

UNIVERSITY OF GHANA

IMPACT OF MACROECONOMIC VARIABLES ON EXCHANGE

RATE MOVEMENTS IN GHANA

BY

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DECLARATION

I, Mary Agyemang-Adjei, hereby declare that this dissertation which is presented to the University of Ghana Business School in partial fulfilment of the master's in finance is entirely my own work. While acknowledging information from other sources, I would like to state with academic honesty that the original work and no other part of it have been presented for another degree elsewhere.

.....

Professor Joshua Abor

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Date

.....

Mary Agyemang-Adjei

.....

Date

DEDICATION

To my parents, Mr. Samuel Adjei & Mrs. Elizabeth Adjei

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I am very thankful to the Almighty God for the strength and wisdom to complete this study. I really appreciate the support of my father, Mr. Samuel Adjei and mother Mrs. Elizabeth Adjei. I also cherish the excellent research support from my friend Nana Kwasi Amponsah Boadi. I want to thank Professor Joshua Abor (University of Ghana Business School and Dr. Vera Fiador (University of Ghana Business School) for effectively supervising the study and reviewing the research. I appreciate the useful comments and inputs from my colleagues in class. I am otherwise responsible for any errors in this research.

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ABSTRACT

The study sought to analyze the effect of exchange rate movements on Ghana's economy (macroeconomic variables); it investigates the relationship these variables have in determining the stability of foreign exchange rate in Ghana, that is, the pricing of the Ghanaian domestic currency relative to the dollar in the context of macroeconomic variables. From different angles and aspect, this study is intended to add to related literature; provide new theoretical arguments and a comprehensive study on reasons underlying exchange rate movements in Ghana. This study examines how macroeconomic variables affect exchange rate movements in Ghana and may help other researchers to undertake further studies in exchange rates determinants in Ghana and other related topics.

In the era of globalization where the foreign exchange market has assumed a very important role in determining growth in countries around the globe. Most countries have had to adequately manage their domestic currencies in relation to major trading currencies to attain and sustain steady rates of long-term economic growth. This premise is based on the assertion that an appreciation or depreciation of domestic currencies plays a key role in influencing a country's trade balance (Stucka, 2004; Aziz, 2008) and ultimately its growth (McPherson and Rakovski, 2000). In Ghana, the relationship among exchange rate and macroeconomic variables are paramount in understanding the depreciation of the cedi relative to

the dollar and other currencies as well as the behavior of the consumer prices and balance of payment in Ghana.

This study uses empirical data from Ghana of some selected macroeconomic variables and employs econometric models' technique to arrive at findings based on the patterns discovered. The selected economic variables are lending interest rates, foreign direct payment, imports, exports, gross domestic products and inflation.

CHAPTER ONE

INTRODUCTION

1.0 Background of study

After passing of Bretton Woods Accord in 1973, countries were led to adopt the floating exchange rate system that allowed for depreciation or appreciation of currencies. The effect of the depreciation of a countries currency from the adopted floating exchange rate system with respect to the trade balance of both developed and developing countries generated increased awareness and renewed interest. Countries have since sought to achieve either an appreciation or depreciation in their domestic currency to attain and sustain some developmental goals.

Most economies in Africa and developing countries such as Ghana have the problem of usually recording a deficit in the government budget and balance of payment. For these economies to have a share in the international market to promote growth they have had to come under undue influence to adopt growth strategies such as import substitution industrialization (ISI) owing to the small and open nature of these economies. The introduction of free-market adjustment program promoted trade liberalization, allowing prices to be set by the interplay of market demand and supply to foster export-oriented development.

Ghana has over the years experienced its share of prolonged depreciation. Countries such as Zambia, Kenya and Nigeria have their exchange rate rise and fall. This is different for Ghana as it's recording a persistent depreciation of the domestic currency over the years. That is in July 2007, the central bank of Ghana embarked on a redenomination exercise where after the exercise the cedi was pegged at about 1 dollar=0.9000GHS. Currently in April 2019 1dollar=5.1000GHS (Bank of Ghana quarterly economic bulletin 2019). The continuous depreciation of the cedi has been a source of great concern to our policymakers because of how the trade market affects a very important part, ensuring steady macroeconomic performance as well as economic growth. Most of Ghana's import is inelastic hence continuous depreciation of the cedi may result in an increase in general price levels and may also lead to increased prices of imports, reduction in portfolio investments and problems with our balance of payments.

The central bank's core mandate of ensuring price stability has led to the adoption of numerous strategies and policies and providing adequate supply to the market all with the aim of halting or reducing depreciation of the cedi. Despite all these measures put in place by the central bank the cedi continues to depreciate. Theory suggests that macroeconomic factors affect exchange rate pricing. It, therefore, remains critical to examine the relationship of macroeconomic variables that are in relation to the pricing of the exchange rate in Ghana. The research will heighten

the central bank's effort to help reduce the depreciation of the cedi by examining the relationship between these variables and prices of the exchange rate in Ghana based on the patterns discovered. The bank of Ghana can then map out appropriate and improved strategies to address some of these concerns.

Exchange rate may appreciate depreciate or remain stable. The currency exchange rate is the most preferred because it fosters and sustains production activities and economic growth, (Chowdhury, 1999). The currency improve strength of the economy may influence trade market in overvaluation, current account issues and cause imports to become artificially cheaper against relative high prices of exports. This will reduce how in competitive a country is on the international level as suggested by (Takaendesa, 2006). Depreciation of a currency can lead to worse terms of trade and cause imports to become artificially expensive while exports remain relatively cheaper. Based on this background, policymakers of the Ghana economy develop and adopt various interventions aimed at achieving and sustaining currency stability.

In Ghana unlike other countries such as Nigeria, Zambia and Kenya where exchange rate rise and fall, Ghana's case is one with continuous depreciation. In July 2007 Bank of Ghana carried out re-denomination exercise after the exercise critical. This study will help complement the Central Bank's efforts to help fight

depreciation in Ghana. It is when these factors are highlighted that the Central Bank can develop strategies to combat these factors.

The exchange rate can depreciate, appreciate or remain stable. Currency strengthening because of real exchange rate fosters overvaluation, current account issues, and causes imports to become less expensive to the country whilst exports remain comparatively expensive, thereby reducing the international competitiveness of the country (Takaendesa, 2006). Depreciation, on the other hand, leads to worsening terms of trade and cause imports to become artificially expensive and exports relatively cheaper. Currency stability facilitates and enhances production activities and economic growth (Chowdhury, 1999) and considered desirable. It is based on this background that policymakers of the Ghanaian economic and exchange rate come up with policy interventions directed at currency stability. (Mordi,2006), “argued that exchange rate movements influence inflation, prices incentives, fiscal viability, the competitiveness of exports, and efficiency in resource allocation, international confidence and balance of payments equilibrium”.

Depreciation of exchange rate refers a situation whereby the relative amount of domestic currency required for purchasing of hard currency increases, while an appreciation means a relatively less amount of domestic currency is needed to purchase hard currency. The movements of the exchange rates and deviations from

a benchmark of trade market rate, for a period are referred to as Exchange rate volatility (Mordi, 2006). Ghana had had its share of exchange rate volatility.

The question on how to achieve and sustain exchange rate stability in Ghana is one of great importance and hence generates interest among economists; this question continues to remain an unanswered research question. During the period where the fixed exchange rate system was adopted by Ghana, most economists believed that the Ghanaian currency was overvalued. However, the adoption of a flexible exchange rate system lead country to record depreciation in exchange rate irrespective of the Central Bank's policy interventions and support to the market. What then mainly drives the exchange rate in Ghana? It is considering these developments that this study becomes very necessary.

1.2 Problem statement

With the introduction of various economic reforms such Structural Adjustment Program (SAP) and Financial Sector Adjustment Program (FINSAP), Central bank's efforts and initiatives as well as government intervention aimed at achieving price stability and a suitable exchange rate to stimulate and sustain economic growth in Ghana, our exchange rate continuous to depreciate over the years. The theory postulates that both macroeconomic and microeconomic factors

affect the price of the exchange rate in Ghana. With some selected macro-economic factors such as interest rates, inflation, Gross domestic products among others, this study sought to access the impact these variables have on exchange rate movements in Ghana by examining how these variables have affected the price of the exchange rate in Ghana. This can be modeled as

$$ER_p = f(\text{macro variable})$$

Where ER is Exchange rate, p is the price of exchange and f is function and macro is macroeconomic factors. Using data from 2000 to 2018 the study investigates and examines the relationship these variables have with exchange rate fluctuations and how these macro-economic variables have the high price of exchange rate in Ghana.

1.3 Objective of the study

The study seeks to access all influence that macroeconomic variables affect exchange rates movements in Ghana by determining how exchange rate volatility is affected by macroeconomic variables covering the period 2000 to 2018 in Ghana. The specific objective seeks to address the following unanswered research questions:

- I. To examine the effect of interest rate and inflation rate differential on exchange rates in Ghana.
- II. To examine the effect of balance of payment and terms of trade on exchange rates in Ghana.
- III. To examine the extent to which interest rate, inflation rate, the balance of payment and trade of terms affect the price of the exchange rate.

1.4 Research Questions

- i. What is the effect of interest rate and inflation rate differential on exchange rates in Ghana?
- ii. What is the effect of balance of payment and terms of trade on exchange rates in Ghana?
- iii. Which macroeconomic variable has the greatest effect on exchange rate?

1.5 Significance of the study

The entirety of benefits of the study in the core of policymakers in the space of demeaning on the inflationary rates, interest rate, balance payment and the terms of payment, call for a moment to affect the exchange rate to the extension of total economy's findings and ideas, forming the decisions made. This study will also

help both exporters and importers to make an informed judgment and mitigate trends or risk, affecting the smooth and true intent of profitability. The purporting factor the study added some values to the theories designed to affect the macro-economic indicators on the exchange rates in Ghana. Nailing, the study also checked on the basis for research work, which will be delved in the future on a similar or related field about rate exchanged.

1.6 Scope and limitations study

The cedi /dollar exchange rate was used because dollar accounts for about 80% of Ghana's foreign transactions thus the study is limited using cedi/dollar exchange rate without including cedi/pound sterling and cedi /euro exchange rates.

Data for macro-economic variables are secondary data, which are sourced from the Research Department at the Bank of Ghana. The sample period under review covers an eighteen-year interval from 2000-2018 due to the objective of the research. The exchange rate used for the study were banks reference rates – rates displayed in banks as against banks' transaction rates which are rates for which actual transaction took place. Banks' indicative rates are the average of all dealer banks exchange rate returns submitted to the Bank of Ghana.

The banks' reference rates were used because of the availability of data as indicative rate had been in existence since the Bank of Ghana was established. Transaction rates evolved in the latter part of 1999 when the bank of Ghana discovered the seeming difference between indicative rates and transaction rate. The economic variables used in this study were U.S dollar/cedi exchange rates, inflation (change in CPI) foreign direct investment, exports (goods) imports (goods), gross domestic products and lending interest rate.

1.7 Chapter Disposition

The research is grouped into five divisional chapters. The first chapter focuses on issues concerning the background to the theory, problem statements, objectives of the research, statement of hypotheses, scope and limitations of the research, significance of the research, and organization of the research. Chapter two considers an overview of various exchange rate policies both globally and local experience and analysis of theoretical and empirical exchange rate studies. Chapter three deals with time series properties of the variables, theoretical framework and model specification, data sources and methods used in analyzing the data. Chapter four considers the presentation of results and discussion. The last chapter presents the summary, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter entails a detailed analysis of literature in this research area.

2.1 Definition of Concepts

This section defines the various concepts in the study. In this section, the research delves deeply into the concept of the exchange rate and provides a detailed overview of the area.

2.1.1 Exchange Rate

According to (Azid, Jamil, and Kousar 2005), an exchange rate is how much one currency cost in relation to other currencies. Likewise,(Stålstedt, 2006), explains that the exchange rate is a cost one pays with domestic money to receive an equivalent amount in foreign currency. (Azid, Jamil, & Kousar. 2005) also, suggest that exchange rate emphasizes on a countries currency quotation with regards to its

foreign counterparts. It can be agreed that if exchange rate, can unreservedly change, then, it might end up being the quickest moving cost within the economy, uniting all the foreign products. Managing exchange rate has been discussed extensively among many such as academicians and policymakers (Senadza & Diaba, 2017). The research argues that exchange rate management began dominatingly when the Gold market price crumbled in 1930 and the consequent rise of Bretton wood arrangement that allowed for change by pegging of currencies from 1940. Changes in the exchange rate are considered a factor that influences business performance as foreign investors would always prefer exchange rate stability (Senadza & Diaba, 2017). Thus, the study posits that stability in exchange rate boosts financial development. According to (Senadza and Diaba, 2017), the exchange rate is a standard measurement unit of one currency that can be used to purchase an equal measure units of another currency. African country like Nigeria has an administration responsible for the exchange rate completely handled by Central Bank of Nigeria. The inception of Structural Adjustment Policy (SAP) in 1986, the national agenda has shifted from the peg routine to an adaptable trade market routine. Thus, (Mordi, 2006) indicate that no exchange rate is perfect, trade rate is totally controlled by market factors, a however overall framework to be observed float where financial experts intercede occasionally in the outside exchange market to achieve some strategic targets.

(Gyamfi, 2011) asserts that businesses and transactions that take place within a nation include the utilization of the local currency which might be in the form of cash, check or different means. However, business operations in a given country may include parties from various currency regions or nations, which can lead to utilization of the vender's local currency, the purchaser's local currency or totally unique currency. Subsequently, these parties to the business may receive payments or get installments in a foreign currency which will create a market for such exchanges referred to as the foreign exchange market. An example includes a situation where residential monetary values are exchanged for foreign ones (Incoom, 1998). In the exchange rate markets, there are merchants and additionally principals. The rate at which the merchant buys the monetary forms is lower than the rate at which he moves them and consequently the distinction between the rates at which he purchases and moves monetary forms is named as the turn (Gyamfi, 2011).

2.1.2 Bilateral, Nominal, and Effective real exchange Rate

Real effective exchange rate (REER), mostly utilized as measure of competitiveness in goods traded. It also serves as a measure of the living standards of a country in comparison with other countries (Betliy, 2002). In addition, (Betliy, 2002) posits that adjustments made in Real Effective Exchange Rate influence

inflation and economic output significantly. According to (Gyamfi, 2011) bilateral exchange rate includes two pair of currencies. The study further indicates that “nominal effective exchange rate (NEER) is weighted with the inverse of the asymptotic exchange weight”. Genuine effective exchange rate (REER) alters NEER by a proper outside value and deflators by home nation’s output level. Contrasted with NEER, GDP average effective trading rate may to progressively suitable regarding worldwide investment.

2.1.3 Volatility

Volatility describes the quantum of uncertainty related to the size of changes experienced in value of a security (Investopedia.com). Again, (Andersen, Bollerslev, Diebold, and Labys 2001), explains volatility as inherently unobservable which implies that volatility cannot be detected thus; volatility is a measure of risk. In this study, volatility is associated with the exchange rate to examine its impact on economic performance. (Gyamfi, 2011) defines volatility to be an "instability, fickleness or uncertainty". He considers volatility in a measure of risk, regardless of the phenomenon being discussed whether in resource evaluation, portfolio optimization, among others that could be a source of contribution to economic decisions. Fluctuations of exchange rate portray the

vulnerability of worldwide exchanges, in both products and money related resources. According to (Azid, Muhammed and Aneela, 2005), exchange rate fluctuations show economic parties' expectations of change in money supplies, interest rates and incomes.

2.1.4 Spot and Real Exchange Rates

Spot exchange rate indicates current trading market rate while forward exchange rate refers to the right to buy an amount of hard currency today to be exercised on a future date based on the agreed terms and conditions of future trading rate (Gyamfi, 2011). Real exchange rate, (RER) depends on the estimation GDP deflator on the level of value in the country and foreign nations which are self-assertive measures equivalent to one year. In this way, the dimension of (RER) is self-assertive measure, contingent on the specific year chosen for the GDP deflator of the two nations. In event that all merchandise was openly tradable, where foreign and local inhabitants bought indistinguishable bushels of products, obtaining power equality that would hold for the GDP deflator of the two nations, and the (RER) would be consistent.

2.2 Determinants of Exchange Rate

The alterations of exchange rate are mainly determined by trading components (forces of demand and supply). Assume only two currencies exist in a market, the supply of one currency can be said to be the demand of the other (Stålstedt, 2006). The exchange rate between two countries is termed as the bilateral exchange rate. The strongest determinants of exchange rate indicated by (Copeland, 2005) are exports, imports and foreign investment and speculation. Other determinants of the exchange rate are government policies. The exchange rate is influenced by the interest rate which thus is specifically influenced by these strategies. A decrease in a country's borrowing rate of the local real interest rate devalues the domestic currency. Meanwhile, a decrease to more tightly fiscal policy additionally leads to a decrease in inflation that leads to an appreciation of the local currency. The consequence of these clashing impacts is vague (Solnik & McLeavey, 2003). The interest rate is influenced by a more expansionary fiscal policy which would most often lead to a fall in real interest rate and an increase in the inflation rate. Both these outcomes lead to a devaluation of the local currency. A stricter financial policy would prompt the contrary outcome (Solnik & McLeavey, 2003). The conclusion of these is the administrative influences on the interest of residential resources, which thus influence the interest for domestic currency.

Notwithstanding, these progressions must not be expected to affect the exchange rate. Such unexpected changes add to the volatility of the exchange rate.

2.3 Theoretical framework

Inflation and exchange rates

In the early years, most countries trading rate maintained a pegged trade market rate system because the floating rate was generally accepted to cause problems in trade. This led to the development of the various strategies of inflation that promoted flexible exchange rate. Countries with relative stability in the exchange rate and low inflation rates tend to experience an appreciation in their currencies. Countries with high inflation typically experience to a depreciation of its local currency relative to other currencies.

Imports and exports and exchange rate

In theory, a change in the value of the cedi should raise or lower the cost of foreign goods, thereby reducing or increasing Ghana's demand for imports. All things have been equal if the value of imported goods and services rises above its exports the terms of trade worsen. This leads to depreciation of the country's currency as pressure would be mounted on foreign currencies (increase in demand). However,

if imports rise lower than the increase in exports this would bring about favorable terms of trade and appreciation of the currency (cedi).

Interest rates and exchange rate

Currency exchange can be affected by economic influences caused by interest rate changes. Interest rate effects return or yield on bonds. Treasury bonds traded in the United States can be purchased only in United State dollars. The high-interest rate on these Treasury bond creates a high demand for dollars (rise in the exchange rate) for the purchase of those bonds. Low-interest rate relative to other securities traded in major economies reduces demand (fall in exchange Rate) for dollars, as investors will see it as unattractive and hence shift toward high yielding investments. This relationship becomes slightly inverted. However, when investors become highly risk-averse during periods of credit contraction or recession where monies would rather be invested in safer assets thereby reducing interest rates. low returns on bonds reflect the demand for investor low credit risk appetite, safety and not necessarily a deterrent.

Exchange rate and Foreign Direct Investment

Generally, is considered that depreciation in countries' currencies increases the amount and rate of foreign direct investment (FDI) that stream into that country. Research has shown that FDI flows in a country may drastically cut down the

domestic currency of the country economy; depreciate upon the standard of pricing in accordance of that of the data from Japan, and United States.

According to by Purbaya, Yudhi and Sadewa (The effective exchange rate on FDI), found out that the decrease in the currency of the country will uniquely increase FDI's from foreign firms if initially, the firms were mainly exporting to other countries. Once they become multinationals, the depreciation of the country may give a different effect on their FDI's inflow back to their economy.

Exchange Rate and GDP

According to (Easterly, 2005), "large overvaluations have an adverse effect on growth". The author did not agree that slight movements have definite effects. Most account link overvaluation to macro-economic instability, (Fisher, 1993). Overvalued exchange rate may result in a shortage of foreign currencies, unsustainable large current accounts deficits and balance of payment crises. These adversely affect growth. Theory suggests that overvaluation may negatively affect growth while undervaluation may facilitate growth relatively.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter reviews research type and design of the study, population, sample requirements and the methodology used for the study. Section 3.1 highlights the research type and design indicating the dependent variable and independent variables. Section 3.2 shows the perimeter and the timeline of the population used for the study. Section 3.3 describes the sample and the conditions under which a variable may be included in it. Section 3.4 explains the procedures used to collect the data related to each variable in the sample.

3.1 Research type and Design

The research method used for this study is quantitative; this method is used because the purpose is to determine the relationship among the price of the dependent variable and independent or variables in the population. Quantitative research helps to establish and adopt appropriate mathematical models, theories and/or hypotheses in relation to price of the Exchange rate in Ghana. The

descriptive research design used is meant to measure only the outcome and to establish if any only associations between variables.

3.2 Population of the Study

The data constitutes twenty-three registered banks that trade in the interbank market and submit returns to Bank of Ghana., macro-economic data obtained from the Statistical Service Department and Bank of Ghana. The period covered under the study is 2000 to 2018. The exchange rates used in the study were rates as computed by the Bank of Ghana and included the registered banks at any period. Exports and imports were mainly goods in nature representing eighty per cent (80%) of total imports... The study principally highlights the only price of exchange rates that is depreciation and appreciation of the domestic currency relative to the dollar as dollar transactions remain over 80% of Ghana's total foreign transactions.

3.3 Sample and Sampling Technique of the Study

The research seeks to establish the influence of these socio-economic factors on dependent variables of the appreciation and depreciation of the trade rates on Ghana's economical frontier. The study covers an eighteen-year period interval

from 2000 to 2018 inclusive. The exchange rate in Ghana is Banks reference rates, Banks transaction Rates, Interbank rates, Forex bureau rates and Bloomberg or Reuters rates.

Banks reference rates were used due to the following:

- i) Availability of data for a very long period
- ii) Its computation does not involve outliers as in the case of reference rates.
- iii) It exists in both the developed and under-developed countries.
- iv) It covers the Ghanaian banks, unlike Bloomberg and Reuters where some foreign banks rates are included on its computations.
- v) Unlike interbank rates which may sometimes involve in very few banks, banks' reference rates are displayed in all money deposit banks.

The following criteria were used for selecting the macroeconomic variables:

- i) Availability of data, for example, Ghana has been receiving large portfolio inflows of since 2008 after which it issued various three-year and five-year bonds, for example, \$3 million sovereign bond issued by government 2019.
- ii) Banks' Cedi/dollar reference rates exchange rates

The above sample selection resulted in a final sample that includes U.S dollar/cedi banks' reference exchange rates, Gross Domestic Product, inflation (change in CPI) foreign direct investment, exports (goods), imports (goods) and interest rate. The real GDP data were annual in nature.

The study employs the use of the purposive technique for sampling. Dane (1990) suggests that one advantage of purposive sampling is that it allows the researcher to home in on people or events, which have good grounds in what they believe, will be essential for the research.

3.4 Data Sources

Data collected for this study is from secondary sources gathered only for completing this study. All the information was obtained from the Bank of Ghana and Ghana Statistical Service. Some information was obtained from the various Bank of Ghana Quarterly Economic Bulletin, the Bank of Ghana notices to universal banks and Bank of Ghana notices to the public.

3.5 Data Collection and Description of the Study

Time series data type was used. Daily, banks submit foreign exchange returns to the Bank of Ghana where banks' weighted averages are computed. Research

Department of the Bank of Ghana carries out surveys periodically and in collaboration with the Statistical Services, come out with some economic variables. These information data for the period 2000 to 2018 were used for the study.

3.6 Data Description

Data used for this study were obtained from three main sources namely the Ghana Statistical Service (GSS), Bloomberg and the database of the Bank of Ghana. At present, the Bank of Ghana deals with the reference rates, transaction rates, interbank rates, forex bureau rates and Bloomberg rates. This study used the reference rates because these are the most extensively used. Information on data made is summarized below at:

EXR: United States Dollar / Ghana Cedi Exchange Rate

GDP: Gross Domestic Products

FDI: Foreign Direct Investment

NET: Net Exports

INF: inflation

LIR: Lending Interest Rates

3.7 Methods of empirical analysis

The study would use a time-series econometric approach to empirically investigate whether economic variables had a significant effect with exchange rate. The exchange rate would be co-integrated with some selected macroeconomic variables i.e. presence of long-run relationship between the exchange rate and the economic variables else only short-run dynamics would be considered. The USD/GHS exchange rate would be regressed against some selected number of macroeconomic variables; these variables are net exports (of goods), foreign direct investments, inflation, lending interest rates, and Gross domestic products.

The general model examining the influence of economic variables on the dollar/cedi trade rate movement, which is specified in Equation 1 below:

$$EXR_i = \beta_0 + \beta_1 NET_i + \beta_2 LIR_i + \beta_3 INF_i + \beta_4 GDP_i + \beta_5 FDI_i + \varepsilon_i$$

Where $i=1, 2, 3 \dots n$, and β_0 is constant.

EXR is USD/GHS rate,

NET is net exports,

FDI is Foreign Direct Investment,

GDP is Gross Products,

IMPO in imports,

INF is inflation,

LINT is lending interest rate, and ε is the error term.

3.8 Unit Root Tests

Most time series data involving regression models are likely to produce spurious results as most time series data are not stationary. (Granger and Newbold, 1974) suggest that using non-stationary macroeconomic variables in time series analysis may cause problems and the regression may produce invalid and questionable results. To avoid this problem, a test for stationary of macro-economic variables before modeling becomes very necessary. A test for the presence of unit root in the variables adopted the augmented dickey-fuller test.

Augmented Dickey-Fuller test helps to identify whether the variables selected in this model are Stationary or not. If the R^2 value exceeds value Durbin-Watson value, then it means the variables selected in the model are non-stationary and spurious, and therefore it cannot be used for forecasting, predicting or testing. However, if the Durbin-Watson value supersedes the R^2 value, then it implies the values are stationary.

3.9 Cointegration Test

Cointegration alludes to the presence of a long-run balance two arrangement factors that are non-stationary at their level (Gujarati, 2004). This is because of the

assumption that the variables are stationary in first difference. Hence, by this test, we can assume a long-run relationship in the model even though the series are drifting apart or trending either upward or downward. The Johansen Cointegration test would be used in this study.

3.10 Test of Significance

The study employed the Coefficient of Determination (R^2) as the test for the fitness of the regression model with the data in the study and how close the data fitted in the regression line. The Variance Inflation Factor (VIF) and the Multicollinearity tests were also conducted to see the significance of the regression results.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

The purpose of the study seeks to investigate the impact macroeconomic variables have on exchange rate rates movements in Ghana, by determining how exchange rates volatility is affected by macroeconomic variables covering the period of 2000 to 2018 in Ghana. Pertaining to this objective, a detailed account of the results and discussions are provided in this chapter. The chapter presents the descriptive statistics of variables and its empirical results.

4.1 Descriptive Analysis

The section presents summary of both dependent and independent variables of the various macroeconomic variables over the time frame and shows the feature of the various variables. The descriptive statistics seek to vividly explain the data included in the model. This makes it easy for the researcher to easily screen the data to prevent any incorrect figures. The major descriptive measures are the mean, standard deviation, the minimum and maximum variables over the period under

review. The table below represents the descriptive statistics. Std. Dev represents standard deviation while Min and Max represent the Minimum and Maximum values of both the independent and dependent variables respectively.

Table 4.1 Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
NET	19	-2049.64	1771.652	-4998.769	1810.285
LIR	19	30.502	5.908	24.25	46.604
INF	19	15.696	6.446	8.7	32.9
EXR	19	1.855	1.293	.686	4.601
GDP	19	6.168	2.53	3.7	14
FDI	19	1866.999	1425.821	58.93	3470.668

Source: Authors compilation from Stata

From the above table, the minimum value for Net Export is (4998.769) and this occurred in the year 2008 while the maximum value is 1810.285 and this occurred in the year 2018. The mean value for net export is (2049.64) and the standard deviation is 1771.652. Foreign direct investment had minimum and maximum values of 58.930 and 3470.668. This occurred in the years of 2002 and 2016

respectively while the standard deviation and mean is 1425.821 and 1866.999. The minimum and maximum values for lending interest rate are 24.250 and 46.604 and this occurred in the years of 2007 and 2001 respectively. The mean and standard deviation were 30.502 and 5.908. Inflation had mean of 15.696 and standard deviation of 6.446. The minimum value for inflation is 8.700 and it occurred in the year 2011 while the maximum value of 32.900 occurred in the year 2001. The exchange rate had standard deviation of 1.293 and mean value of 1.855. The minimum value of the exchange rate is 0.686 and it occurred in the year 2000 while the maximum value is 4.601 and this occurred in the year 2018. Gross Domestic Product recorded a mean and a standard deviation of 6.168 and 2.530. The minimum value is 3.7 and this occurred in the year 2016 and 2000 while the maximum value is 14.00 and this occurred in the year 2011.

4.2 Correlation Matrix

The correlation matrix for all random variables used in the regression analysis is shown in table 4.2. The coefficient of correlation gives an index of direction and the relation between two variables without any causality. The correlation matrix is helpful in sorting out variables that highly correlated and cannot be in a model. Table 4.2 provides a pairwise correlation of the variables used in this study. The

correlation matrix is very vital in terms of knowing whether there are elements of multicollinearity in data. Multicollinearity is a situation whereby some or all the variables in a model are highly correlated with one another making it tedious to know which of them influences the dependent variable. The table below shows that the correlation between the variables is very low. Therefore, there is no multicollinearity between the variables.

Table 4.2 Matrix of correlations

Variable	(1)	(2)	(3)	(4)	(5)	(6)
s						
(1)	1.000					
NET						
(2)	0.492	1.000				
LIR						
(3)	0.295	0.852	1.000			
INF						
(4)	0.411	-0.270	-0.250	1.000		

EXR

(5) -0.287 -0.440 -0.543 -0.060 1.000

GDP

(6) -0.113 -0.509 -0.480 0.729 0.355 1.000

FDI

Source: Authors compilation from Stata

4.3 Variance Inflation Factor (VIF)

The Variance Inflation Factor (VIF) is the ratio of variance in a model with a single term over the variance in a model that several terms (Fletcher, Eves, Glover, Robinson, Vernooij, Thompson & Wallis, 2017). It aims at quantifying the severity of multicollinearity in a regression analysis. It deals with how the variance of a regression coefficient is increased because of collinearity. The table below represents the Variance Inflation Factor. From the above table, the mean for VIF is 2.903 is less than five. This means that there is no multicollinearity in the variables used for the estimated model.

Table 4.3 Variance inflation factor

	VIF	1/VIF
LIR	5.3	.189
INF	4.678	.214
NET	1.552	.644
GDP	1.537	.651
FDI	1.45	.69
Mean VIF	2.903	.

Authors own compilation from Stata

4.4 Empirical Results

Table 4.4 Regression result

VARIABLES	EXR

NET	0.000427***
	(8.89e-05)
LIR	-0.0945*
	(0.0492)
INF	0.0328
	(0.0424)
GDP	-0.132*
	(0.0619)
FDI	0.000676***
	(0.000107)

Constant	4.650***
	(1.284)
Observations	19
R-squared	0.876
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

The regression findings shown in table 4.4 shows that Net Export significantly and positively influences Exchange Rate at a 1% significant level. This implies that international trade with a balance of trade surplus causes the exchange rate of a country in relation to its trading partners to increase. This is because there would be a higher demand for the country's products and services. As demand increases, the country's currency will also be demanded by its international trade partners. All these being equal, the increase in demand for local currency, given supply and all other factors remain constant; will incite an increase in the exchange rate. This finding agrees with the findings of (MacDonald & Ricci 2003).

The results also show that Foreign Direct Investment (FDI) significantly influences Exchange Rate in a positive direction. This implies that when a country has foreigners investing heavily in its economy, this causes an increase in local currency demand, since the hard currency introduced into the country would be converted into local currency. Given the increase in demand for local currency, the exchange rate of the country in question adjusts upwards. This conforms to the findings of (Ranga & Wijesinghe, 2015), (Blonigen 1997), and (Klein & Rosengren, 1994).

Lending Interest Rate (LIR) significantly impacts on Exchange rate. The impact moves in the positive direction. Theoretically, the higher the Lending Interest Rate of a country, the higher the value placed on the investments in that country. Consequently, there would be pressure on the local currency. For instance, since the Lending Interest Rate affects the bond yield, a higher bond yield makes such bonds attractive to foreign investors. The subsequent increase in demand for local currency to purchase such bonds, all things being equal, should increase the exchange rate of the country's currency. However, the results of the regression show that Lending Interest Rate negatively influences the exchange rate as found by (Drine & Rault. 2003). Related studies are inconclusive as to the relationship between these two macroeconomic variables.

Of all the variables employed in the study, inflation was the only one found to have no significant influence on Exchange rate. This meant that a country's exchange rate does not depend on its inflation rate at any point in time.

GDP negatively impacts the exchange rate of a country. And this impact is significant per the regression results depicted above. This implied that an increase in GDP of a country causes the exchange rate to depreciate.

4.5 Test for Unit Stationary

Table 4.5 Test for stationarity

EXR	Coef.	St.Err.	t- valu e	p- valu e	[95% Conf Interval]	Sig
NET	0.000	0.000	4.80	0.00 0	0.000	0.001 ** *
LIR	-0.095	0.049	-1.92	0.07 7	-0.201	0.012 *
INF	0.033	0.042	0.77	0.45 3	-0.059	0.124
GDP	-0.132	0.062	-2.13	0.05 2	-0.266	0.002 *

FDI	0.001	0.000	6.34	0.00	0.000	0.001	**
			0				*
Constant	4.650	1.284	3.62	0.00	1.876	7.424	**
			3				*
Mean dependent var	1.855	SD dependent var	1.293				
R-squared	0.876	Number of obs	19.000				
F-test	18.328	Prob > F	0.000				
Akaike crit. (AIC)	35.023	Bayesian crit. (BIC)	40.690				

Durbin- Watson d-statistic (6, 19) 1.910401

Authors own compilation from Stata

From the above table, it can be observed that our Durbin Watson statistic (1.910401) is greater than the R-squared value indicating that the variables are

stationary and not spurious. This means that the variables used in this study can be used for forecasting and prediction.

4.6 Cointegration Test

When the series under scrutiny are stationary in levels, performing Cointegration test is not necessary. In other words, the Cointegration test is not needed when the variables are neither lagged nor differentiated before getting the stationary of the variables. This is because any shock in immediate time period quickly adjusts to extended period of time.

However, Cointegration test was done in other to show that there were no traces in the variables.

Table 4.6 Cointegration test

Johansen tests for co integration

Trend: constant

Number of obs = 18

Sample: 2001 - 2018

Lags = 1

maximum rank	parms	LL	eigenvalue	max statistics	5% critical value
0	6	428.006	-	45.6035	39.37
1	17	405.204	0.92062	41.1207	33.46
2	26	384.644	0.89817	13.4352	27.07
3	33	377.926	0.52593	10.14	20.97
4	38	372.856	0.43069	5.7807	14.07
5	41	369.966	0.27469	0.0023	3.76
6	42	369.965	0.00013		

Authors own compilation from Stata

The table above shows the result of the Cointegration test. It can be seen that no trace was found in the variables since the variables were stationary in all levels

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents an overall summary of the findings, conclusions and recommendations pertaining to this study. The summary takes into consideration the salient points in this study. Recommendations proposed are based on the conclusion of this work. These recommendations will be profitable today and in the future.

5.1 Summary of key findings

Foreign exchange market has assumed a very important role in determining growth in countries around the globe. Most countries have managed their domestic currencies in relation to major trading currencies to attain and sustain steady rates of long-term economic development; this premise establishes the assertion that an appreciation or depreciation of domestic currencies plays a key role in influencing Ghana's trade balance and ultimately its growth. The association or connection relationship of both exchange rate and macroeconomic variables are paramount in the understanding of depreciation of our domestic currency relative to the dollar and other currencies as well as the behavior of the consumer prices and balance of payment in Ghana.

The study uses empirical data from Ghana of some selected macroeconomic variables and employs econometric models' technique to arrive at findings based on the patterns discovered. The selected economic variables are lending interest rates, foreign direct payment, imports, exports, gross domestic products and inflation.

The finding of the research indicates positive and statistically significant connection amongst Exchange rate (EXR) and Net Export (Export-Import) at a 1% significant level. On average, an increase in Net Export by 1 will lead to a 0.000427 rise on exchange rate. Foreign Direct Investment (FDI) influences significantly on determinant of the Exchange rate at the 1% level of significance. Lending Interest Rate (LIR) has an inverse relationship with the exchange rate. It is statistically significant at a 10% significant level. On average, an increase in Interest by 1 will reduce the exchange rate by 0.0945. Inflation is statistically insignificant with exchange rate, although there is a positive relationship with exchange rate. GDP has an inverse relationship with a statistically significant impact at 1% level on exchange rates. An increase in GDP by 1 will result in a decrease in the exchange rate by 0.132.

5.2 Conclusion

Interest rate and inflation rate were found to have a strong, positive correlation. Yet the study failed to establish a direct causal relationship between these two variables.

The study established that balance of payments has a positive, significant influence on the exchange rate of the country. This is an indication that a balance of payment deficit would induce a depreciation of local currency in relation to foreign trading partners' currencies. This means the exchange rate will fall. Should the country record a balance of payments surplus, the exchange rate will increase.

Foreign Direct Investment was found to have a positive influence on the exchange rate of a country. This meant that the volume of investments made by foreign investors really influence the exchange rate of a country.

On the other hand, the Lending Interest Rate and Gross Domestic Product of a country have negative impacts on the country's exchange rate. This implied that when the interest rate is high, the exchange rate fell. Local currencies depreciated against foreign currencies.

Finally, though much controversy exists in literature about the exact relationship between Gross Domestic Product and exchange rate, the study found that Gross domestic product negative impacts exchange rate.

5.3 Recommendations

Several measures should be put in place to ensure that the economy becomes an export-driven economy rather than an import-driven economy with a high taste and preference for foreign products. This would help the country maintain a balance of trade surplus account. Consequently, the country's exchange rate will appreciate in order to give it a competitive edge in international trade and investments.

Taxes on goods and services should be adjusted through government policies to favor the exporters of goods and services. Tax incentives, reliefs and related policies should be given to encourage high volumes of exports in the face of reduction of prices of goods and services. This would mean an improvement of the terms of trade, all things being equal.

The volume of foreign direct investment should be increased leveraging on the country's social and political environment. The socio-political environment should be continually serene and investor-friendly. The country's political administration

must be equitable and by the rules to boost investor confidence in the nation. This would in turn positively impact the exchange rate due to the influx of foreign direct investment.

Tightening and monetary policies should be employed in order to control the rate of inflation in the country.

Finally, the study used a period of 18 years and a few macroeconomic variables to investigate the influence that macroeconomic variables have on exchange rate. Further studies should focus on the other macroeconomic variables not included in this study. The time frame should also be expanded to draw more accurate conclusions.

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