiplying and simplifying further gives:

$$e = r_¢ - r_\$ - er_\$ \quad \ldots eqn\ (2.14)$$

Where ***e*** is the rate of appreciation or depreciation. If $er_\$ \approx 0$, equation (2.14) reduces to:

$$e = r_¢ - r_\$ \quad \ldots eqn\ (2.15)$$

Equation (2.15) is the UIRP condition. Here, if the local currency is expected to change, rate of return on Cedi-denominated assets will exceed that of abroad by the expected rate of change.

2.4.4: Capital Mobility and Expectations

The model assumes a perfect competition in that individual countries take interest rate as given in the capital market. Capital mobility will ensure the equilibrium in the expected net yield so that the home interest rate minus the expected rate of depreciation will be equal to the world prevailing rate.

Taking the natural logarithm of equation (2.11) gives:

$$ln(1 + r_{¢}) - ln(1 + r_{\$}) = lnE_{¢/\$,t+1} - lnE_{¢/\$,t} \quad \ldots eqn\ (2.16)$$

Since a good approximation can be drawn from the logarithmic difference of a variable, and assuming $ln(1 + r_{¢}) \approx r_{¢}$, $ln(1 + r_{\$}) \approx r_{\$}$, and $lnE_{¢/\$,t+1} - lnE_{¢/\$,t} = e$ it follows that,

$$e = r_{¢} - r_{\$} \quad \ldots eqn\ (2.17)$$

Where ***e*** is the rate of depreciation. Here also, if the local currency is expected to fall in value, rate of return on Cedi-denominated assets will exceed that of abroad by the expected rate of depreciation.

The framework, based on expectation formation, distinguishes between the current exchange rate and long run exchange rate. The model then assumes that:

$$e = \emptyset(lnE_{¢/\$,t+1} - lnE_{¢/\$,t}) \quad \ldots eqn\ (2.18)$$

From equation (2.18), it is obvious for one to draw a conclusion that the expected rate of depreciation of the spot rate is proportionate to the differences between the current spot rate and the long run rate by $\emptyset$. The adjustment coefficient ($\emptyset$), which depends on structural perimeters, determines the rate at which the economy will converge to a long run equilibrium along the perfect foresight path.

Putting equation (2.18) into equation (2.17) and solving for the spot exchange rate results:

$$lnE_{¢/\$,t} = lnE_{¢/\$,t+1} - \frac{1}{\emptyset}(r_{¢} - r_{\$}) \quad \ldots eqn\ (2.19)$$

Equation (2.19) shows that the spot exchange rate is affected by the domestic interest rate.

2.4.5: Analysis of the Money Market and Monetary Policy

The quantity of money supplied is assumed to be autonomously determined by the central bank in an economy. However, quantity demanded of money is influenced by interest rate variations and level of income. Interest rate changes leads to a movement along the liquidity preference curve but a change in income causes a shift (either leftwards or rightwards). According J. M. Keynes, due to transactions motive, economic agents

increase the amount of money demanded when there is a rise in income. This results in an upward shift in the liquidity preference curve and consequently a rise in interest rate. Contrary, interest rate falls accordingly when there is a decrease in income.

Mathematically, equilibrium situation in the domestic money market is represented as:

$$\frac{M}{P} = Y^{\theta} \exp(-\beta r_{¢}) \quad \ldots eqn\ (2.20)$$

Where ***M*** is the nominal money supply, ***P*** is the price level, ***M/P*** is the real money balance, $r_{¢}$ is the domestic interest rate, ***Y*** is real income and $Y^{\theta} \exp(-\beta r_{¢})$ is the real money demand.

Taking natural logarithm of equation (2.20) gives:

$$\ln M - \ln P = \theta \ln Y - \beta r_{¢} \quad \ldots eqn\ (2.21)$$

Solving for $r_{¢}$ gives:

$$r_{¢} = \frac{1}{\beta}(\theta \ln Y - \ln M + \ln P) \quad \ldots eqn\ (2.22)$$

Substituting equation (2.22) into equation (2.19) gives:

$$lnE_{¢/\$,t} = lnE_{¢/\$,t+1} + \frac{1}{\emptyset\beta}(\ln M - \theta \ln Y - \ln P + \beta r_{\$}) \quad \ldots eqn\ (2.23)$$

As depicted in equation (2.23), spot exchange rate will increase when there a rise in foreign interest rate and domestic money supply but a rise in domestic income and price level will lead to a fall in the current spot exchange rate and vice versa.

2.4.6. Analysis of the Goods Market

In a free market economy, the determination of domestic goods' prices is based on market mechanisms (i.e. the interactions of demand and supply). As it has become a basic tenet in the market oriented economies, when there is excess demand over supply, price increases. On the other hand, price falls when supply exceeds demand. Equation (2.24) represents the rate of increase in the domestic goods which is proportional to excess demand measure.

$$P = \pi(lnD_t - lnY_t) \quad \ldots eqn\ (2.24)$$

Where P denotes the growth rate of prices in the domestic economy. D_t, the demand for domestic output with Y_t representing the total national output at a given period of time. It must be stated that the demand for domestic goods is a function of interest rates, real output and the relative price of goods in the local market. This state of affairs is algebraically presented in equation (2.25) below.

$$lnD_t = \alpha + \gamma\left(lnE_{¢/\$,t} + lnP_t^* - lnP_t\right) + \vartheta lnY_t - \eta r_t \quad \ldots eqn\ (2.25)$$

Here, α is the intercept and can be said to be the autonomous term.

Putting equation (2.25) into equation (2.24) and simplifying results:

$$\dot{P} = \pi\left(\alpha + \gamma\left(lnE_{¢/\$,t} + lnP_t^* - lnP_t\right) + (\vartheta - 1)lnY_t - \eta r_t\right) \quad \ldots eqn\ (2.26)$$

Recall from equation (2.22), interest rate can be modified as:

$$r_t = \frac{1}{\beta}(\theta \ln Y_t - \ln M_t + \ln P_t) \quad \ldots eqn\ (2.27)$$

Substituting equation (2.27) into equation (2.26) and simplifying gives:

$$\dot{P} = \pi\left(\alpha + \gamma lnE_{¢/\$,t} + \gamma lnP_t^{*} - \gamma lnP_t + (\vartheta - 1)lnY_t - \frac{\eta\theta}{\beta}\ln Y_t + \frac{\eta}{\beta}\ln M_t - \frac{\eta}{\beta}\ln P_t\right) \quad \ldots eqn(2.27)$$

A further simplification gives:

$$\dot{P} = \pi\left(\alpha + \gamma lnE_{¢/\$,t} + \gamma lnP_t^{*} - \left(\gamma + \frac{\eta}{\beta}\right) lnP_t - \left(1 - \vartheta + \frac{\eta\theta}{\beta}\right) lnY_t + \frac{\eta}{\beta}\ln M_t\right) \quad \ldots eqn(2.28)$$

The long run equilibrium condition in the goods market will ensure that the aggregate levels of demand and supply equate. The implication is that inflation rate in the domestic economy will be zero. That is: $P/\pi = 0$. Hence, dividing both sides of equation (2.28) by π and simplifying leaves:

$$0 = \alpha + \gamma lnE_{¢/\$,t} + \gamma lnP_t^{*} - \left(\gamma + \frac{\eta}{\beta}\right) lnP_t - \left(1 - \vartheta + \frac{\eta\theta}{\beta}\right) lnY_t + \frac{\eta}{\beta}\ln M_t \quad \ldots eqn(2.29)$$

Solving for the domestic price gives:

$$lnP_t = \frac{1}{\left(\gamma + \frac{\eta}{\beta}\right)}\left[\alpha + \gamma lnE_{¢/\$,t} + \gamma lnP_t^{*} - \left(1 - \vartheta + \frac{\eta\theta}{\beta}\right) lnY_t + \frac{\eta}{\beta}\ln M_t\right] \quad \ldots eqn(2.30)$$

It can be concluded from the ensuing analysis that the spot exchange rate and domestic price are generated endogenously.

2.4.7: Portfolio Balance Approach to Exchange Rate Determination

This approach endeavours as much as possible to explain how the rate of returns on financial assets determine the nominal exchange rate movements in an economy. It postulates that rational economic agents, as way of diversifying their portfolio of financial wealth, combine assets denominated in different currencies. In addition, the model acknowledges that short-run capital mobility among nations is possible to emanate as a result of loss of confidence in the domestic economy, growing supply of funds and stock-adjustment of an existing stock of assets due to interest rate differentials across the world. In this model, emphasis is laid on the stock-adjustment component. Such adjustments in financial assets are perceived to be a key determinant of movements in exchange rates in the short run. This stems from the fact that bearers of such financial instrument are guided by the profit and safety motives.

2.4.8. Impacts of Currency Depreciation on the Domestic Economy

In theoretical perspective, currency depreciation has divergent effects on the local economy. There can be positive gains such as: a potential growth from output effect, increase in employment and the likes. However, cost of public external debt servicing increase, unemployment, and demand pull and cost inflation can result from exchange rate

depreciation. If the local currency depreciates a firm's transactions, for instance, are affected in the following ways: one, increase in local sales (relative to foreign competition in local markets); two, increase in exports denominated in local currency; three, increase in exports denominated in foreign currency; four, increase in interest received from foreign investments; five, increase in imported supplies denominated in foreign currency; and six, increase in interest owed on foreign funds borrowed.

Local sales should increase due to reduced foreign competition because prices denominated in strong foreign currencies will seem high to the local customers. The firm's exports denominated in the local currency will appear cheap to importers, thereby increasing foreign demand for those products. Even exports denominated in the foreign currency can increase cash flows because a given amount in foreign currency inflows to the firm will convert to a larger amount of the local currency. All these can culminate into increase in output. In addition, interest or dividends from foreign investments will now convert to more of the local currency.

With regard to cash outflows, imported supplies denominated in the local currency will not be directly affected by any change in exchange rates. The cost of imported inputs denominated in the foreign currency will rise, however, because more of the weakened local currency will be required to obtain the foreign currency needed.

Any interest payments paid on financing in foreign currency-denominated capital will increase. These will translate into higher production cost and eventual decline in output. The fall in output can lead to a rise in unemployment, increase in consumer price level, to mention a few.

The overall resultant effect will depend on the relative strength of each effect. If a country has a robust exporting base, then the positive growth effect will dominate. In general, depreciation of the firm's local currency causes an increase in both cash inflows and outflows. A firm that concentrates on exporting and obtains supplies and borrows funds locally will likely benefit from a depreciated local currency. Conversely, a firm that concentrates on local sales, has very little foreign competition, and obtains foreign supplies (denominated in foreign currencies) will likely be hurt by a depreciated local currency.

2.5: Empirical Review

As noted earlier, several research works have been conducted in the subject area and for that matter this subsection will consider some of such works. Subjecting the various theoretical models to empirical tests, the PPP was rated above the others for it appeals theoretically and intuitively.

Owusu-Afriyie et al. (2004) derived a simple monetary model of exchange rate determination for Ghana and employs the technique of co-integration analysis to empirically investigate the principal factors driving the Cedi/Dollar rate of exchange since the adoption of floating exchange rate regime in the country. The basic model was augmented with political variables to examine any potential impact on the exchange rate. The empirical results corroborate the model, with the effect that macroeconomic fundamentals play an important role in the cedi-dollar rate dynamics. Similarly speculation based on recent past behaviour of the Cedi/Dollar (to extrapolate the future

behaviour of the rate) is crucial and this has been linked largely to underdevelopment of the financial system and the exchange rates market. However, while the political variable is correctly signed, it is not significant at conventional levels of significance. Finally, the effectiveness of Bank of Ghana intervention (as measured by non-oil forex sales) on the value of the cedi was examined.

Bakarr et al. (2012), investigated the impacts of exchange rate on inflation and macroeconomic performance in economies constituting the West African Monetary Zone (WAMZ). The researchers formulated an open-economy general equilibrium model to throw light on the interrelationships among inflation, money supply growth, exchange rate movements and real GDP growth. Quarterly data series for the period
1981 to 2010 for all countries with the exception of Ghana (1983 to 2010) and Guinea (1989 to 2010) were used. The analysis was done by the use of Vector Autoregressive (VAR) model. The use of this model was appropriate as it allowed the researchers to estimate the impulse response functions and variance decompositions for inflation and output in order to determine how inflation and output respond to changes in the exchange rate, and what proportion of inflation and output variance can be explained by the exchange rate. Generally, the study revealed that exchange rate has a significant effect on inflation in all economies involved.

Asiamah et al. (2010) conducted a study on the effect of Exchange Rate Regimes (ERR) on Foreign Direct Investment (FDI) inflows in Ghana. The work employed Ordinary Least Squares (OLS) and the cointegration techniques to analyse data spinning 39 year period (1970 – 2008). A stationarity check was done on the variables after which harmonious error correction model was estimated. Democracy, rather than ERR, was found to have

the expected positive sign and to be a strong determinant of FDI flows into the economy. This resulted because the variable included in the four different regressions were peculiar to the Ghanaian situation. Omission of variables and validity of data gathered, as even admitted by the researchers, were possibly responsible for such findings. They, therefore, recommended the sustenance of democracy and current flexible ERR as a way forward in attracting FDI. They entreated policy makers to back these moves with policies but as to which ones they think would be appropriate was not made known in the paper.

Elsharif-Suliman (2005) studied the relationship between FDI and exchange rate for twenty low-income countries of the Sub-Saharan Africa. He did use a panel data from 1980 to 2003. The study used the two-Stage Least Squares method, the fixed effects method, the cross-section weights technique (CSW), and the seemingly unrelated regression (SUR) weighted least squares technique, the results show that both real exchange rate and its volatility have influenced the FDI inflows. His findings were consistent with a priori expectations. To him the decision by most of the sub-Saharan African countries pegging their currencies at a fixed rate to the Dollar as an incentive to attract FDI was a move in the right direction because it involves a trade-off between uncertainty and flexibility. The resultant price competitiveness will influence FDI inflows. Although, analysing almost the same relationship, his work differs from the other researcher's for the focus was not on only one country.

Yemidi (2010) conducted a study with the principal focus on the determination of variables that explain the variation in the exchange rate in the Ghanaian economy. He pointed the attempt made by successive governments since independence to curtail exchange rate depreciation and lamented heavily about the still existence of the problem.

He made use of quarterly data covering 24 years (1985 – 2008) and analysis, mainly on the PPP model, was done using cointegration, granger causality text, vector error correction mechanism. Excessive government expenditure coupled with past information on exchange rate, he noted, tend to have dominant effect on the exchange rate forecasting. He therefore recommended a reduction in government expenditure in order to achieve a short run stability in exchange rate movement. The researcher limited himself to a few contributing factors to exchange rate movement which might have affected his findings remarkably. This study will take into account all the possible variables that come into play in exchange rate depreciation in the Ghanaian context. Notwithstanding the shortcoming, the research employed the appropriate mathematical and statistical techniques in arriving at his findings.

Frimpong and Anokye (2010) examined the impact of exchange rate changes on consumer prices using vector autoregression models and cointegration analysis. The study covered the time frame January, 1990 to February, 2009 and like Yemidi, a quarterly data that allowed for reasonable sample size was used. They foresaw that exchange rate volatility heavily affect consumer prices as it is a well-established fact that increase in exchange rate leads to inflation in most economies. Their empirical results, however, showed that there existed long run positive and insignificant relationship between exchange rate and domestic prices rendering their findings inconsistent with a priori expectations. In the short run their work was able to detect a low degree of passthrough which they attributed to the increased openness and tighter monetary policy implemented by the Bank of Ghana over the period and entreated authorities to maintain the approach.

Eichenbaum and Evans (1995) investigated the effects of monetary policy shock on the exchange rate. The variables included in their model were based on the flexible monetary model of exchange rate determination. Five exchange rates in relation to the US Dollar were examined Japanese yen, German mark, Italian lira, French franc, and British Pound. Monthly data over the period 1974 - 1990 which was obtained from the International Financial Statistics (IFS) and the Federal Reserve Bank, USA were used. The study employed Vector Autoregression (VAR) in the estimation of the model. The research found out that contractionary shocks to US monetary policy were followed by sharp, persistent increases in US interest rates. Also, it was found that the same shocks led to sharp, persistent appreciations in US nominal and real exchange rates.

Adu-Gyamfi (2011) studied the impact of exchange rate volatility on Ghana's economic growth. Data on time series macroeconomic variables covering the period of 1983 – 2010 were used in his study. As the title of his research suggests, the core objective was to assess the effects of exchange rate movement on the Ghanaian economy. The study employed unit root test, cointegration analysis and error correction models (ECM) in the determination of short run and long run causal relationships that existed among the variables. In the short run, the study established a significant negative relationship between economic growth and exchange rate volatility but proved otherwise in the long run. This, as admitted by the researcher, was as result of government intervention in the foreign exchange market. The second finding of the study was not consistent with a priori expectations as variables of such nature are believed to show some long run associations. He, also, upon identifying the problems that emanates from instability in exchange rate in

Ghana entreated policy makers to formulate measures to curtail the situation but failed to pinpoint any such measures.

To overcome the problem of spurious results, Corbae and Ouliaris (1988) studied the validity of the purchasing power parity using the cointegration technique proposed by Engle and Granger (1987). By definition, the real exchange rate should be equal to one when absolute purchasing power parity holds. For PPP to hold, any deviation from it must be stationary. It, therefore, means that testing the PPP implies testing the (log of the) real exchange rates for stationarity. The data for the study were monthly averages of daily Canadian Dollar, French franc, Deutsche mark, Italian lira, Japanese yen, and UK Pound/US Dollar spot exchange rates and monthly consumer price indices for each of the above countries. These data were collected from the Citibank (U.S.) covering the period July 1973 and September 1986.

Fiagboh (2013) examined the relationship of real effective exchange rate (REER) and other macroeconomic variables in Ghana. This was to envisage whether or not there exist short and long term causal relationships among the variables of interest. With focus on foreign aid, empirical models were developed for REER. Time series data covering 32 years (1880 – 2011) were used. As has been the culture of analysing such data, approaches such as: vector autoregressive (VAR), vector and error correction (VEC), and cointegration analysis using Johanson method were made use of by the researcher. The results from the study showed that government expenditure, foreign aid, terms of trade, among several others have great influence on real effective exchange rate. His findings were consistent with what is expected in a priori sense. This is by virtue of the macroeconomic variable that were taken into account in the study.

Frenkel (1980) investigated the purchasing power parity doctoring by using a two-stage least squares. The choice of this approach is informed by the conviction that both the exchange rate and the relative prices are endogenously determined. The data for the study involved the monthly flexible exchange rates during the 1920s. The sample included four countries: France and Germany, on one hand, which experienced hyperinflation conditions, Britain and the US, on the other hand, which experienced more normal economic conditions. The results from that study support the purchasing power parity hypothesis.

Chinn et al. (2004) tested the uncovered interest rate parity hypothesis by using a longhorizon data on exchange rate and interest rates. That is, the study used interest rates on longer-maturity bonds for the group of seven industrialised (G7) countries. Monthly data from 1983 to 200 of yields on outstanding government bonds with ten-year maturity at the date of issuance were used. The ten-year volatility in the exchange rate versus the Dollar for the other six currencies was then regressed on the ten-year lagged differential in the associated bond rate. In all cases, the estimated slope coefficient was positive, with four of the six values lying close to unity than zero. For the Canadian Dollar and the Deutsche mark, the point estimates are very close to unity, indicating that there is near one-to-one relation between the exchange rate and interest rate differential. The yen, lira and Pound were the three cases in which uncovered interest rate parity was statistically rejected. A robustness tests was conducted in order to ascertain whether the results were sensitive to the data frequency, sample period, and data types. Generally, the results from the robustness tests were consistent with earlier results.

Adopting the Engle-Granger two-step procedure, Barungi (1997) analysed the relationship between the rate of inflation and exchange rate in Uganda. The study evident that high inflation is principally due to increases in supply of money in the medium term. Currency depreciation was found to have an indirect impact on the general price level through its effect on the parallel exchange rate and the budget. However, this transmission mechanism was found to be deflationary rather than inflationary which violates theoretical assertion.

Sackey (2001) understudied the factors that influence real exchange rate in Ghana. The researcher postulated a relationship between the real exchange rate as the explained variable and commercial policy stance, terms of trade, inflows of external aid (defined as real Net Official Development Assistance to Ghana), government consumption on nontradables (measured by share of government consumption in GDP), and technological progress as the explaining variables. The cointegration approach was used to examine the aid-real exchange rate relationship employing annual time series data covering the period 1962 - 1996. The study revealed that foreign aid inflows results in real exchange rate depreciation instead of appreciation. This finding is not consistent in a priori sense.

Ndung'u (1997), in a similar study, investigated the relationship between inflation and exchange rate in the Kenya economy. Employing quarterly data spanning 1970 to 1993, one significant cointegrating equation was identified from the multivariate cointegration test performed. The researcher conducted a granger causality test which indicated a bilateral causality between inflation in the domestic economy and the rate of exchange. The study further revealed that inflation rate, globally, has no prediction power to determine domestic rate of inflation, rather forecast exchange rate variations. In addition to these findings, exchange rate volatility, not domestic inflation rate, could be predicted

on the basis of real effective exchange rate movements. It must be noted that exchange rate is a price and for that matter whatever accounts for its movements will eventually translates into changes in inflation rate in the domestic economy.

CHAPTER THREE

METHODOLOGY

3.1: Introduction

The methods and methodologies used in arriving at the findings of this study are outlined in this chapter. It seeks to explain the tools and approaches that were used in gathering and analysing the data. In addition, this chapter touched on the possible variables in determining exchange rate, process of measuring their degree of variation in exchange rate and from which the conclusion of the study is derived. Based on the information provided in this chapter, the validity of the study, in terms of data utilized and method of analysis, can be assessed.

3.2: Research Design

It is quite natural to divide the research into two parts as this work is ramified into a theoretical and a practical approaches. For the theoretical part of the study, the paper employed an explorative research method so as to grasp issues, comprehensively, relating to exchange rate movements and to generate assumptions that will serve as guides for the field study. In the second part, from data collected, inferential and analytical research method were employed and this helped in giving economic intuitions to the subject area. Correlation analysis among the variables was done. A field work was conducted because from the researcher's point of view an activity of such sort creates a picture of reality regarding the effects of exchange rate depreciation in the Ghanaian economy.

3.3: Sampling

Although, the study principally employed secondary data in its analysis and arriving at its findings, the use of primary data was equally indispensable. The target population for the study comprised all those in the used vehicle importation business in the Kumasi Metropolis but a sample of thirty respondents were contacted to solicit their views regarding the impacts of the Cedi depreciation on their activities. It was costly, financially and in terms of time, gathering data from the entire population hence choosing a sample size of 30 appeared to be the most cost effective decision. The selection criterion of the participants for the study was simple random sampling method. A simple random sample was chosen in order to give each respondent the equal chance of being selected for the study thereby eschewing personal bias in the selection process.

3.4: Data Collection and Source

Both qualitative and quantitative data were used. The tool employed in gathering the primary data was personally administered structured interviews. Here, predetermined questions were posed to respondents personally. Annual data on exchange rate, imports, Gross Domestic Product, inflation, interest rate and both external and internal debt accumulated by the country over the years were obtained from Bank of Ghana (BoG, 2013) and International Monetary Fund (IMF, 2013) through the internet and journals. It must be stated that imports, Gross Domestic Product, and public debt are expressed in millions of Ghana Cedis. Interest rate and inflation rate are measured in a 91-day Treasury bill rate and year-on-year rate respectively quoted by the Bank of Ghana.

3.5: Theoretical Framework

The Ghanaian economy is assumed by this model to be small in the world capital market and has no influence on foreign rate of interest. Also, as a market economy, capital mobility is permitted across the borders of Ghana with less restrictions. This capital mobility will ensure the equalisation of net expected yields so that the domestic interest rate, adjusted for the rate of depreciation, will equal the interest rate of her trading partners.

It can be deduced from equation (2.16) that:

$$lnE_{¢/\$,t} = lnE_{¢/\$,t+1} - r_{¢} + r_{\$} \qquad \ldots eqn\ (3.1)$$

Equation (3.1) presents the spot exchange rate which relates to long run exchange rate and foreign interest rate positively but inversely to domestic interest rate, determined by forces in the money market.

Also, recall from equation (2.7) that,

$$\hat{E}_t = \hat{P}_t - \widehat{P^*}_t \qquad \ldots eqn\ (3.2)$$

Equation (3.2) depicts clearly that variation in exchange rate emanates changes in the relative prices. Therefore, an increase in inflation in the domestic economy relative to that of a foreign economy will results in a rise the exchange rate implying a depreciation of the domestic currency and vice versa.

Again, from equation (2.23), we can derive

$$lnE_{¢/\$,t} = lnE_{¢/\$,t+1} - \frac{1}{\emptyset}(\theta \ln Y - \ln M + \ln P) + r_{\$} \qquad \ldots eqn\ (3.3)$$

Assuming money supply is not autonomously determined by the Bank of Ghana rather depending on public debt, domestic interest rate, national output, and volume of imports, we can obtain:

$$\ln M = f_1(pd, imp, r_¢, y) \quad \ldots eqn\ (3.4)$$

Putting equation (3.4) into equation (3.3) gives:

$$lnE_{¢/\$,t} = lnE_{¢/\$,t+1} - \frac{1}{\emptyset}(\theta \ln Y - f_1(pd, imp, r_¢, y) + \ln P) + r_\$ \quad \ldots eqn\ (3.5)$$

In functional form, equation (3.5) can be written as:

$$e = f_2(pd, imp, r_\$, p, r_¢, y) \quad \ldots eqn\ (3.6)$$

Where the current spot exchange rate is a function of public debt, imports, national income, price level in the domestic economy, domestic interest rate and foreign interest rate.

3.6: Model Specification

The study formulated the small simultaneous equation model as expressed in equation (3.7) below where the Cedi-Dollar rate of exchange is expressed as a function of other macroeconomic variables.

$$ER_t = f(INFL_t, INT_t, NGDP_t, DEBT_t, IM_t)^\beta \quad (3.7)$$

Where β represents the vector of the parameter.

Reformulating equation (3.7) and introducing an intercept gives:

$$ER_t = \alpha INFL_t^{\beta_1} INT_t^{\beta_2} NGDP_t^{\beta_3} DEBT_t^{\beta_4} IM_t^{\beta_5} \quad (3.8)$$

A natural logarithm transformation of equation (3.8) and an introduction of a stochastic term results:

$$lnER_t = ln\alpha + \beta_1 lnINFL_t + \beta_2 lnINT_t + \beta_3 lnNGDP_t + \beta_4 lnDEBT_t + \beta_5 lnIM_t + {}_t \quad (3.9)$$

Assuming $ln\alpha = \beta_0$ which is the autonomous component of the regression model, the OLS can then be estimated as presented in Equation (3.10).

$$lnER_t = \beta_0 + \beta_1 lnINFL_t + \beta_2 lnINT_t + \beta_3 lnNGDP_t + \beta_4 lnDEBT_t + \beta_5 lnIM_t + {}_t \quad (3.10)$$

It must be stated that $\beta_0 \ldots \beta_5$ represents the respective elasticities and $_t$ is the stochastic term.

3.7: Definition of Variables

The study focused on the depreciation of the Cedi-Dollar Exchange rate (being the dependent variable) with the following independent variables: inflation rate, interest rate, nominal Gross Domestic Product, imports, and public debt.

i. Exchange Rate

As noted earlier, exchange rate is the price of one currency in terms of another. Depending on economic conditions existing in a particular country at a point in time, it can either depreciate or appreciate. A depreciation in the exchange rate implies that much more of the domestic currency is required in exchange for the foreign currency. On the contrary, when lesser units of the local currency is needed in exchange for the foreign one then the local currency is said to have appreciated against the foreign currency. Interest rate, inflation rate, balance of payment, current account balance among several others are the possible factors that influence exchange rate movement in the economy. The Cedi-Dollar rate of exchange is employed by the study.

ii. Interest Rate

Interest rate is the price paid by deficit borrowers on loan taken which goes to surplus lenders as income for making available surplus funds to borrowers. The variability in this rate across countries can greatly influence capital mobility. For instance, assuming the expected rate of return on Dollar-denominated financial assets is higher than that of Cedi-denominated assets, it will be rational for arbitrageurs to channel their funds into US to gain from such difference under the assumption of less or no transaction cost.

This, invariably, will exert pressure on the local currency causing it to depreciate.

Appreciation of the Cedi will be the case if interest rate in Ghana is above that of United States of America.

Argued differently, the power to calibrate interest rate in the country has been conferred in the hands of Bank of Ghana. Nominally, high interest rates may appear as increase in the monetary value of a creditor. In order to restore parity, however, if interest rate in Ghana is higher than that of say the United States then the Ghana Cedi, in real value, will depreciate. Exchange rate, therefore, is expected to relate positively with foreign interest rate but negatively with domestic interest rate. The interest rate used in this study is the 91-day Treasury bill rate by the Bank of Ghana for the time frame.

iii. Public Debt

Excessive government borrowing (both internally and externally) to finance its expenditure can greatly influence exchange rate movement. The sales of financial securities such as T-bills, bond, is one way the government does this. Investors' confidence is reduced upon realising a large public debt and as a results will not invest in Cedi-denominated assets, the long run. Also, when it comes to servicing and paying back loans taken denominated in a foreign currency, government would have to demand much the underlying currency. In so doing, market forces will cause the price of the said foreign currency to increase. These, in effect, will lead to depreciation in the domestic currency. However, according to some school of thought, the short run effect of a rise in public debt is an appreciation of the domestic currency as the supply of the underlying foreign currency increases but this situation is short lived and cannot be relied on. An increase in government debt is expected to relate positively with exchange rate. Both the internal debt and external debt which encapsulate into public debt is expressed in millions of Ghana Cedis.

iv. Gross Domestic Product

The GDP is the total output of goods and services produced within the boundaries of a country in a particular time period irrespective of the nationals that produced it. Human beings, by nature, increase their demand for normal goods when a rise in income is experienced as postulated by John M. Keynes. The additional income can be consumed on both domestic and foreign produced goods and services. Part of the increased income also leaks out of the economy as foreigners repatriate their profit. Invariably, profit repatriation and spending on foreign goods and services exerts pressure on the domestic currency as the demand of the underlying foreign currency rises. A positive relationship is expected between increase in GDP and exchange rate depreciation. The neoclassicals think otherwise and expects increase in national output to cause an appreciation in a domestic currency on the grounds that increase in exports (which improves trade balance) increases with output. The nominal GDP quoted in millions of Ghana Cedis for the time frame is used by the study.

v. Imports

Ghana, over the years, has been characterised by negative net export. That is, the country's volume of imports exceeds that of exports. This may be attributed to the fact nationals, socio-economically, have developed exquisite taste for foreign goods and services or cannot find substitute for them locally. As a result, importation has been on the increase. In order to undertake transactions relating to the ever-increasing demand for foreign goods and services, residents in Ghana will have to increase their demand for the underlying

foreign currencies. This mounts pressure on the Cedi because of the rise in price of the foreign currencies resulting from increasing demand for them. A positive relationship is expected between imports and exchange rate. Here, volume of import is expressed in millions of Ghana Cedis.

vi. Inflation Rate

Inflation can be defined as a persistent increase in the general price level of goods and services in an economy over a given period of time. When it comes to the performance of the Cedi, inflation is one key determinant. The Cedi can depreciate in value as a result of consistent increase in inflation. That is to say, a rise in prices in the domestic economy makes imports relatively cheaper than locally manufactured substitutes leading to an increase in the volume of imports. Also, exports from Ghana to other countries becomes more expensive. This results in a rise of demand for foreign currency to patronise foreign goods and services thereby depreciating the Cedi as a result of market forces. A positive relationship is expected between inflation and exchange rate. The rate of inflation employed in this study is based on the year-on-year rate quoted by Bank of Ghana.

3.8: Estimation Techniques and Data Analysis

Statistical softwares such as Eviews and SPSS were used in the analysis of secondary and primary data collected respectively. The cointegration, unit root test and other approach have therefore been conducted. Results from various test performed has been presented in

charts for visual appreciation of the relationships that exist among the macroeconomic variable used in the study. Again, the study did not overlook the use equations and tables in its presentation of findings.

Time series data on macroeconomic variables as employed in this study, without doubt, are non-stationary in nature and are not exogenous. Estimating the relationships that may exist among such variables by applying the Ordinary Least Squares (OLS) is likely to results in spurious regression and inferences drawn thereof cannot be relied on (Granger and Newbold, 1973). This is because the stationary assumption (i.e. the no contemporaneous correlation between the error term and the independent variables) held by the OLS is violated. To achieve stationarity in the variables, the first difference must be taken though there is the tendency of losing information valuable enough in the long run.

Also, if the variables of interest are generated endogenously (i. e. there is multicollinearity), using the OLS to estimate a model will results in inconsistent and biased parameter estimation. Employing multivariate estimation technique will be the way to overcome this problem. According to Granger 1983, the variables when cointegrated at their levels, can be expressed as error correction model.

As a way of avoiding spurious regressions, the unit root test using the Augmented Dickey-Fuller (ADF) was conducted in this study. Equation (3.11) is the ADF test to be estimated.

$$\Delta Y_t = \gamma_0 + \gamma_1 t + (\beta - 1)Y_{t-1} + \delta_1 \Delta Y_{t-1} + e_t \quad \ldots eqn\ (3.11)$$

Where Y_t is the variable of interest at period, t.

Due to the I(0) and I(1) nature of the variables being used in the study, an Autoregressive Distributed Lag (ARDL) model propounded by Pesaran et al (2001) where a bound test is conducted to determine the number cointegrating equations available in the model was adopted. Also, according to Haug (2002) the ARDL approach is appropriate for cointegration analysis since it provides a better results for small sample data set (i.e. sample size less than 60) (Ahmed, 2013; Khim-Sen, 2004). Assuming a long run relationship among exchange rate, inflation, interest rate, nominal GDP, public debt, and imports, the following unrestricted error correction regression can be estimated.

$$\Delta ER_t = \mu + \sum_{i=1}^{n} \Gamma_i \Delta ER_{t-i} + \sum_{i=1}^{n} \beta_i \Delta INF_{t-i} + \sum_{i=1}^{n} \theta_i \Delta INT_{t-i} + \sum_{i=1}^{n} \delta_i \Delta NGDP_{t-i}$$
$$+ \sum_{i=1}^{n} \gamma_i \Delta DEBT_{t-i} + \sum_{i=1}^{n} \alpha_i \Delta IM_{t-i} + \rho_1 ER_{t-1} + \rho_2 INF_{t-1} + \rho_3 INT_{t-1}$$
$$+ \rho_4 NGDP_{t-1} + \rho_5 DEBT_{t-1} + \rho_6 IM_{t-1} + v_t \quad \ldots eqn\ (3.12)$$

Here, using the F-statistics to test the existence of long run relationship, the null hypothesis that no long run relationship exist among the variable can be formulated as:

$H_0: \rho_1 = \rho_2 = \rho_3 = \rho_4 = \rho_5 = \rho_6 = 0$ against

$H_A: \rho_1 \neq \rho_2 \neq \rho_3 \neq \rho_4 \neq \rho_5 \neq \rho_6 \neq 0$

Two set of critical values (the lower and upper bounds) are reported by the ARDL model. The decision rule is to reject the null if the calculated F-statistic falls outside the inclusive bound.

If a stable long run association is established among the variables, the ARDL (a, b, c, d, e, f) model is estimated as:

$$ER_t = \alpha_0 + \sum_{i=1}^{a} \beta_i ER_{t-i} + \sum_{i=1}^{b} \vartheta_i INF_{t-i} + \sum_{i=1}^{c} \pi_i INT_{t-i} + \sum_{i=1}^{d} \tau_i NGDP_{t-i} + \sum_{i=1}^{e} \omega_i DEBT_{t-i} + \sum_{i=1}^{f} \sigma_i IM_{t-i} + \epsilon_t \quad \ldots eqn\ (3.13)$$

It must be note that Schwartz Bayesian Information Criterion (SBIC) was used by this study to determine the optimal structure for the ARDL specification.

In order to deal with possibility of losing valuable information after specifying the ARDL and calculating the associated long run multipliers, error correction model should be formulated. This model shows the error correction term measuring the degree at which the endogenous variables deviate from their respective long run equilibrium levels, in addition of the variables integrated of order one [I(1)].

$$\Delta ER_t = \alpha_0 + \sum_{i=1}^{a} \beta_i \Delta ER_{t-i} + \sum_{i=1}^{b} \vartheta_i \Delta INF_{t-i} + \sum_{i=1}^{c} \pi_i \Delta INT_{t-i} + \sum_{i=1}^{d} \tau_i \Delta NGDP_{t-i} + \sum_{i=1}^{e} \omega_i \Delta DEBT_{t-i} + \sum_{i=1}^{f} \sigma_i \Delta IM_{t-i} + \eta ECM_{t-i} + \varepsilon_t \quad \ldots eqn\ (3.14)$$

Where ECM_{t-i} is the error correction term which must have a negative sign and must be statistically significant with η being its parameter indicating the speed of adjustment to long run equilibrium after a shock. A parameter stability test needs to be performed after correcting the long run model. The common test for this study are those introduced by

Brown et al. (1975). These are: cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMQ).

Engel and Granger came out with a suggestion that inasmuch as there is cointegration between two variables, then, there must be either unidirectional or bi-directional Granger-causality between them. Hence, the cointegrating variables can be represented by an error correction mechanism (ECM). Thus, a Granger causality test to determine the causal relationship that exist among the variables considered in this study was as well been conducted. Generally, two time series variables say ***A*** and ***B*** are said to

Granger cause each other if they each can be better predicted using the histories of both than it can by using the history of one alone. The definition leans heavily on the idea that the cause occurs before the effect, which is the basis of most, but not all, causality definitions. The test for the absence of Granger causality has been presented in equation (3.15) and equation (3.16).

$$A_t = \tau_0 + \sum_{i=1}^{n} \alpha_i A_{t-i} + \sum_{i=1}^{n} \beta_i B_{t-i} + \varepsilon_t \quad \ldots eqn\ (3.15)$$

$$B_t = \tau_1 + \sum_{i=1}^{n} \gamma_i B_{t-i} + \sum_{i=1}^{n} \rho_i A_{t-i} + \mu_t \quad \ldots eqn\ (3.16)$$

Where n is the maximum number of lagged observations included in the model, τ_i representing the intercept with $\alpha_i, \beta_i, \gamma_i \; and \; \rho_i$ denoting the coefficients of their respective variables. The stochastic terms are: $_t \; and \; \mu_t$.

Now, testing the null and alternate hypothesis gives:

$H_0: \beta_1 = \beta_2 = \cdots = \beta_n = 0$ against

$H_A: \beta_1 \neq \beta_2 \neq \cdots \neq \beta_n \neq 0$

This is a test that *B* **does not** Granger-cause *A*.

Similarly, testing the null and alternate hypothesis give:

$H_0: \rho_1 = \rho_2 = \cdots = \rho_n = 0$ against

$H_A: \rho_1 \neq \rho_2 \neq \cdots \neq \rho_n \neq 0$

This is a test that *A* **does not** Granger-cause *B*.

A rejection, in each case, of the null hypothesis implies the existence of Granger causality.

As a prelude to performing an impulse response and the variance decomposition, vector autoregressive (VAR) model which expresses the present value of the endogenous variable as a function of deterministic terms and the lagged values of all other endogenous variables was conducted. Equation (3.17) is a vector of endogenous variables the study made use of:

$$ER_t = (ER, IM, DEBT, INFL, INT, NGDP)^I \quad \ldots eqn\ (3.17)$$

Generally, the *p*-order VAR model can be expressed as:

$$X_t = \mu + \prod_1 X_{t-1} + \prod_2 X_{t-2} + \prod_3 X_{t-3} + \cdots + \prod_p X_{t-p} + \quad _t \quad \ldots eqn\ (3.18)$$

Where $\prod_i = k \times k$ coefficient matrix, $\mu = k \times 1$ constants' vector and $_t = k \times 1$ vector for zero mean unobservable white noise for $t = 1, 2, \dots, T$.

In order to estimate the VAR model, an appropriate lag length must be determined by the use of lag selection criterion and for this study the Akaike Information Criterion (AIC) and/or Final Prediction Error (FPE) were suitable due to the 34-year sample size. Equation (3.18) is the expression for the estimation of the correct lag length.

$$IC(p) = \ln |\sum(p)| + C_T[\varphi(n, p)] \quad \dots eqn\ (3.19)$$

Where $\varphi(n, p)$ is the function that punishes large VAR model, C_T being the sample size T sequence index and $\sum(p)$ represents a non-degree of freedom matrix for the residual covariance.

As a way of identifying the length and the manner a shock in the error term affects the entire VAR system, an impulse response function where a simulation of the behaviour of the variables of interest is formulated, has been conducted. Here, it is assumed that the variables are endogenous and a one standard deviation innovation of the independent variable being considered is allowed. The study employed the Cholesky dof adjusted ordering system in calculating the impulse responses of each independent variable vis-àvis the dependent variable. Below are the models estimated.

$$Y_t = \beta_0 + \beta_1 X_{t-i} + \beta_2 Y_{t-i} + \mu_1 \quad \dots eqn\ (3.20)$$

$$X_t = \beta_3 + \beta_4 Y_{t-i} + \beta_5 X_{t-i} + \mu_2 \quad \dots eqn\ (3.21)$$

In Equation (3.20), a change in μ_1 will bring about a change in Y which in turn lead to a change in X. Ultimately, there will be a change in Y in the next period. The transmission mechanism in Equation (3.21) will be direct opposite of Equation (3.20). We, therefore, investigate how long and the manner allowing a shock in the residual will transmit through the dependent to influence the whole VAR system.

A variance decomposition (also termed as, forecast error variance decomposition) indicates a percentage variation in the dependent variable explained by a shock in the independent variable(s) in a VAR system. In other words, it a relative measure of importance a variable's innovation are in explaining the variation in another variable. This study made use of the Cholesky ordering system for it results in a lower triangular matrix with positive main diagonal elements for the variable of interest. Thus, while impulse response functions traces the effects of a shock to one endogenous variable on to the other variables in the VAR, variance decomposition separates the variation in an endogenous variable into the component shocks to the VAR. When decomposing the forecast error variances, it is assumed that the structural innovations do not exhibit any autocorrelation and correlation among their leads or lags. Equation (3.22) presents the variance decomposition estimated.

$$E[Y_{t+i} - E(Y_{t+i})]^2 = E[(\prod^{*-1} \in_{t+i})(\prod^{*-1} \in_{t+i})'] \quad \dots eqn\ (3.22)$$

Where the expression at the right hand side is the $k \times k$ matrix that represents the variance of the structural shock and the term at the left hand side is the mean square error of variable, Y_t at time $t + i$. The variance of each structural shock when divided by the mean square error gives the percentage contribution of each structural shock in

forecasting Y_t.

CHAPTER FOUR

PRESENTATION OF FINDINGS AND ANALYSIS

4.1: Introduction

The adverse economic consequences of currency depreciation can hardly be escaped by economies even the advanced ones. In line with the general objective of the study, a critical analysis has been done empirically in this chapter. The nature of data used has necessitated the conduction of a unit root test to envisage the stationary status of the respective variables. Presented in this chapter, also, is a cointegration analysis to determine the long run relationships existing among the variables. The chapter, also, brings to bear the effects, both from the field work and secondary data collected, of the depreciation of the Cedi against the major trading currencies on the Ghanaian economy.

4.2: Descriptive Statistics

Table 4.1 presents the descriptive statistics of the macroeconomic variables. Statistical measures examined include the mean, median, maximum value, minimum values, standard deviation (dispersion), Skewness (Peakness), and kurtosis. It can be observed from the table that all the variables, but exchange rate, have positive average values (mean and median) at the log levels. Also, the fluctuations of the variables from their means as shown by their standard deviations. The variables also have positive standard deviation.

The rate of interest and public debt have the lowest and highest standard deviations respectively. All the macroeconomic variables have positive maximum values. The variable with the least minimum value is exchange rate whiles interest rate is variable with the least minimum value. With the exception of inflation rate and rate of interest, all the macroeconomic variables the study considers are negatively skewed. The Kurtosis indicates their respective heaviness of tail.

Table 4.1: Summary Statistics

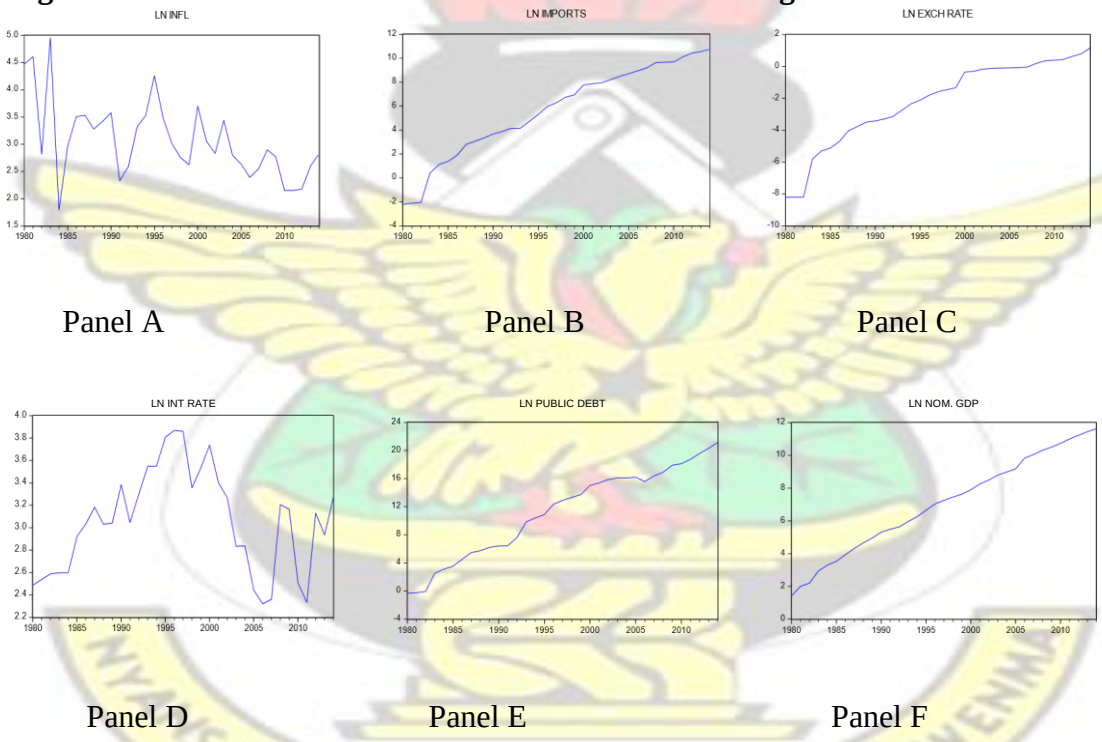
	LN EXCH	LN INFL	LN INT	LN NGDP	LN DEBT	LN IM
Mean	-2.310031	3.088310	3.051914	6.902257	10.95748	5.489963
Median	-1.697091	2.934053	3.044388	7.142865	12.62980	6.123672
Maximum	0.788457	4.958763	3.868698	11.44482	20.31585	10.56413
Minimum	-8.198739	1.789778	2.322388	1.424984	-0.307885	-2.207275
Std. Dev.	2.666288	0.734639	0.464285	2.919925	6.286355	3.788352
Skewness	-0.840950	0.697699	0.068729	-0.155589	-0.338613	-0.525548
Kurtosis	2.776254	3.165128	1.983714	1.933788	1.822948	2.271160

Source: Calculated from Data from Bank of Ghana and International Monetary Fund, 2013.

4.3: Time Series Characteristics of Variables

It can be inferred from Figure 4.1, Panels B, C, E, and F that imports, exchange rate, public debt, and nominal GDP respectively, exhibited a general upward trend over the years under consideration. In Panel A, inflation appears to have a downward trend over the past 34 years though it rose to as high as 142.42 percent in 1983 but fell drastically to 5.99 percent the following year.

Figure 4.1: Behaviour of the Variables at the Natural Log Levels

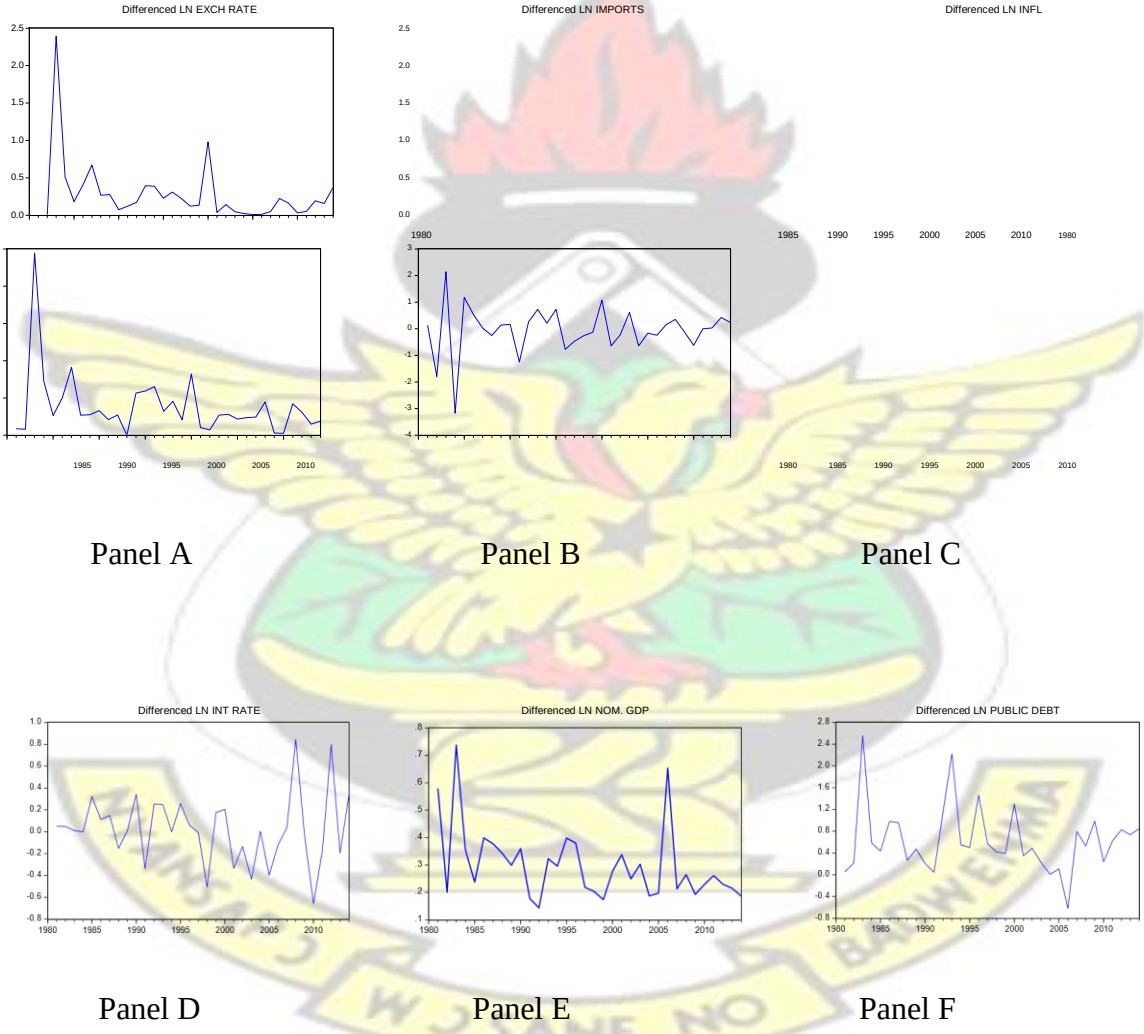


Source: Produced from Data from Bank of Ghana and International Monetary Fund, 2013.

Current account continuously experienced a deterioration over the years under review with a worsening deficit of US$ 12,548.88 in 2013 as imports persistently increased. Interest rate, in Panel D, exhibited an upward trend from 1980 to 1997, assumed a downward trend

from 1998 to 2006, reverted around its mean for four years and began to rise thereafter. These variables achieved stationarity when differenced as shown by Figure 4.2 below. They, therefore, fluctuate around their mean after their respective first difference has been taken.

Figure 4.2: Behaviour of the Variables after First Difference



Panel A Panel B Panel C

Panel D Panel E Panel F

Source: Produced from Data from Bank of Ghana and International Monetary Fund, 2013.

4.4: Unit Root Tests

The tests performed in this section affirm the stationarity status that manifested having differenced of the variables in Figure 4.2. Table 4.2 shows the Augmented Dickey-Fuller Unit Root tests conducted on the variables.

Table 4.2: Augmented Dickey-Fuller Unit Root Test

Variable	Level		First Difference		Order of Integration
	Constant	Constant and Trend	Constant	Constant and Trend	
LN EXCH	-2.672373	-1.954466	-5.279545**	-6.232079**	I(1)
LN INFL	-4.810653**	-6.210688**	-5.286246	-5.295160	I(0)
LN INT	-2.230770	-2.210634	-5.473980**	-5.669787**	I(1)
LN NGDP	-2.533883	-3.421703	-6.336303**	-6.982045**	I(1)
LN DEBT	-1.237751	-1.577180	-5.291566**	-5.486768**	I(1)
LN IM	-2.359736	-1.984656	-5.247699**	-6.062654**	I(1)

Source: Calculated from Data fro m Bank of Ghana and International Monetary Fund, 2013.

** the unit root hypothesis rejected at 5% margin of error

The results from the table depicts that all the variables, but inflation rate, are integrated of order one [I(1)]. The variables exhibit signs of mean reversion for the 34 years and hence the null hypothesis were rejected.

4.5: Cointegration Analysis

Table 4.3 presents the Bound test results showing the existence of long run relationship among exchange rate depreciation, inflation, interest rate, nominal GDP, public debt, and imports for the time frame the study covers. The test shows clearly that at 5 percent error margin, there is a long run relationship among the macroeconomic variables the study made use of. This is evident in the F-statistic (i.e. 4.554557) which lies beyond the upper bounds at the error levels. The variables then can be said to share common stochastic trend and for that matter will tend to grow proportionally. Thus, the null hypothesis that no long run relationship exist among these variables is rejected.

Table 4.3: Test for Existence of Cointegration

ARDL Bounds Test

Test Statistic	Value	K
F-statistic	4.554557 **	5

Critical Value Bounds

Significance	Lower Bound	Upper Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18

1%	3.41	4.68

Source: Calculated from Data from Bank of Ghana and International Monetary Fund, 2013.

Note: ** Null hypothesis rejected at 5% level of significance

4.5.1: Long Run Causality of the ARDL model

The bound test conducted in Table 4.3 only assists in the establishment of long run relationship among the variables in this study but fails to specify which variable(s) influence the other. Presented by Table 4.4 is the long run regression results of the ARDL model indicating the significance of inflation rate, interest rate, nominal GDP, public debt, and imports at 5 percent error margin on the Cedi-Dollar exchange rate in the Ghanaian economy. The results revealed that, with the exception of interest rate, all the macroeconomic variables significantly influence exchange rate movements. This is evident in the significant F-statistic at 5 percent error and the high R-square value.

It can be concluded that the regressors together can explain 97.67 percent variation in the regressand. All significant variables but nominal GDP have positive long run relationship with exchange rate. The implication is that the domestic currency fall in value as a result of a rise in inflation rate, public debt, and imports but appreciates when there is increase in nominal GDP in the long run. The study by Yemidi (2010) also provided evidence of a positive and significant influence of increasing public debt on exchange rate depreciation in Ghana. The long run positive relationship established between imports, inflation and public debt, each, and the domestic currency depreciation is consistent in a priori sense. Also, the negative long run relationship between GDP growth (propelled by increase in

imports of industrial inputs) and exchange rate depreciation lends support to the neoclassicals' argument. Though not significant, domestic interest rate has the expected sign.

Table 4.4: Long Run Regression Results (Dependent Variable: LN EXCH)

Regressors	Coefficient	Standard Error	T- Ratio	Probability
C	-4.570080	0.738552	-6.187890***	0.0000
Ln INFL	0.260534	0.116252	2.241104**	0.0417
Ln INT	-0.170450	0.121063	-1.407949	0.1810
Ln NGDP	-0.619436	0.154697	-4.004176***	0.0013
Ln DEBT	0.159811	0.057649	2.772149**	0.0150
Ln IM	0.865647	0.121337	7.134253***	0.0000
$R^2 = 0.9767$	$R^2 = 0.9500$	F-stat = 36.6486	P(F-stat) = 0.0000	D-W stat =2.8678

Source: Calculated from Data from Bank of Ghana and International Monetary Fund, 2013.

Note: ***, and ** signify the significance of a variable at 1% and 5% error level respectively.

It must be stated that the respective coefficients represent elasticities since the variables are in their natural logarithmic form. From Table 4.4, the exchange rate will rise (a depreciation of the domestic currency) by 15.98%, 86.56%, and 26.05% respectively

should public debt, imports, and inflation rate witness a percentage rise in the long run. However, a long run proportionate increase in nominal GDP will lead to 61.94% fall in the Cedi-Dollar exchange rate.

4.5.1.1: Error Correction Mechanism

From Table 4.5, it can be inferred that there is a long run causal relationship between the independent variables together and the dependent variable. This is because the coefficient of the cointegrating equation which represents the speed of long run adjustment towards equilibrium has the appropriate sign with a probability value less than five percent. This makes it statistically significant and desirable. It can be concluded that the macroeconomic variables return to equilibrium, in the long run, if there happen to be any deviation(s) at the speed of 81.70 percent.

Table 4.5: Corrected Long Run Causal Relationship

Regressor	Coefficient	Standard Error	T- Ratio	Probability
CointEqn(-1)	-0.816993	0.184716	-4.422970	0.0006

Source: Calculated from Data from Bank of Ghana and International Monetary Fund, 2013.

Equation 4.1 presents the error correction term obtained from the error correction model/ mechanism.

$$Eqn\ 1\ (-1) = lnEXCH + 4.5701 - 0.2605lnINFL + 0.1704lnINT$$

$$+ 0.6194lnNGDP - 0.1598lnDEBT - 0.8656lnIM \qquad \ldots eqn\ (4.1)$$

4.5.2: Short Run Causality of the ARDL Model

As can be seen in Table 4.6 below there is a short run deterministic effect from a year's lag values of exchange rate, and inflation rate on current rate of Cedi-Dollar exchange. That is the Cedi appreciates against the Dollar when persistent rise in general price level in a previous year but exchange rate depreciates in the case of own lag. Hence, current depreciation in the domestic currency worsens the forward exchange rate position in the Ghanaian economy. This is in confirmation of the study conducted by Owusu-Afriyie et al (2004) which adopted a monetary approach to investigate the determinants of the Cedi-Dollar exchange rate in Ghana. A current increase in public debt can have a positive influence on the Cedi-Dollar exchange rate (i.e. a depreciation of the Cedi). This is in contradiction to the view expressed by some school of thought that the immediate effect of increase in government borrowing leads to an increase in the supply of the underlying foreign currency; thus, eventually causing the domestic currency to appreciate in value.

In the same vein, a current increase in import can lead to a fall in the value of the Cedi vis-à-vis the Dollar but a previous year rise in imports can cause the Cedi to appreciate accordingly. Also, in support of the findings from a study by Adu-Gyamfi (2011) and Fiagboh (2013) is the significant relationship between GDP growth and public debt respectively and exchange rate depreciation. The Keynesian economists' view that

increase in imports can lead to currency depreciation is justified by the positive short run relationship found between imports and exchange rate.

Table 4.6: Short Run Regression Estimates (Dependent Variable: LN EXCH)

Variable	Coefficient	Std. Error	t -Statistic	Prob.
D[LN EXCH(-1)]	0.398368	0.153195	2.600391**	0.0210
D(LN INFL)	-0.008494	0.078246	-0.108556	0.9151
D[LN INFL(-1)]	-0.133129	0.055267	-2.408814**	0.0304
D(LN INT)	0.094486	0.089946	1.050479	0.3113
D[LNINT(-1)]	0.173451	0.108922	1.592436	0.1336
D(LN NGDP)	0.049535	0.234446	0.211283	0.8357
D(LN DEBT)	0.202130	0.052140	3.876669***	0.0017
D(LN IM)	0.422258	0.145341	2.905297**	0.0115
D[LN IM(-1)]	-0.450047	0.185487	-2.426303**	0.0294
D[LN IM(-2)]	-0.155357	0.079406	-1.956488*	0.0707
R-squared	0.976681			
Adjusted R-squared	0.950031			
F-statistic	36.64858	Durbin-Watson stat		2.867823
Prob(F-statistic)	0.000000			

Source: Calculated from data collected for Bank of Ghana and International Monetary Fund, 2013.

Note: ***, **, and * signify the significance of a variable at 1%, 5%, and 10% error level respectively.

Selected Model: ARDL (2, 2, 2, 1, 1, 3) based on Schwarz Bayesian Criterion

4.5.3: Diagnostic Text

The potency of this ARDL model can then be verified on the following assumptions (i.e. Null hypothesis): 1) there is no serial correlation, 2) there is no heteroskedasticity (or ARCH effect), 3) the residual follows the normal distribution, 4) the model is not wrongly specified and 5) there is no instability in the long run model. The results from the potency test is presented by Table 4.6.

The table depicts clearly that the ARDL model contains no autocorrelation (i.e. the covariance of the error term is equal to zero) and no heteroskedasticity (i.e. constant variance of the error term). Again, the residuals follow the normal distribution and the model is correctly specified. This is because we fail to reject the null hypothesis as the probability values under each test is greater than 5 percent proving that the model suffers from no such weakness. Hence, the model is potent at five percent allowable error level.

Table 4.7: Residual Diagnostic Test – [ ] Probability values

Test Statistics	**LM Version**	**F Version**
A: Serial Correlation	CHSQ(1) = 1.5220** [0.217]	F(1, 23) = 1.1875** [0.287]
B: Functional Form	CHSQ(1) = 0.9895** [0.320]	F(1, 23) = 0.7583** [0.393]
C: Normality	CHSQ(2) = 0.8721** [0.647]	NA

D: Heteroscedasticity CHSQ(1) = 0.7637** [0.382] F(1, 29) = 0.7325** [0.399]

Source: Calculated fro m Data from Bank of Ghana and International Monetary Fund, 2013.

Note: ** We fail to reject the Null hypothesis at 5 percent level of significance.

A: Lagrange multiplier test of residual serial correlation

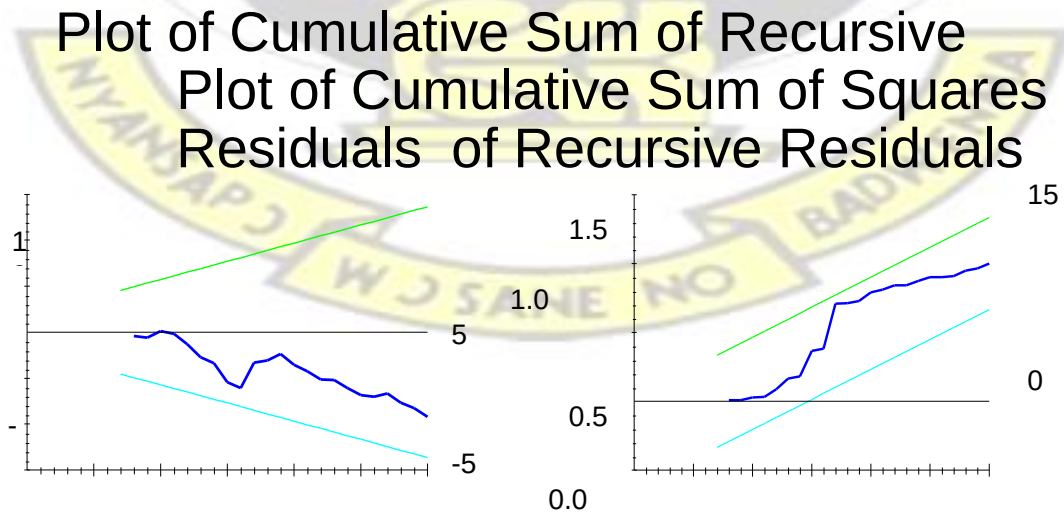
B: Ramsey's RESET test using the square of the fitted values

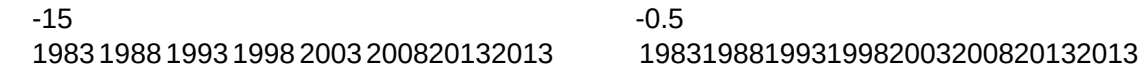
C: Based on a test of Skewness and kurtosis of residuals

D: Based on the regression of squared residuals on squared fitted values

Figure 4.3 shows the stability in the long run ARDL model with CUSUM test plot affirmed by the CUSUM square test plot giving evidence of stability where the blue curve lies between the two straight lines.

Figure 4.3: Long Run Model Stability Test Plots





The straight lines represent critical bounds at 5% significance level The straight lines represent critical bounds at 5% significance level

Source: Produced from Data from Bank of Ghana and International Monetary Fund, 2013.

4.6: Granger Causality Test

Granger causality test results has been presented in Table 4.8. Here, the pairwise Granger causality has been conducted to establish the nature of the causal relationship among the macroeconomic variables affirming the results of the cointegration analysis and helping in the accomplishment of the second specific objective of this study.

Table 4.8: Granger Causality Test for Cedi-Dollar Exchange Rate

Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**
LN INFL does not Granger Cause LN EXCH	31	1.21647	0.3252
LN EXCH does not Granger Cause LN INFL		6.11819***	0.0030
LN INT does not Granger Cause LN EXCH	31	0.27431	0.8433
LN EXCH does not Granger Cause LN INT		0.65593	0.5871
LN NGDP does not Granger Cause LN EXCH	31	3.25755* *	0.0391
LN EXCH does not Granger Cause LN NGDP		1.62975	0.2088

LN DEBT does not Granger Cause LN EXCH	31	15.4448 ***	8 .E-06
LN EXCH does not Granger Cause LN DEBT		3.03799**	0.0486
LN IM does not Granger Cause LN EXCH	31	3.41190* *	0.0336
LN EXCH does not Granger Cause LN IM		3.19550**	0.0416

Source: Calculated from data collected for Bank of Ghana and International Monetary Fund, 2013.

Note: ***, and ** signify null hypothesis rejected at 1 %, and 5% error level respectively.

Required lag length: 3

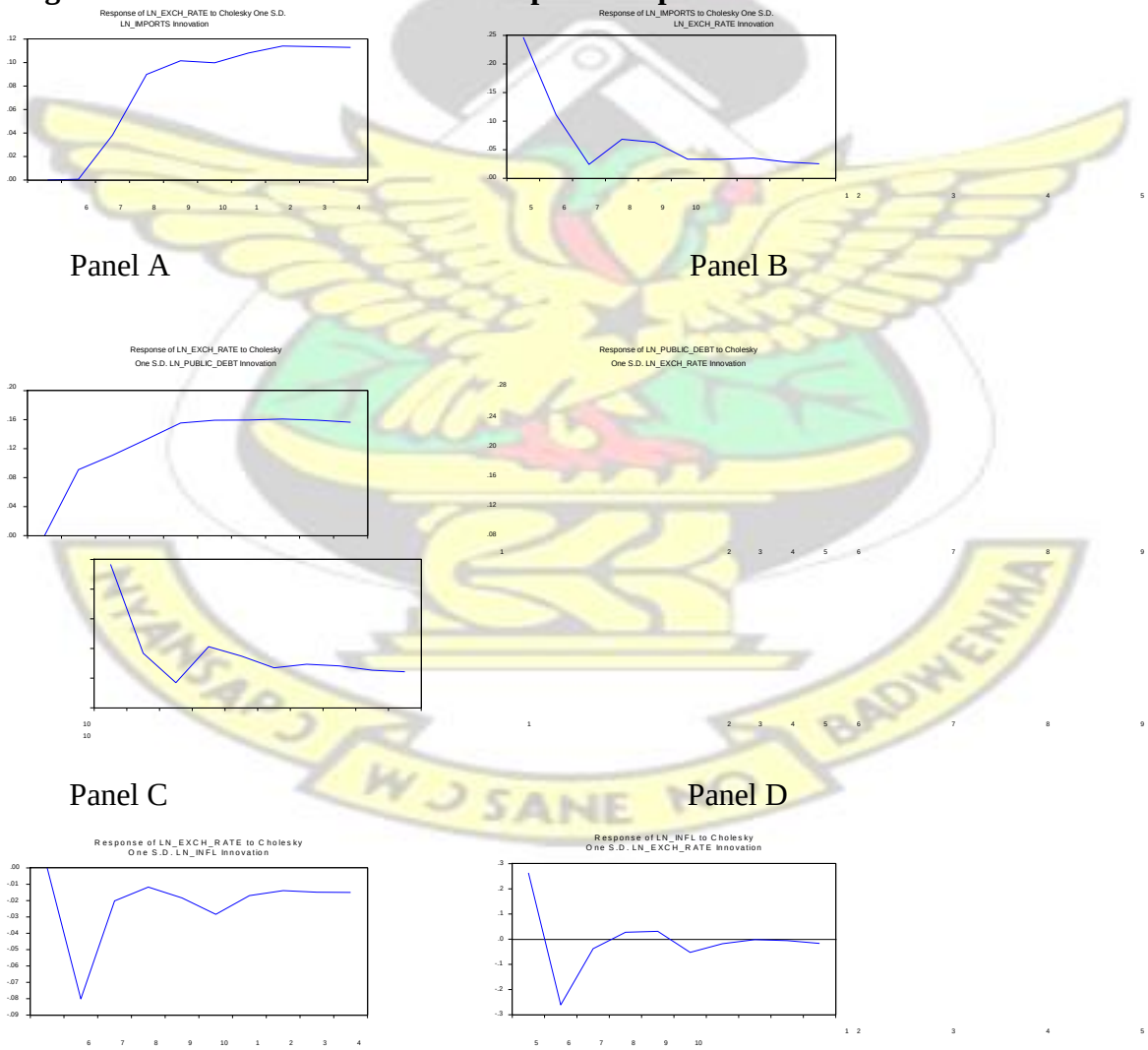
There exists bi-directional Granger causality between exchange rate and public debt, and imports. A unidirectional causal relationship was found between inflation rate, and nominal GDP and exchange rate. The findings of this study in relation to the causal relationship between inflation rate and currency depreciation is in contradiction with that of Barungi (1997). There was no directional causal relationship between interest rate and exchange rate depreciation.

4.7: Impulse Response Functions

Appendix D shows the results of the vector autoregressive model estimated. Figure 4.5 illustrates a pairwise simulation of the behaviour of the macroeconomic variables under consideration. It can be observed that the Cedi-Dollar exchange rate experienced stability for the first year as depicted in Panel A. But the Cedi begun to depreciate heavily and continuously against the Dollar for the following two years and increased at a decreasing

rate for the rest of the years being forecasted as a result of a one standard deviation innovation in imports of goods and services. Consistent in theory, is the inverse relationship between the responses of imports to a shock in exchange rate in Panel B. A shock in public debt resulted in a sharp rise in exchange rate implying a fall in value of the domestic currency in the first year of forecast. Subsequent years saw the Cedi depreciating at a relatively better rate as can be seen in Figure 4.5 (C). A general decline in public debt when predicted on a standard deviation impulse in exchange rate is presented in Panel D.

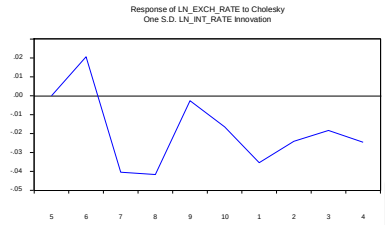
Figure 4.5: The Cedi-Dollar Model Impulse Response Functions



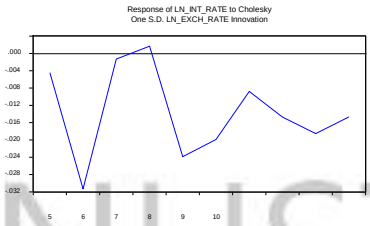
Panel A Panel B

Panel C Panel D

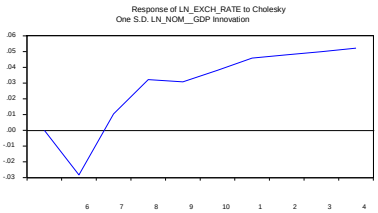
Panel E



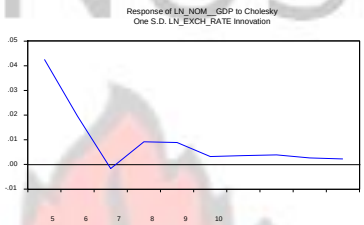
Panel F



Panel G



Panel H



Panel I

Panel J

Source: Produced from Data from Bank of Ghana and International Monetary Fund, 2014.

Also, the Cedi-Dollar rate appreciated in the first forecasted year but depreciated rapidly during the second year and remained relatively high and stationary thereafter when subjected to a shock in rate of inflation. However, inflation in the economy stabilizes after four years of fluctuations with the hardest hit in the first year of forecast as a result of shocks in exchange rate. In Figure 4.5 (G), the Cedi-Dollar rate witnessed depreciation in year one but made a somewhat appreciable gain in value after being subjected to a standard deviation innovation of interest rate. Figure 4.5 (H) shows the respective annual movements of interest rate emanating from a shock in exchange rate. Moreover, presented in Panel I is an incessant devaluation of the Cedi against the Dollar after one year appreciation resulting from a shock in nominal GDP. The observed response of nominal GDP to an impulse in Exchange rate is manifested in Figure 4.5 (J).

4.8: Variance Decomposition

This section presents a report of proportionate contribution of innovation that emanates from exchange rate, inflation rate, interest rate, nominal GDP, public debt, and imports in predicting the Cedi-Dollar rate of exchange over ten quarters following a standard deviation impulse to the rate of exchange. The test results is shown in Table 4.9 below.

It can be inferred from Table 4.9 that a complete shock in exchange rate results from an innovation in the forex market in the first quarter. In the third quarter, the contribution of variation in the Cedi-Dollar rate of exchange by own, inflation rate, interest rate, nominal GDP, public debt, and imports innovations are 82.79%, 6.93%, 4.08%, 2.63%, 2.03%, and 1.54% respectively.

Table 4.9: Variance Decomposition of LN EXCH RATE

Period	S.E.	LN EXCH	LN INFL	LN INT	LN NGDP	LN DEBT	LN IMPORTS
1	0.185011	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.230770	88.71809	6.067830	1.194330	2.460979	0.704092	0.854678
3	0.239176	82.78939	6.930388	4.080196	2.630275	2.034702	1.535054
4	0.252960	74.85031	7.416502	8.716761	4.823589	2.530138	1.662698
5	0.281857	63.52197	6.422157	14.17855	8.503763	4.940700	2.432852
6	0.308811	54.29983	6.790117	21.35013	11.40456	4.128667	2.026689
7	0.342636	45.68761	7.998236	23.55915	17.45392	3.358869	1.942212
8	0.374899	42.45344	8.883825	23.26913	19.92809	3.029431	2.436091
9	0.404855	40.73276	8.775678	24.24673	20.17955	2.697030	3.368259
10	0.425117	38.94857	8.846464	23.99968	20.69511	3.312131	4.198055

Source: Calculated from Data from Bank of Ghana and International Monetary Fund, 2013.

The seventh quarter saw 45.69%, 7.99%, 23.55%, 17.45%, 3.35%, and 1.94% fluctuations in exchange rate being explained by respective shocks in exchange rate itself, inflation rate, interest rate, nominal GDP, public debt, and imports.

The percentage variations in Cedi-Dollar exchange rate to shocks in foreign exchange market, inflation rate, interest rate, nominal GDP, public debt, and imports are 38.94%, 8.84%, 23.99%, 20.69%, 3.31%, and 4.19% respectively in the tenth quarter. It can be observed that as the percentage contributions to variance of the Cedi-Dollar rate by impulse in interest rate and nominal GDP persistently increased over the years understudied, that by inflation rate, public debt and imports remained almost constant and not that much. The effect from shocks in the foreign exchange market to percentage variations in the Cedi-Dollar exchange rate continually declined.

In confirmation to the results of the study by Bakarr et al. (2012), exchange rate depreciation had significantly impact on inflation and nominal GDP. The proportionate contribution to variations in nominal GDP by exchange rate depreciation continually increased whiles that on consumer prices declined over the quarters (See Appendix E).

4.9: Economic Impacts of a Rise in Cedi/Dollar Rate

A critical examination of Table 4.8 reveals that in addition to the previous information on the rate of inflation in the Ghanaian economy, inflation rate can be forecasted based upon

prior values of exchange rate. Invariably, inflationary effect on an economy is a major concern to its citizenry as it reduces their purchasing power thereby making them worse-off. This stems from the fact that spending on imports constitutes a considerable proportion of total expenditure in Ghana. Cedi depreciation against major currencies does not only raise the cedi prices of final goods through imports of such goods but also through increased cedi costs of imported inputs.

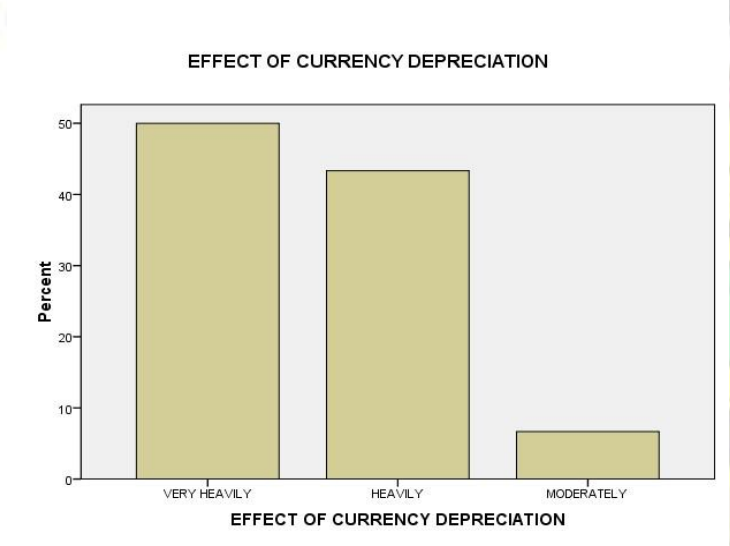
In addition, the test result show depreciation of the Cedi against the Dollar can Granger cause unfavourable terms of public debt and imports situations in Ghana. The eventual effect is a contraction in output. This is in accordance with argument held by recent growing literature that depreciation raises the local currency cost of imported inputs thereby reducing their volume of import. Due to insufficient inputs and high cost relative to the prices of their domestic final products, firms tend to produce less leading to a decline in aggregate supply and its associated lay-off of some workers. Furthermore, a country like Ghana with a considerable large external debt accumulation, currency devaluation negatively affects both government and residents as it may reduce the net worth of the populace. Devaluation lead to a rise in domestic currency cost of debt servicing. Government of Ghana can finance debt service payment by cutting down on its expenditure, raising domestic borrowing or taxes. All these modes of financing reduces aggregate demand rendering a contraction in output (See Bakarr et al, 2012; West African Monetary Institute: Occasional Paper Series No 2).

Moreover, an innovation in exchange rate depreciation in Ghana has a remarkable proportionate contribution in the variations in inflation rate, public debt, interest rate, nominal GDP, and imports (See Appendix E, II – VI).

4.9.1: Effects on Sampled Importers

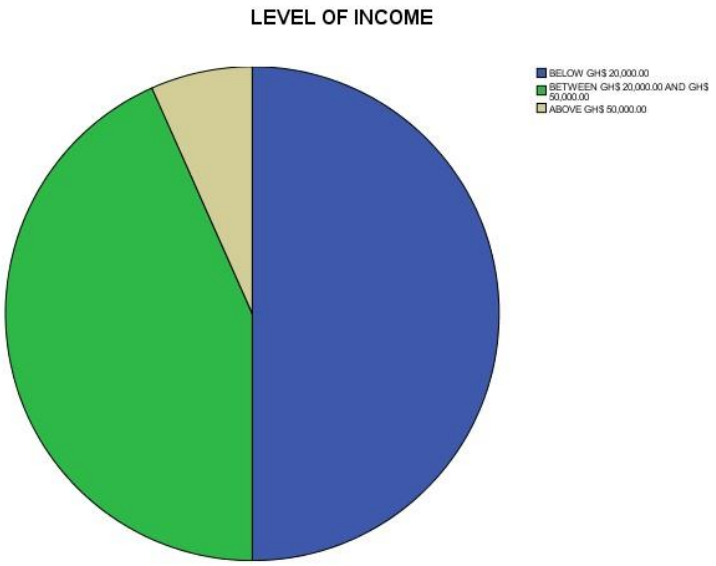
The study revealed that a very good number (i.e. 72.46%) of the respondents contacted had been in the second-hand vehicle importation business not less than ten years. As depicted in Figure 4.6 the depreciation of the domestic currency adversely affects these importers. With just 6.7% respondents realizing a moderate effect of the Cedi persistent depreciation on their business, 50% and 43.3% respectively responded that the depreciation of the Cedi very heavily and heavily takes its toll on their activities.

Figure 4.6: Effect of the Cedi Depreciation



Source: Data from Field Work, 2013.

Figure 4.7: Level of Income



Source: Data from Field Work, 2013.

Their income levels, provided in Figure 4.7 above, attest to this circumstance where those responded to earn less than GH¢ 20,000.00 constituting 50.86% and 44.30% earning between GH¢ 20,000.00 and GH¢ 50,000.00. Only 4.84% can earn as much as GH¢ 50,000.00 and above. Some recounted that they are left with no option than to borrow at high cost to augment their capital since they, at times, find it difficult to pass through the increasing transaction cost (for instance, rise in Cedi-Dollar exchange rate) to customers. This affects the living standard of these businessmen, their dependents and economy as a whole since little is realised as income tax from these men and women.

CHAPTER FIVE

SUMMARY, RECOMMENDATION AND CONCLUSION

5.1: Introduction

The chapter presents summary of the research findings, recommendations, and conclusion. The summary provides a brief overview of the objective, problem of the study, methodologies adopted in arriving at the findings, and the findings from the studies. In the section containing recommendations, remedial measures have been suggested to help curtail the exchange rate predicament that has entangled Ghana over the years. Also received attention here is the problems confronted in the course of the study, and a conclusion.

5.2: Summary of Findings

The principal aim of this study was to investigate the reasons why Ghana cannot break away from depreciation of the Cedi and its attendant problems. The frequent exchange rate volatility poses a serious challenge to economic agents. Both primary and a thirtyfour year secondary data were made used of in arriving at the findings of the study. Qualitative and quantitative analysis were done to serve as means of presenting the findings of the research work.

The macroeconomic variables, apart from inflation, under consideration in this study at their natural logarithmic level appear to follow a particular trend but became stationary having integrated them to order one [I(1)]. An Augmented Dickey-Fuller unit root test conducted attest to this. In order to conduct a cointegration analysis of the macroeconomic variables, an optimal lag length was chosen. As revealed appropriate for this study by other researchers, the ARDL model of cointegration analysis was therefore undertaken which produced, at five percent level of significance and lag length of three, a long run relationship having performed the bounds test. The lag length is based on the Schwarz Bayesian Information Criterion (SBIC)

An error correction model was applied to cater for any disequilibrium situation that emanated in attempt to establish a long run relationship existing among the Cedi-Dollar exchange rate, inflation rate, nominal GDP, national debt, volume of imports, and rate of interest. Adopting ECM affirmed the long run casual association among the variables. Also some of the variables were revealed to have significant effects on exchange rate

movement in the short run. This state of affairs was also manifested in the Granger. Imports, public debt, inflation rate, and nominal GDP were found to Granger cause exchange rate depreciation. However, interest rate was found to have no causal relationship with exchange rate depreciation. The impulse response and variance decomposition performed also revealed the various degree of impacts these macroeconomic variables have on one another.

One major impact the study revealed is that on rate of inflation in the economy. Inflation, as it is known, has a rippling effect on all sectors in every economy. Importers of second-hand vehicles were not left unaffected by the persistent fall in the value of the domestic currency against the major trading currencies. Upon engaging these business executives to get fair insight into issues pertaining exchange rate depreciation, it was realised that their income, business strategies, and to mention a few are hampered greatly.

5.3: Recommendations

Creation of import substitutes is one possible way to improve the Cedi depreciation and mitigate associated impacts of this economic problem that has plagued the Ghanaian economy over the years. It is a well-established fact that creation of import substitutes and their improvement is one measure adopted by countries once entangled with trade deficit and aimed at breaking away from it (Bank of Ghana Annual Report, 1999). Most of the imported goods are not produced locally. The little that is produced here too hardly meet international standards. With improvement in industrialisation, the volume of export can

be raised remarkably. Not only will the volume of exports be increased but also it will help add value to our export since goods will be semi or fully processed before being exported. Creating congenial business environment such as tax adjustment, subsidies, improving infrastructure (e.g. roads) that can lead to a reduction in cost for the private sector (since it is believed to be the engine of industrial growth) can be a means to accomplish this goal. The creation of imports substitutes and the eventually potential increase in exports will cause the Cedi to appreciate because market mechanisms will cause a rise in the price of the Cedi as a result of the increase in demand for it. Thus, improving already manufacturing goods and services as well as creation of new ones, invariably, will improve Ghana's balance of trade.

One other issue that needs serious attention here is the over-riding public debt in the Ghanaian economy. As per the data collected from the central bank of Ghana, there is no single year the public debt experienced a fall. Debt currently constitute about 71 percent of Ghana's GDP thereby putting the economy in a highly indebted category (Bank of Ghana, 2015). Even if the country manages to reap the benefits of growth effect of national output it is likely to be retrograded due to the predominance of high Dollar denominated liabilities of government in recent times. A move to reduce the debt situation in the country will be a step in the right direction as it will boost investors' confidence in the economy. Such improvement will create investor friendly environment thereby attracting foreign direct investment which in turn lead to a rise in the supply of foreign currencies particularly, the Dollar and eventual appreciation in the domestic currency.

5.4: Limitation of the Study

The study was faced with the difficulty in data acquisition. For instance, inefficient bookkeeping on the part of business men and women engaging in second-hand vehicle importation surfaced as a major militating factor in data collection. The study, again, encountered both financial and time constraints. Gathering of a more accurate data from respondents in the institution involved required sufficient time and funds. There were instances the researcher was not attended to in time or at all due to the tight schedules of the targeted respondents and officials of the said institutions.

In addition to these, redenomination of the Cedi posed a bit of challenge because it made comparison of economic status of the country before and after somewhat difficult and confusing. That is to say, if care was not taken misleading conclusions that the economy, especially in the early 80s, was better than now could have been drawn.

5.5: Conclusion

The inherent objective of this research was to investigate why exchange rate problem still hang at our neck as an economy upon enormous efforts made by Bank of Ghana and successive governments to address the menace from 1980 to 2013. The findings of this research show that the exchange rate situation in Ghana is self-induced. This is because, despite efforts made, government, individuals, and cooperate institutions still embark on transactions that throw the economy back into web of exchange rate depreciation.

Failure to adopt the right policies to achieve stability in exchange rate movement, Ghana's quest to escape from its effects is likely to remain a tantalizing mirage.

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APPENDICES

A: REGRESSION ESTIMATES

Method: ARDL
Sample (adjusted): 1983 2013
Included observations: 31 after adjustments
Maximum dependent lags: 3 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (3 lags, automatic): LN INFL, LN INT RATE, LN NOM GDP, LN PUBLIC DEBT, and LN IMPORTS
Fixed regressors: C
Number of models evalulated: 3072
Selected Model: ARDL(2, 2, 2, 1, 1, 3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LN EXCH RATE(-1)	0.581374	0.191481	3.036202	0.0089
LN EXCH RATE(-2)	-0.398368	0.153195	-2.600391	0.0210
LN INFL	-0.008494	0.078246	-0.108556	0.9151
LN INFL(-1)	0.088220	0.070440	1.252416	0.2309
LN INFL(-2)	0.133129	0.055267	2.408814	0.0304
LN INT RATE	0.094486	0.089946	1.050479	0.3113
LN INT RATE(-1)	-0.060292	0.107004	-0.563457	0.5820
LN INT RATE(-2)	-0.173451	0.108922	-1.592436	0.1336
LN NOM GDP	0.049535	0.234446	0.211283	0.8357
LN NOM GDP(-1)	-0.555609	0.253185	-2.194482	0.0456
LN PUBLIC DEBT	0.202130	0.052140	3.876669	0.0017
LN PUBLIC DEBT(-1)	-0.071565	0.061073	-1.171809	0.2608
LN IMPORTS	0.422258	0.145341	2.905297	0.0115
LN IMPORTS(-1)	-0.320434	0.213042	-1.504092	0.1548
LN IMPORTS(-2)	0.450047	0.185487	2.426303	0.0294
LN IMPORTS(-3)	0.155357	0.079406	1.956488	0.0707
C	-3.733724	1.239342	-3.012667	0.0093

		Mean dependent var	-1.740156
R-squared	0.998863		
Adjusted R-squared	0.997563	S.D. dependent var	2.004178
S.E. of regression	0.098947	Akaike info criterion	-1.486611
Sum squared resid	0.137068	Schwarz criterion	-0.700231
Log likelihood	40.04247	Hannan-Quinn criter.	-1.230271
F-statistic	768.3702	Durbin-Watson stat	2.867823
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

B: BOUND TEST RESULTS

ARDL Bounds Test				
Sample: 1983 2013				
Included observations: 31				
Null Hypothesis: No long-run relationships exist				
Test Statistic	Value	k		
F-statistic	4.554557	5		

Critical Value Bounds				
Significance	I0 Bound	I1 Bound		
10%	2.26	3.35		
5%	2.62	3.79		
2.5%	2.96	4.18		
1%	3.41	4.68		
Test Equation:				
Dependent Variable: D(LN_EXCH_RATE)				
Method: Least Squares				
Date: 11/30/15 Time: 15:49				
Sample: 1983 2013				
Included observations: 31				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LN EXCHRATE(-1))	0.398368	0.153195	2.600391	0.0210
D(LN INFL)	-0.008494	0.078246	-0.108556	0.9151
D(LN INFL(-1))	-0.133129	0.055267	-2.408814	0.0304
D(LN INT RATE)	0.094486	0.089946	1.050479	0.3113
D(LN INT RATE(-1))	0.173451	0.108922	1.592436	0.1336
D(LN NOM GDP)	0.049535	0.234446	0.211283	0.8357
D(LN PUBLIC DEBT)	0.202130	0.052140	3.876669	0.0017
D(LN IMPORTS)	0.422258	0.145341	2.905297	0.0115
D(LN IMPORTS(-1))	-0.605404	0.188700	-3.208293	0.0063
D(LN IMPORTS(-2))	-0.155357	0.079406	-1.956488	0.0707
C	-3.733724	1.239342	-3.012667	0.0093
LN INFL(-1)	0.212854	0.117423	1.812719	0.0914
LN INT RATE(-1)	-0.139256	0.095678	-1.455475	0.1676
LN NOM GDP(-1)	-0.506075	0.120144	-4.212233	0.0009
LN PUBLIC DEBT(-1)	0.130564	0.049553	2.634853	0.0196
LN IMPORTS(-1)	0.707228	0.161079	4.390560	0.0006
LN EXCH RATE(-1)	-0.816993	0.184716	-4.422970	0.0006
R-squared	0.976681	Mean dependent var		0.289910
Adjusted R-squared	0.950031	S.D. dependent var		0.442646
S.E. of regression	0.098947	Akaike info criterion		-1.486611
Sum squared resid	0.137068	Schwarz criterion		-0.700231
Log likelihood	40.04247	Hannan-Quinn criter.		-1.230271
F-statistic	36.64858	Durbin-Watson stat		2.867823
Prob(F-statistic)	0.000000			

C: ARDL COINTEGRATING AND LONG RUN FORM

ARDL Cointegrating And Long Run Form
Dependent Variable: LN EXCH RATE
Selected Model: ARDL(2, 2, 2, 1, 1, 3)
Sample: 1980 2013
Included observations: 31

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
		0.153195		
D(LN EXCH RATE(-1))	0.398368		2.600391	0.0210
D(LN INFL)	-0.008494	0.078246	-0.108556	0.9151
D(LN INFL(-1))	-0.133129	0.055267	-2.408814	0.0304
D(LN INT RATE)	0.094486	0.089946	1.050479	0.3113
D(LN INT RATE(-1))	0.173451	0.108922	1.592436	0.1336
D(LN NOM GDP)	0.049535	0.234446	0.211283	0.8357
D(LN PUBLIC DEBT)	0.202130	0.052140	3.876669	0.0017
D(LN IMPORTS)	0.422258	0.145341	2.905297	0.0115
D(LN IMPORTS(-1))	-0.450047	0.185487	-2.426303	0.0294
D(LN IMPORTS(-2))	-0.155357	0.079406	-1.956488	0.0707
CointEq(-1)	-0.816993	0.184716	-4.422970	0.0006

Cointeq = LN EXCH RATE - (0.2605 *LN INFL -0.1704*LN INT RATE
-0.6194*LN NOM GDP + 0.1598*LN PUBLIC DEBT + 0.8656
*LN IMPORTS -4.5701)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
		0.116252		
LN INFL	0.260534		2.241104	0.0417
LN INT RATE	-0.170450	0.121063	-1.407949	0.1810
LN NOM GDP	-0.619436	0.154697	-4.004176	0.0013
LN PUBLIC DEBT	0.159811	0.057649	2.772149	0.0150
LN IMPORTS	0.865647	0.121337	7.134253	0.0000
C	-4.570080	0.738552	-6.187890	0.0000

D: ESTIMATES OF THE VECTOR AUTOREGRESSIVE MODEL

VAR Lag Order Selection Criteria
Endogenous variables: LN EXCH RATE, LN INFL, LN INT RATE, LN NOM GDP, LN PUBLIC DEBT, and LN IMPORTS
Exogenous variables: C
Sample: 1980 2013
Included observations: 31

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-139.7118	NA	0.000487	9.400764	9.678309	9.491237
1	42.20356	281.6754*	4.17e-08	-0.013133	1.929689*	0.620179
2	85.66287	50.46888	3.42e-08	-0.494379	3.113718	0.681771
3	144.7999	45.78347	1.85e-08*	-1.987087*	3.286285	-0.268099*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Vector Autoregression Estimates
Sample (adjusted): 1983 2013
Included observations: 31 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	LN EXCH RATE	LN INFL	LN INT RATE	LN NOM GDP	LN PUBLIC DEBT	LN IMPORTS
LN EXCH RATE(-1)	0.393063	0.312463	-0.646313	-0.017354	0.305310	-0.052991
	(0.43259)	(1.02180)	(0.65121)	(0.29186)	(1.12860)	(0.33802)
	[0.90863]	[0.30580]	[-0.99249]	[-0.05946]	[0.27052]	[-0.15677]

LN EXCH RATE(-2)	-0.480818	-0.268424	1.030286	0.101846	0.710054	-0.970356
	(0.48982)	(1.15697)	(0.73735)	(0.33047)	(1.27789)	(0.38273)
	[-0.98163]	[-0.23201]	[1.39728]	[0.30818]	[0.55565]	[-2.53533]
LN EXCH RATE(-3)	-0.087006	-0.133114	-0.256325	-0.078056	-1.083667	0.469348
	(0.36925)	(0.87219)	(0.55586)	(0.24913)	(0.96335)	(0.28853)
	[-0.23563]	[-0.15262]	[-0.46113]	[-0.31332]	[-1.12490]	[1.62670]
LN INFL(-1)	0.088184	0.029934	-0.039140	0.038821	-0.455780	0.206082
	(0.15640)	(0.36942)	(0.23544)	(0.10552)	(0.40803)	(0.12221)
	[0.56384]	[0.08103]	[-0.16624]	[0.36791]	[-1.11703]	[1.68633]
LN INFL(-2)	0.033968	-0.188866	-0.366305	0.031889	-0.309100	-0.072624
	(0.10443)	(0.24666)	(0.15720)	(0.07046)	(0.27244)	(0.08160)
	[0.32528]	[-0.76569]	[-2.33017]	[0.45261]	[-1.13455]	[-0.89002]
LN INFL(-3)	-0.145227	-0.274133	-0.242520	0.026051	-0.214653	-0.208169
	(0.08244)	(0.19473)	(0.12411)	(0.05562)	(0.21509)	(0.06442)
	[-1.76154]	[-1.40773]	[-1.95412]	[0.46834]	[-0.99798]	[-3.23144]
LN INT RATE(-1)	0.186610	0.731905	0.710830	-0.047610	1.273905	-0.123424
	(0.19045)	(0.44984)	(0.28669)	(0.12849)	(0.49686)	(0.14881)
	[0.97986]	[1.62703]	[2.47945]	[-0.37053]	[2.56393]	[-0.82940]
LN INT RATE(-2)	-0.212315	-0.730580	0.141117	-0.053044	-0.177793	0.031878
	(0.20199)	(0.47710)	(0.30406)	(0.13628)	(0.52696)	(0.15783)
	[-1.05114]	[-1.53130]	[0.46411]	[-0.38924]	[-0.33739]	[0.20198]
LN INT RATE(-3)	0.297714	0.347127	0.496004	-0.127162	0.579608	0.299039
	(0.20276)	(0.47894)	(0.30523)	(0.13680)	(0.52899)	(0.15844)
	[1.46829]	[0.72479]	[1.62501]	[-0.92954]	[1.09568]	[1.88745]
LN NOM GDP(-1)	-0.101413	-0.277539	0.251053	0.646749	1.299817	0.154654
	(0.45717)	(1.07986)	(0.68821)	(0.30845)	(1.19273)	(0.35723)
	[-0.22183]	[-0.25701]	[0.36479]	[2.09678]	[1.08978]	[0.43293]
LN NOM GDP(-2)	0.146746	1.960110	1.406002	0.023484	-0.240104	0.876057
	(0.59330)	(1.40141)	(0.89314)	(0.40029)	(1.54788)	(0.46360)
	[0.24734]	[1.39867]	[1.57423]	[0.05867]	[-0.15512]	[1.88969]
LN NOM GDP(-3)	-0.165983	-2.031405	-1.248546	0.238204	0.498054	-0.743169
	(0.45380)	(1.07190)	(0.68314)	(0.30617)	(1.18393)	(0.35459)
	[-0.36576]	[-1.89515]	[-1.82767]	[0.77801]	[0.42068]	[-2.09584]
LN PUBLIC DEBT(-1)	0.076976	-0.002694	0.047927	0.053841	0.593144	-0.041136
	(0.13007)	(0.30723)	(0.19580)	(0.08775)	(0.33934)	(0.10163)

	[0.59181]	[-0.00877]	[0.24478]	[0.61354]	[1.74795]	[-0.40475]
LN PUBLIC DEBT(-2)	0.003024	0.361711	-0.271464	-0.000854	-0.362943	0.259880
	(0.14568)	(0.34411)	(0.21931)	(0.09829)	(0.38008)	(0.11384)
	[0.02076]	[1.05114]	[-1.23782]	[-0.00869]	[-0.95491]	[2.28294]
LN PUBLIC DEBT(-3)	0.154829	0.002315	0.131525	0.042274	0.774799	0.051587
	(0.13875)	(0.32774)	(0.20887)	(0.09361)	(0.36199)	(0.10842)
	[1.11587]	[0.00706]	[0.62969]	[0.45158]	[2.14038]	[0.47582]
LN IMPORTS(-1)	-0.266830	-1.290243	0.522462	-0.126843	-0.901985	0.184503
	(0.35894)	(0.84782)	(0.54033)	(0.24217)	(0.93644)	(0.28047)
	[-0.74339]	[-1.52183]	[0.96693]	[-0.52378]	[-0.96321]	[0.65784]
LN IMPORTS(-2)	0.484185	0.236148	-0.900970	-0.072717	-0.744978	0.693155
	(0.46541)	(1.09933)	(0.70062)	(0.31401)	(1.21423)	(0.36367)
	[1.04033]	[0.21481]	[-1.28596]	[-0.23158]	[-0.61354]	[1.90601]
LN IMPORTS(-3)	0.172972	0.604548	0.060692	0.088568	0.314124	-0.292302
	(0.35124)	(0.82964)	(0.52874)	(0.23698)	(0.91636)	(0.27445)
	[0.49246]	[0.72868]	[0.11478]	[0.37374]	[0.34280]	[-1.06503]
C	-6.647419	4.089030	0.707444	1.156217	-4.482416	-3.718962
	(2.24995)	(5.31449)	(3.38700)	(1.51801)	(5.86995)	(1.75808)
	[-2.95447]	[0.76941]	[0.20887]	[0.76167]	[-0.76362]	[-2.11535]
R-squared	0.996591	0.827360	0.850809	0.999056	0.996874	0.999114
Adj. R-squared	0.991478	0.568400	0.627022	0.997639	0.992185	0.997784
Sum sq. resids	0.410750	2.291675	0.930807	0.186973	2.795755	0.250788
S.E. equation	0.185011	0.437004	0.278509	0.124824	0.482680	0.144565

F-statistic	194.9138	3.194934	3.801868	705.2626	212.6105	751.3944
Log likelihood	23.03116	-3.614179	10.35111	35.22994	-6.695875	30.67849
Akaike AIC	-0.260075	1.458979	0.557993	-1.047093	1.657798	-0.753451
Schwarz SC	0.618820	2.337875	1.436888	-0.168198	2.536694	0.125445
Mean dependent	-1.740156	3.003329	3.101660	7.388432	12.03730	6.226661
S.D. dependent	2.004178	0.665189	0.456034	2.568949	5.460177	3.070895

Determinant resid covariance (dof adj.)	1.05E-09
Determinant resid covariance	3.53E-12
Log likelihood	144.7999
Akaike information criterion	-1.987087
Schwarz criterion	3.286285

E: VARIANCE DECOMPOSITION

I: Variance Decomposition of LN EXCH RATE

Period	S.E.	LN EXCH RATE	LN INFL	LN INT RATE	LN NOM GDP	LN PUBLIC DEBT	LN IMPORTS
1	0.185011	100.0000			0.000000		
			0.000000	0.000000		0.000000	0.000000
2	0.230770	88.71809	6.067830	1.194330	2.460979	0.704092	0.854678
3	0.239176	82.78939	6.930388	4.080196	2.630275	2.034702	1.535054
4	0.252960	74.85031	7.416502	8.716761	4.823589	2.530138	1.662698
5	0.281857	63.52197	6.422157	14.17855	8.503763	4.940700	2.432852
6	0.308811	54.29983	6.790117	21.35013	11.40456	4.128667	2.026689
7	0.342636	45.68761	7.998236	23.55915	17.45392	3.358869	1.942212
8	0.374899	42.45344	8.883825	23.26913	19.92809	3.029431	2.436091
9	0.404855	40.73276	8.775678	24.24673	20.17955	2.697030	3.368259
10	0.425117	38.94857	8.846464	23.99968	20.69511	3.312131	4.198055

Variance
omposition of LN INFL

Period	S.E.	LN EXCH RATE	LN INFL	LN INT RATE	LN NOM GDP	LN PUBLIC DEBT	LN IMPORTS
1	0.437004	29.08411		0.000000	0.000000		
			70.91589			0.000000	0.000000
2	0.482666	24.09780	60.86754	5.955608	4.457990	0.052905	4.568160
3	0.519225	21.74393	52.59986	5.855669	9.318431	6.326652	4.155461
4	0.571043	18.49511	56.19950	7.034957	7.762292	6.408764	4.099373
5	0.592240	17.33807	53.02237	10.54992	8.263268	6.579062	4.247306
6	0.603783	17.11324	52.60926	10.76806	8.036217	7.201404	4.271823
7	0.630429	15.84835	51.05914	10.12267	12.34153	6.610650	4.017668
8	0.635409	15.61449	50.29135	10.06323	13.12220	6.934219	3.974510
9	0.640333	15.55238	50.14504	10.30853	12.97140	7.009749	4.012900
10	0.642666	15.44920	49.92711	10.23461	12.88622	7.397291	4.105576

ɪmposition of L
ATE

Period	S.E.	LN EXCH RATE	LN INFL	LN INT RATE	LN NOM GDP	LN PUBLIC DEBT	LN IMPORTS

1	0.278509	23.77478		61.42012	0.000000		
			14.80510			0.000000	0.000000
2	0.343650	17.38794	15.18164	63.71899	1.972100	0.261696	1.477637
3	0.423864	11.43196	10.16782	47.24812	26.43923	3.451929	1.260942
4	0.445999	10.42540	9.547844	46.77317	28.91376	3.199653	1.140172
5	0.467217	11.46612	8.713696	49.32441	26.36837	3.065297	1.062110
6	0.492533	10.42365	8.442916	47.49588	26.07735	6.446382	1.113822
7	0.507141	9.920078	9.021020	44.80538	27.93552	7.055969	1.262036
8	0.508342	10.00152	9.132355	44.59474	27.95755	7.026883	1.286954
9	0.509697	9.975612	9.166484	44.36018	27.89412	7.322085	1.281512
10	0.516896	10.21350	8.993728	44.03650	27.14297	8.366722	1.246574

IV: Variance Decomposition of LN NOM GDP

Period	S.E.	LN EXCH RATE	LN INFL	LN INT RATE	LN NOM GDP	LN PUBLIC DEBT	LN IMPORTS
1	0.124824	10.87492	27.16526	0.815174	61.14464		
						0.000000	0.000000
2	0.152881	11.52211	32.77408	3.715428	50.70688	0.841434	0.440067
3	0.169294	15.28126	33.08867	5.026989	42.64610	1.629887	2.327089
4	0.187937	19.37153	29.74180	9.039362	35.21315	3.401043	3.233114
5	0.201685	22.08567	27.23108	11.58966	30.67553	3.558049	4.860012
6	0.210728	23.27694	26.38964	12.62992	28.16381	4.251005	5.288680
7	0.219513	24.08596	26.56178	13.18984	25.95484	4.926211	5.281363
8	0.228608	24.13687	27.30340	13.26609	24.61066	5.563361	5.119623
9	0.237324	24.10629	27.54592	13.17218	23.62972	6.538993	5.006888
10	0.245743	24.85066	27.39581	12.66263	22.66576	7.378456	5.046689

mposition of LN
DEBT

Period	S.E.	LN EXCH RATE	LN INFL	LN INT RATE	LN NOM GDP	LN PUBLIC DEBT	LN IMPORTS
1	0.482680	48.18069	6.110294	3.835835	8.374913		
						33.49826	0.000000
2	0.626494	49.31835	7.948312	10.13620	4.989861	26.28215	1.325126
3	0.682857	43.32308	6.712162	19.19724	6.786390	22.60138	1.379751
4	0.762336	39.25733	5.393799	25.29890	10.02865	18.20681	1.814507
5	0.885731	34.80527	7.265833	30.45101	12.11911	13.93441	1.424374
6	1.008162	29.20706	9.265058	32.60544	16.12853	11.19260	1.601303

7	1.116131	25.22902	10.43160	29.92955	22.80484	9.570406	2.034586
8	1.180299	24.81810	11.21201	27.75038	25.01851	8.600057	2.600935
9	1.219797	25.08011	11.53656	26.54157	25.17439	8.460314	3.207058
10	1.244376	24.62601	11.92685	25.53560	25.28357	8.971271	3.656698

ecomposition of
PORTS

Period	S.E.	LN EXCH RATE	LN INFL	LN INT RATE	LN NOM GDP	LN PUBLIC DEBT	LN IMPORTS
1		46.72020	0.219944	5.910071	16.25281		
	0.14 4565					0.307864	30.58911
2	0.167487	38.64689	15.93603	5.598179	15.66704	0.586705	23.56516
3	0.215374	23.51424	23.25945	3.903794	22.65900	9.882696	16.78081
4	0.241671	24.99100	18.52633	3.101586	18.69056	21.36252	13.32801
5	0.276297	32.67328	14.32465	5.820158	16.31012	20.33636	10.53543
6	0.297772	34.47429	13.09127	8.520826	15.31511	17.60080	10.99771
7	0.330681	34.10308	14.05234	11.23148	15.34743	14.42245	10.84323
8	0.370066	34.10612	15.49365	13.32984	15.51989	11.89934	9.651158
9	0.406812	32.22319	15.67784	14.86830	18.22679	9.999264	9.004620
10	0.432780	30.15092	15.97477	14.31159	21.61588	9.188941	8.757888

NB: Cholesky Ordering: LN EXCH RATE, LN INFL, LN INT RATE, LN NOM GDP, LN PUBLIC DEBT and LN IMPORTS

F: PRIMARY DATA

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF ECONOMICS

(INTERVIEW QUESTIONS ON THE IMPACTS OF CURRENCY DEPRECIATION IN GHANA POSED TO IMPORTERS)

The study is meant for academic purposes and has no bearing on anyone or institution. Confidentiality of respondents is assured.

1. For how long have you been in this business?

☐ Less than 10 years ☐ 10 years – 30 years ☐ Over 30 years

2. How has the currency depreciation affected your business?

☐Very Heavily ☐ Heavily ☐ Moderately ☐ Less Heavily ☐ not at all

3. What is your level of income (i.e. profit) from a trip or a consignment?

☐ Less than GH¢ 20,000.00 ☐ Between GH¢ 20,000.00 - GH¢ 50,000.00

☐ Above GH¢ 50,000.00

4. Kindly recount on any situation/challenge(s) confronted as a results of the currency depreciation?

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