

UNIVERSITY OF CAPE COAST

REAL EXCHANGE RATE AND ECONOMIC GROWTH IN GHANA

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BY

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## DECLARATION

### Candidate's Declaration

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

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

Name: Faustina Entsua-Mensah

### Supervisors' Declaration

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

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

Name: Mr. Anthony Adu-Asare Idun

## ABSTRACT

This study sought to determine the effect of real effective exchange rate on economic growth in Ghana using annual data for the period 1984 to 2014. The study employed the Auto Regressive Distributed Lag Estimation technique as well as the Bounds Testing approach to cointegration to establish a long run relationship between Economic Growth and Real Effective Exchange Rate in Ghana. The result suggests that real exchange rate, capital stock, and labour force exert a positive and statistically significant effect on economic growth both in the long-run and short-run. The study recommended that there is the need to ensure macroeconomic stability by ensuring exchange rate stability; productive government expenditure as well as ensuring the growth of the capital stock.

**KEY WORDS**

Auto-Regressive Distributed Lag (ARDL)

Economic Growth

Government Expenditure

Ghana

Trade Openness

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**DEDICATION**

I dedicate this work to Mr. Robert Asmah

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## LIST OF ACCRONYMS

ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
BoG	Bank of Ghana
BOP	Balance of Payment
BW	Bandwidth
CPI	Consumer Price Index
CUSUM	Cumulative Sum of Recursive Residuals
CUSUMSQ	Cumulative Sum of Square Recursive Residuals
DF	Dickey-Fuller
ECM	Error Correction Model
ECT	Error Correction Term
ERP	Economic Recovery Programme
EXHH	Real Exchange Rate
EXV	Exchange Rate Volatility
DW	Durbin-Watson
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GMM	Generalized Methods of Moments
HQ	Hannan-Quinn Information criterion
IMF	International Monetary Fund
INF	Inflation
K	Capital

L	Labour
LDCs	Less Developed Countries
LINF	Log of Inflation
LOPN	Log of Trade Openness
MNCs	Multinational Corporations
OECD	Organization of Economic Co-operation and Development
OLS	Ordinary Least Square
PP	Phillips-Perron
R&D	Research and Development
RER	Real Effective Exchange Rate
SAP	Structural Adjustment Programme
SBC	Schwartz-Bayesian Criterion
SIC	Schwarz Information Criterion
US	United States
VAR	Vector Auto Regressive
VECM	Vector Error Correction Mechanism
WAMZ	West Africa Monetary Zone
WDI	World Development Indica

## CHAPTER ONE

### INTRODUCTION

#### **Introduction**

This chapter put the entire research into perspective by presenting the background to the study, problem statement, purpose of the study, hypotheses, justification, scope and organization of the study.

#### **Background to the Study**

The World Bank and IMF in the era of World War II aftermath witnessed a period of fixed exchange rate regime. This system was however, not fit to survive even from the infantile state due to its inflexibility. The Bretton Woods system by 1973, adopted the floating exchange rate regime. The collapse of the Bretton Woods system was preceded by the imbalances in the U.S economy.

The imbalances included huge balance of payments deficits, significant outflows of gold, and the refusal of major trading partners to realign currency values. The major U.S policy that brought the World Bank and IMF to their knees is the sole termination of the U.S dollar conversion to gold by the Nixon administration. This new regime subsequently led to market forces freely influencing so many currencies. The relative desirability regarding the fixed vis-a-vis the floating exchange rate has long been a debatable issue in international money and finance, and this remains unresolved for decades after the Bretton Woods epoch. Those in favour of fixed exchange rate argued that floating exchange rate has the tendency to increase uncertainty in trade and expose importers to high risk due to fluctuation in the domestic currency, and this may lower trade volumes. This argument is indeed valid because, some empirical

evidence exists to attest to fixed exchange rate promoting trade openness and economic integration (Frankel & Rose, 2002).

Hanke and Schuler (1994) also argued that the external balance of a country could be strengthened or improved in a fixed exchange rate regime by enabling sound management of budget because this crippled Government in its ability to print money to expend. Proponents of floating exchange rate however, argued that risks that could result from exchange rate fluctuation are mild through sufficient and systematic hedge, therefore does not affect trade flows. It was also argued that, floating exchange rate ensure discipline in fiscal policy because unbalanced fiscal policies can be easily corrected through adjustment in exchange rate and price level (Tornell & Velasco, 2000)

Exchange rate instability is the persistent fall and rise in value of domestic currency relative to other currencies (exchange rate). This has gained much attention in recent international finance literature due to its influence on developed and developing countries. Exchange rate fluctuations has an effect on most macroeconomic indicators like trade (Doyle, 2001; Clark, Dollar, & Micco, 2004); inflation (Danjuma, Shuaibu, & Sa'id, 2013) employment growth (Tenreyro, 2007) and economic activity (Adewuyi & Ak-pokodje, 2013).

Ghana, shifted from the pegged exchange rates to floating exchange rate regime as part of the major reforms adopted during the Financial Sector Adjustment Programme (FINSAP). FINSAP was a component of the Economic Recovery Programme (ERP) implemented in the 1980s to address the ailing Ghanaian Economy. This change from the fixed to flexible exchange rate regime was among other things done due to the understanding that floating exchange rate cures the boom and bust syndrome and will also stimulate



economic growth through exchange rate pass-through on consumer prices, terms of trade, volume of trade and investments (Rodrik, 2008).

The Ghana Cedi under the floating exchange rate regime has seen some depreciation against the major currencies especially the US Dollar (US\$), although, not monotonic, the Ghana Cedi however was somewhat stable between 2002 and 2007. The country undertook a redenomination exercise on July 1<sup>st</sup>, 2007 which led to a dollar (US\$1) exchanged for 93 pesewas. This exercise saw the Ghana cedi depreciating and by the end of July 2009, a Ghana Cedi was worth US\$ 0.67. (Bank of Ghana Annual report, 2009).

While the above statistics may partly espouse some connection between exchange rate and economic growth in Ghana, more research is needed to examine the correlation because the pass-through mechanism can be positive- that is depreciation leading to higher growth through a rise in demand for domestic goods by internationals or negative- that is depreciation declining growth due to undying taste for foreign goods by nationals and low productive capacity to take advantage of the currency depreciation (Devereux & Engel, 2003).

Exchange rate variability and its effect on Economic growth can also be positive- when the shock is immediately corrected through sound monetary policies and adjustment in prices or negative- when there is poor adjustment in prices and policies leading to a fall in trade volumes. The extent or magnitude of the exchange rate effect on economic growth also needs to be examined. Exchange rate instability has been a topical issue in the country for some time now and all these makes ascertaining the effect of exchange rate on the Ghanaian economy an important discourse (Gagnon & Ihrig, 2004)

This study sought to examine the effect of real exchange rate on GDP growth in Ghana to determine whether the former has a short-term and long-term impacts on the latter. The study relied on time-series data spanning from 1984 to 2014. Aside the chief explanatory variable, exchange rate, foreign direct investment, trade openness, government expenditure, labour force and capital stock were used as control variables.

### **Statement of the Problem**

The fluctuation in the value of the currency can be detrimental to the economy by creating uncertainty in businesses (trade) and altering consumer prices which lowers trade volume (Obstfeld & Rogoff, 1998)

However, with appropriate monetary policies, hedging against exchange rate risk and quick adjustment in prices, flexibility in exchange rate may be beneficial to the economy (Devereux & Engel, 2003). From a historical perspective to even more recently, the exchange rate of Ghana has on the average depreciated over time (Alagidede & Ibrahim, 2017). Contemporary trade argument would mean that the economy must experience a favourable trade balance but this is not the case. This paint the picture that the economy is in a way not competitive. Recent marginal falls in the GDP growth of Ghana from 14% in 2011 to a 4% in 2014 has been attributed to the exchange rate unsteadiness which has had impact on cross-border investment and trade (Alagidede & Ibrahim, 2017)..

From the Ballassa-Samuelson proposition, the real effective exchange rate has implication for international trade from the tradable and non-tradable sectors. Nonetheless, differences in the sectoral or structural makeup of economies as well as some peculiar factors make the real effective exchange

rate somehow unpredictable in terms of its impact on economic growth. Several works have been carried out to establish the link between real exchange rate and economic growth. Among them are the studies of Aguirre and Calderón (2005); Razmi, Rapetti, and Skott (2012); Frenkel and Rapetti (2008); Rodrik (2008); Berg and Miao (2010); Rapetti, Skott, and Razmi (2012); Di Nino, Eichengreen, and Sbracia (2011); Basirat, Nasirpour, and Jorjorzadeh (2014). This shows that this study is not holistically new. However, the researchers above did not consider the time period used under consideration in this study.

Moreover, not all the variables in the study have been considered by the researchers. For example, foreign direct investment is key to economic growth as it can possibly improve productivity. From the early 1980s, Ghana has barely run a flexible exchange rate. It is therefore, appropriate for more research to be conducted to ascertain how real exchange rate influence economic growth. Therefore, this work intends to further study the link between real exchange rate and Gross Domestic Product growth using a data, spanning from 1984-2014 in Ghana.

### **Purpose of the Study**

The main purpose of the study was to analyze the effect of real exchange rate on economic growth in Ghana.

### **Specific Objectives:**

1. Trend analysis of real exchange rate in Ghana from 1984 – 2014.
2. To examine the short run relationship between real exchange rate and economic growth in Ghana.
3. To examine the long run relationship between real exchange rate and economic growth in Ghana.

### **Research Hypotheses**

The following hypotheses are formulated to enable us respond to the objectives.

$H_0$ : There is no short run relationship between real exchange rate and economic growth.

$H_1$ : There exists a short run relationship between real exchange rate and economic growth.

$H_0$ : There is no long run relationship between real exchange rate and economic growth.

$H_1$ : There exists a long run relationship between real exchange rate and economic growth.

### **Scope of the study**

The study employed data on the following variables; Real Exchange Rate, Inflation Rate, Industrial contribution to GDP, GDP Per Capita, Foreign Direct Investment and Economic Growth. Economic growth is proxy by Gross Domestic Product Growth (GDPG). The study was limited to the period 1984 – 2014. This period is chosen so as to do away with structural breaks and also it is this period that the exchange rate of this country was flexible.

The unit root test and cointegration technique are used to verify the stationarity of data and long run relationships respectively among the variables. Also, Auto Regressive Distributed Lagged (ARDL) Model and Error Correction Model (ECM) are applied to examine the speed of adjustment toward the long run equilibrium. The data for the study were sourced from the 2016 edition of the World Development Indicators (WDI).

## **Organization of the Study**

The study was structured into five main chapters each of which is further divided into sections. Chapter one presented the background to the study, problem statement, aims of the study, hypotheses, justification, scope and organization of the study. Chapter two focussed on the literature review which include both empirical and theoretical literature on real exchange rate and economic growth. Chapter three looked at the methodology, which embodies the theoretical framework, specification of the empirical model and estimation technique used in the study. The results of the data collected for the study was analysed and discussed in chapter four. Chapter five presented the summary of findings, conclusion, policy implications and recommendations of the study.

## **Chapter Summary**

The chapter basically provided an introduction of the study. The background, problem statement, hypothesis, significance of the study and organisation of the study were presented.

## CHAPTER TWO

### LITERATURE REVIEW

#### Introduction

This chapter focused on literature review on the various subjects which form the basis for this study. This section was structured into theoretical and empirical literature review in addition to some explanation of terms. The empirical literature looks at studies conducted by various authors on the topic, and draw lessons from these studies.

#### Theoretical Literature Review

##### Economic Growth Theories and Models

The emergence of economic growth theories can be traced back to Adams Smith's Wealth of Nations. In Smith's view, economic growth of a nation strictly speaking, 'wealth of Nations' depends on the division of labour and is limited by the limits of division of labour. The Smithian view was later superceded by the view of Ricardo, Malthus and Mill. The growth theories suggested by these great economists are collectively called classical theory of economic growth. And then, during the nineteen thirties and forties, R.F. Harrod and Domar developed a path breaking theory of economic growth-the capital accumulation theory of economic growth, popularly called Harrod-Domar growth model. The following theories of economic growth would be discussed:

Musgrave Rostow's Theory The theory asserts that in early stages of economic growth, public expenditure in the economy should be encouraged. The theory further states during the early stages of growth there exist market failures and hence there should be robust government involvement to deal with these market failures. The theory is faulted because it ignores the contribution

to development by the private sector by assuming the government expenditure is the only driver of economic growth.

### **Wagner Theory of Organic State**

Among the pioneer literatures on public expenditure was one associate with a German economist called Wagner. The literature opines that growth of public expending was a natural consequence of economic growth. Specifically, Wagner law viewed public expenditure as behavioural variable that positively responds to the dictates of a growing economy. The hypothesis tries to find either a positive relationship between government spending and income and or a unidirectional causality running from government spending to economic growth.

The Wagner law is admired because it in many ways attempt to explain public expenditure and economic growth. The law is faulted because of its inherent assumption of viewing the state as separate entity capable of making its decisions ignoring the constituent's populace who in actual fact can decide against the dictates of the Wagner law.

### **Harrod-Domar Growth Model**

The Harrod-Domar growth model is an early post Keynesian model of economic growth. It was developed by Harrod (1939) and Domar (1946). It explains a functional relationship in which the growth rate of domestic product (GDP) depends on directly on the national net savings rate(S) and inversely on the national capital output ratio(C). The model is today referred to as the AK model because it is based on a linear production function with output given by the capital stock (K), time as constant, often labelled A. It is mostly applied in developing countries such as Ghana.

### **The Solow-Swan theory**

The Solow-Swan theory of economic growth sort to clarify growth by taking into account technology as a tool to influence economic growth. The theory proposed that, in the long run it is the technological progress and population growth that determine economic growth. According to Solow, government can influence the population growth rate, saving rate and incentive to invest in human and physical investment through its different policies.

According to (Barro, 1990a), with diminishing returns to capital, a nation's per capita growth tends to be inversely related to its initial level of income per person in the long run. Neo-classical growth theories also emphasized the position of technological change as an exogenous factor. Especially in Solow's expression, technological change is an act of economic growth, but it is an exogenous factor and hence it is called a "public good". Besides the exogenous nature of technological alteration, Solow and neo-classicalists have many assumptions, such as perfect markets, perfect knowledge in the markets, utility maximization, no spill overs, and positive and reducing marginal revenue (Solow, 1956).

One could simply argue in opposition to a number of these assumptions, for example, perfect markets and perfect knowledge in the markets, but such assumptions are basic to the model of the thesis. Solow's neo-classical growth theory has been able to practically give details on two-thirds of countries economic growth. Finally, according to Neo-classical growth model, impact of fiscal policy on steady economic growth is temporary and not permanent (Chamley, 1986; and Judd, 1985).



### **Keynesian Growth Theory**

The Keynesian model indicates that during recession a policy of budgetary expansion should be undertaken to increase the aggregate demand in the economy thus boosting the Gross Domestic Product (GDP). This is with a view that increases in government spending leads to increased employment in public sector and firms in the business sector. The employment rises, income and profits of the firm increase, and this would result in the firms hiring more workers to produce the goods and services needed by the government.

In consonance to the above, the work of (Barro, 1990a) has stipulated a new perspective in which the investigation of the impact of fiscal budgetary expansion through public expenditure can enhance output growth. The authors employed a Cobb-Douglas model and found that government activity influences the direction of economic growth (Barro & Sala-i-Martin, 1992). However, one of the greatest limitations of Keynesian theory is that it fails to adequately consider the problem of inflation which might be brought about by the increase in government spending.

### **The Peacock and Wiseman Theory**

The theory dealing with growth of public expenditure was advanced by Peacock and Wiseman in their study of public expenditure in the UK for the period 1890 – 1955. It's based on the premise that; the populace is naturally tax averse while the government on the other hand has an inherent appetite for expenditure. During times of shocks like calamities and war, the government would expeditiously increase the public expenditure, this necessitates moving taxes upwards, the researchers argued that the populace (tax payers) would allow and condone such an increase in tax. The scenario is referred to as

displacement effect, though it's meant to be a short-term phenomenon, it normally assumes a long-term trend (Peacock & Wiseman, 1961).

Most economic theories do not directly articulate how the exchange-rate regime and particularly the exchange-rate peg affects growth. Rather, the debate normally focuses on its bearing on investment and international trade, basically exports. Nonetheless, (Levy-Yeyati & Sturzenegger, 2001) expansively conducted a survey on how exchange-rate regime affects growth. They opined that there is a connection between exchange rate systems and economic growth, but the sign of the impact is unclear. Supporters of Exchange Rate Targeting strategy typically stress that by the reduced policy uncertainty and lowered interest-rates unpredictability, this approach stimulates an environment which is conducive to growth. Conversely, an exchange rate target does not offer an adjustment mechanism in periods of shocks, thus inspiring protectionist behaviour, distortion in prices and hence misallocation of resources in the economy.

McKinnon and Schnabl (2003) arguing in the same line stated that before the Asian crisis of 1997/98, the stability of the exchange-rate against the US dollar was a major contributory factor to a fall in inflation and the sound fiscal position. The ensuing unwavering anticipations then promoted investment and stimulated long-term growth, which was then referred to as the "East Asian miracle".

Friedman (1966), explains that flexible rates serve as absorbers of external shocks; in case of a rigorous exchange-rate target, the adjustment is directed through the change in the relative prices. However, the adjustment is sluggish in a world of Keynesian prices and this creates an extreme burden in

the economy and eventually harms growth. In addition, under perfect capital mobility, interest rates variations brings high costs to the economy, in an attempt to shield a peg when the currency is under attack.

In sharp contrast to those views, Gylfason (2000) expounds that the macro-stability enforced by pegging also upholds foreign trade, thus “stimulating economic efficiency and growth over the long haul and restraining inflation, which is also good for growth” (p.176). Higher output expansion may occur in the medium and long term by supporting greater openness to international trade as a result of fixing exchange rate. moreover, the international trade openness may spur growth by easing technology transfer, thus sustaining the growth in productivity, and which in turn is boosted by promoting greater openness (Martin-Moreno et al., 2001).

According to De Grauwe and Schnabl (2004), two important factors work in favour of a peg to bring about higher output growth: the first is the elimination of exchange-rate risk which fuels international trade and international division of labour; the second is that a credible fix of exchange rate stimulates certainty, as argued earlier, and this lowers the country risk-premium entrenched in the interest rate. Low interest rates will in turn stimulate consumption, investment and growth.

Ghosh, Gulde, Ostry, and Wolf (1997); Garofalo (2005) and Collins (1996) all studied the link between the peg exchange rate and economic growth. Gosh et al, (1997) explained that a peg boosts investment, but a float enhances faster growth of productivity. Reverting to the Cobb-Douglas production function and precisely to the Solow model of growth, output growth could be enhanced if one of the factors of production (labour and capital) or the total

factor productivity, or all three increases. In that case, if a considerable substantiation exists about the fact that an exchange-rate target stimulates investment, then the lower productivity under a peg must be linked to slower output growth. Moreover, the spurred productivity growth under more flexible exchange rate regime is partly caused by the faster growth of international trade.

### **Empirical Literature Review**

A number of researches have examined the effect of real effective exchange rate on economic growth in a number of countries. Below, we present some empirical works relating to our study though results varied from one research to another.

Toulaboe (2016)) conducted an investigation into the link between real exchange rate misalignment and the mean growth rate of per capita (GDP), using data from 33 developing countries. He concluded that average real exchange rate misalignments have a negative correlation with economic growth. Hence, unsuitable exchange rate policies could lead to poor economic performance that many developing countries have experienced.

Basirat *et al.*(2014) demonstrated that in countries with lower level development of the financial market the effect of exchange rate fluctuation on economic growth is negative but it can be positive in countries with upper level financial market development. They used a five-year panel data from a sample of 69 countries and adopted a panel data model, to examine the impact of exchange rate fluctuations on economic growth considering the level of financial markets development.

Seifipour (2010) used panel data on 85 countries to analyse the effect of financial development on economic growth. The empirical evidence portray

that countries with high-income which are financially more advanced in money and investment market, strengthening the financial development stimulates economic growth. With regards to countries with low and intermediate income and low level of financial development in money and investment market strengthening financial development in money market has negative consequence but enhancing financial development in investment market has positive effect on economic growth.

Maingi (2010) while conducting study on the impact of government expenditure on economic growth in Kenya reported that improved government expenditure on areas such as physical infrastructure development and in education enhance economic growth while areas such as foreign debts servicing, government consumption and expenditure on public order and security, salaries and allowances were growth retarding.

Massa and Macias (2009) used a panel cointegration analysis to examine the long-run relationship between economic growth and four different types of private capital inflows (cross-border, bank lending, foreign direct investment (FDI), bonds flow, and portfolio equity flows) on a sample of selected sub-Saharan African countries over the period 1980-2007. Their results showed that FDI and cross-border bank lending exert a significant and positive impact on sub-Saharan Africa's growth, whereas portfolio equity flows and bonds flows had no growth impact. Their estimates suggested that a drop by 10% in FDI inflows may lead to a 0.5% decrease of income per capita in sub-Saharan Africa, and a 10% decrease in cross-border bank lending may reduce growth by up to 0.7%. Therefore, the global financial crisis was likely to have an important

effect on sub-Saharan Africa's growth through the private capital inflows channel (half a percent of growth is worth around \$5 billion in lost output).

Jerono (2009) conducted a study on the impact of government spending on economic growth in Kenya and found that though expenditure on education had a positive relationship with economic growth; it does not spur any significant change to growth. Given the reason that the expansion of education is higher than that of job growth in Kenya and there are relatively few job opportunities outside government for secondary and university graduates hence education have been blamed for producing surplus graduates, and long waits for government jobs. The study also asserted that a mere expenditure growth does not necessarily bring potential to spur growth; growth on the GDP was dependent on other factor too such as political will efficiency and also prioritization on the key components of the economy.

Aghion, Bacchetta, Ranciere, and Rogoff (2009) based on data for a set of 83 countries between the period 1960-2000 studied how exchange rates and productivity growth change with respect to the role of financial development. Their findings revealed that real exchange rates changes have a significant effect on growth of productivity in the long-term. But, this effect indirectly depends strongly on the country's level of financial development. They further explained that in countries with relatively low financial development, changes in exchange rate is likely to retard growth, but for countries with advanced financial development exchange rate change has no significant effect on growth.

Rodrik (2008)) in his study on real exchange rate misalignment and growth, used time series data for 184 countries from 1950 to 2004 for his estimation. The author developed an index to measure the degree of real

exchange rate undervaluation adjusted for the Balassa-Samuelson effect using Real Per Capita GDP (RGDPCH - Penn World Table) data. His main finding was that, countries with more undervalued real exchange rates have higher economic growth. He further found that the effect is linear and similar for both under and overvaluation, indicating that an overvalued real exchange rate harms growth while an undervalued rate fosters growth. He also explained that developing countries are usually characterized by institutional fragilities and market failures. Due to this the magnitude and statistical significance of the estimated coefficient for real exchange rate undervaluation is higher.

In analysing the impact of exchange rate stability on economic growth, Körner and Schnabel (2011) used data in 41 economies of the European Union. The major findings of his study reveal that the major channels through exchange rate stability can be transmitted to economic growth is through introduction of international trade, international capital flows and ensuring macroeconomic stability. as major channels for transmission of exchange rate stability. The study uses panel data approach to measure the negative effect of exchange rate fluctuations on economic growth.

Eichengreen (2008) developed a historical literature review on real exchange rate and economic growth. His focus was on probable ways through which the real exchange rate might have an influence on long-run economic growth. The author advocates for a more depreciated real exchange rate as long as this is not allied to extreme exchange rate volatility. The blend of a depreciation in real exchange rate and low volatility is regarded as a positive combination for developing and emerging economies. This is because a more vibrant export sector is usually an recipe for the process of attaining higher and

sustained economic growth rates. Therefore, one of the major policy recommendations is that such countries should maintain a very competitive exchange rate level with lesser volatility since it is important for kick-starting growth built on development experiences, such as the high growth East Asian economies.

Khungwa (2007) analysed the determinants of economic growth in Malawi. Her research work employed a growth framework that emanated from Cobb-Douglas production function. She used time series data from the period 1970 to 2003. She found out that terms of trade, openness, and human capital all had a significant effect on economic growth in Malawi. She suggested that in order to boost future economic growth in Malawi, policies and strategies that are to be implemented should aim at increasing human capital and creating a conducive macroeconomic environment. Above all, the government should continue to pursue stable macroeconomic policy.

Gala and Lucinda (2006) using panel data from a set of 58 countries spanning from 1960 to 1999, developed a dynamic analysis employing Difference and System techniques. With a measure of real exchange rate misalignment incorporating the Balassa-Samuelson effect and other control variables for the growth regression such as physical and human capital, institutional environment, inflation, the output gap and terms of trade shocks. The main findings from the study supports the argument that a real depreciated exchange rate is associated with higher growth and vice versa.

Oteng-Abayie and Frimpong (2006) examined the impact of FDI inflows and trade on economic growth in Ghana for the period 1970 – 2002. The method of analysis that was used is the bound testing procedure. They



found out that labour, capital investment and trade are important in explaining Ghana's economic growth in the long run.

The work developed by Aguirre and Calderón (2006) tried to measure exchange rate misalignment and its impact on growth. Their work was based on the residuals from a fixed effect regression and they use dynamic panel and cointegration analysis. They used data from 60 countries spanning 1965 to 2003. Their finding showed empirical evidence that the real exchange rate misalignment effect on growth is non-linear, implying that a higher depreciation of real exchange rate has a negative impact on growth but when it is small or moderate it can be growth enhancing.

In contrast, recent literature has also raised concerns about the deleterious effects of flows of capital on the recipient countries. That is, some theories predict that foreign direct investment in the presence of pre-existing trade, price, financial and other distortions will hurt resource allocation and slow down economic growth in any economy (Papanek, 1973; Cohen & Soto, 2007). Specifically, the negative effect of FDI on growth might be due to; repatriation of profit, enclave investment, sweatshop employment, income inequality and high external dependency (Ranis, Stewart, & Ramirez, 2000). Some empirical studies have found a negative relation of FDI on economic growth in the receiving economies (Aitken & Harrison, 1999; Carkovic & Levine, 2005; Akinlo, 2004)

Dobronogov and Iqbal (2005) investigated the key determinants of economic growth in Egypt by combining the growth diagnostics framework with econometric time series analysis. They argued that trends in government consumption, private sector credit and Organization of Economic Cooperation

and Development (OECD). GDP among other major growth determinants in Egypt since 1986. They also found out that the inefficiency of the financial intermediation was an important constraint on growth. They concluded that an improvement in the quality of financial intermediation may bring a sustained growth dividend to Egypt in the long-run.

Foreign Direct Investment (measured as FDI/GDP, the share of manufacturing in merchandise export) has recently played a crucial role of internationalizing economic activity and it is a primary source of technology transfer and economic growth. This major role is stressed in several models of endogenous growth theory (Barro, 1990; Barro & Sala-i-Martin, 1992) However, according to the neoclassical models, FDI can only affect growth in the short-run because of diminishing returns of capital in the long-run. The empirical literature examining the impact of FDI on growth has provided more-or-less consistent findings affirming a significant positive link between FDI and economic growth (Balasubramanyam, Salisu, & Sapsford, 1999; Asheghian, 2004; and Vu, Gangnes, & Noy, 2008)

Aryeetey and Kanbur (2005) analysed Ghana's GDP growth for the period 1961-1996. The method of analysis used by the study was the growth accounting method by Solow. They found out that the only significant variable among others was the economic liberalization dummy variable, which had a positive impact of GDP growth. They also found out that growth in labour and capital did not contribute significantly to GDP growth. They finally suggested that total factor productivity played a more important role in the observed pattern of GDP, and that TFP was affected by economic regimes. This meant that liberal regimes positively contributed to TFP and growth. Research at

ISSER has also sought to explain the source of economic growth in Ghana and found similar results.

Sentsho (2000) did a study on Export Revenues as Determinants of Economic Growth: Evidence from Botswana. The main objective of the paper was to assess whether export revenues derived from an ‘enclave sector’ like the case of mining in Botswana, can lead to significant and positive economic growth in a country. The paper used both statistical data and time series econometric analysis to test the causal relationship between exports and economic growth. The results indicated that primary export revenues have led to positive and significant economic growth in Botswana. He concluded that his results should be seen as a transition strategy towards long term economic growth based on manufactures and services as the main engines of growth.

Adams (2003) looked at the impact of Intellectual Property Rights (IPRs) on economic growth for a cross – section of 34 Sub-Saharan (SSA) countries from 1985 to 2003. Using three different estimation techniques (Ordinary Least Squares, seemingly unrelated regressions, and Fixed effects), the results of the study indicated that: (1) strengthening IPRs had a negative effect on economic growth; (2) domestic investment is positively correlated with economic growth; and (3) human capital was an important determinant of economic growth. The findings of the study suggested that a “one size fits all” approach to harmonizing IPRs in developing countries might not produce the expected benefits for Sub-Saharan African countries.

Baily (2003) of the Institute of International Economics conducted a research on “sources of economic growth in the Organization for Economic Cooperation and Development (OECD) countries”. The methodology

employed was aggregate regression analysis with particular emphasis on the ways in which policies affect outcomes. Baily (2003) found out that investment in physical and human capital, sound macroeconomic policies, government spending, research and development by the business sector, financial market, and international trade were all important factors to economic growth in OECDs. On the other hand, Baily (2003) found out that a larger sized government spending, direct taxes and research and development by the public sector all contributed negatively to economic growth.

Dewan and Hussein (2001) examined the determinants of economic growth in developing countries. They used a sample of 41 middle income developing countries to develop an empirical model for growth. Both cross country and time variation specifics were used in an attempt to explain the determinants for sustained economic growth in developing countries. They found out that, apart from the natural rate of growth of labour force, investment in both physical and human capital, as well as low inflation and open trade policies (to encourage efficiency through assessing better foreign technologies) were necessary for economic growth. They again found out that, since many of the developing countries have large agricultural sector, adverse supply shocks were found to have a negative impact on growth.

There is a substantial and growing empirical literature investigating the relationship between openness and growth. On one hand, a large part of the literature found that economies that are more open to trade and capital flows have higher GDP per capita and grew faster (Frankel & Romer, 1999; (Sukar, Ramakrishna, & Hassan, 2002; Yanikkaya, 2003) There are other studies, however, that question the wisdom of trade openness. Rodriguez and Rodrik

(2000), for example, present a critical view of the link between open-trade policy and economic growth. Their analysis shows that the relationship between average tariff rates and economic growth is only slightly negative and nowhere near statistical significance. Also, competition arising from openness to trade may discourage innovation by making investment in research and development less profitable (Harrison, 1996). Finally, openness to trade does not enhance economic growth in poor countries (Harrison, 1996).

Chen and Feng (2000) used a statistical analysis of data on twenty-nine (29) provinces, municipalities and autonomous regions for the period 1978-1989. They found out that private and semi-private enterprise, higher education and international trade all led to an increase in economic growth in China. They also found out that high fertility, high inflation and the presence of state-owned enterprises reduced growth rates among the provinces. In the final analysis, their evidence indicated that the convergence hypothesis holds in China

Ojo and Oshioyokoya (1995) studied the determinants of long term growth in a cross section of African countries over the period 1970 – 1991. As is usual in much of the growth regressions literature, the authors included variables such as initial per capita income, investment, population growth, macroeconomic policy (inflation and exchange rates), external factors (export growth, external debt, and terms of trade), political environment, and human capital development. The paper found that, on average the most significant variables influencing long-term growth in the sample of African countries over the study period were-investment, external debt, population growth, and the macroeconomic environment.

Ghura and Hadjimichael (1996) investigated long run growth in sub-Saharan Africa over the period 1981 – 1992. Using feasible generalized least squares techniques on a panel of 29 sub-Saharan African countries; the authors found support for conditional convergence, even though the absolute convergence was rejected on the control variables, the authors found that both private and public investment had a positive and significant growth.

Easterly and Levine (1997) contributed some valuable empirical perspective on the growth tragedy in Sub-Saharan African in particular. The paper investigated both the direct and indirect effect of ethnic diversity on economic growth. The paper made some interesting observations first, it was reported that ethnicity had a significant negative direct effect on growth; second, it was found that high levels of ethnic diversity were strongly linked to high black market premiums, political instability, poor financial development, low provision of infrastructure and low levels of education.

Sachs and Warner (1997) analyzed the sources of slow growth in developing countries with a particular emphasis on sub-Saharan Africa over the period 1965 – 1990. The authors included a wide range of explanatory variables such as openness, geography, climate, natural resources, institutional quality, inflation, life expectancy, neighborhood effects, ethnic fractionalization and population growth. They found that natural resource dependence, tropical climate, and limited access to the sea were the key sources of economic growth in sub-Saharan Africa.

Hsing and Hsieh (2009) examined the determinants of the growth rate of real output for China with an emphasis on institutional, social and political changes and development. They found out that growth rate of real output was

positively correlated with employment to real output ratio, investment/output ratio, human capital, but negatively associated with the great leap forward, and cultural revolution. In addition, they found out that the coefficient of deficit financing, the openness of the economy and dummy variables for economic and agricultural reforms were insignificant.

### **Chapter Summary**

This chapter reviewed relevant literature putting the study into perspective. Specifically, types of exchange rate, exchange rate regimes, among others were elaborated. The empirical literature made it clear the effects of real exchange rate and the control variables on economic growth are illusive both at country and cross-country level, one reason this study is important.

## CHAPTER THREE

### RESEARCH METHODS

#### **Introduction**

The methods used for this study was discussed in this chapter. It provides a comprehensive description of the research design, theoretical and empirical models and a detailed explanation of variables and estimation techniques used for the study.

#### **Research Design and Approach**

Quantitative approach was adopted. Quantitative simply means deriving meaning from analyzing numerical values by using statistics and diagrams. It was also defined by Burns and Grove (1993) as a formal, systematic and objective process to define and test relationships and also to analyze the cause and effect interactions among variables. Quantitative research according to Smith (1988), constitutes measuring events and performing the statistical analysis of a numerical body.

The positivist paradigm assumed that, an objective truth exists in this world that can be scientifically measured and explained. The Quantitative paradigm concerned itself mainly with the fact that a measurement that clearly predict a cause and effect is reliable, valid, and generalizable (Cassell & Symon, 1994).

#### **Theoretical Model Specification**

The theoretical model specification for this study relied on the growth model by Solow (1956) The neoclassical growth model is based on a large number of contemporary theoretical and empirical studies conducted on economic growth. The model was extensively used because it hinges on the



essential role it plays in bringing together and incorporating a number of studies in public finance macro and international economics. This model as a result, enjoys a comprehensive usage in aggregate economic analysis.

According to the postulates of the neo-classical Solow model a combination of two elements, namely labour and capital resulted in economic growth. The question then arises as to what percentage of the output growth can be attributed to other factors of production with exception of capital and labour. In order to answer this question, Solow break down the growth in output into three components, each identified as contribution of one factor of production, labour, capital and total factor productivity. This type of measurement of total factor productivity is still often referred to as the Solow residual. The term residual is appropriate because the estimate present the part of measured GDP growth that is not accounted for by the weighted-average measured growth of the factors of production (capital and labour).

To account for this, Solow used the Cobb-Douglas production function and started from his simple growth equation. For simplicity, the equation can be written as:

$$Y = f(A, L, K) \quad (1.)$$

Where A = total factor productivity which allows for augmentation and for the purpose of this work, it comprises Real Exchange Rate, Inflation, GDP Per Capita, Foreign Direct Investment, And Industry share of GDP.

L = Labour force

K = Capital stock

Y= National Income or GDP

Using Cobb-Douglas production function, we cast equation (1) in time series form as stated the following equation:

$$Y_t = A_t K_t^\alpha L_t^\delta \quad (2)$$

Where the Total Factor Productivity,  $A_t$ , captures all the control variables at time  $t$ . According to Solow (1956) it is convenient to use the Cobb-Douglas production function because it exhibits constant returns to scale. The key point to note here is that the variable is not constant but varies with different production functions based on the factors being studied. This production function is widely used in literature including Feder (1983); Fosu (1990); and Mansouri (2005); Aside the traditional input of production-labour and capital, the model assumes other conventional inputs.

### **Empirical Model Specification**

Our empirical model closely follows the analytical framework depicting the relationship between aggregate output and the real effective exchange rate, controlling for other variables. However, a large number of empirical studies, for instance, Rhodd *et al.*(1993), and Upadhyaya and Upadhyay (1999) also include respective countries' external terms of trade (TT). For a small open economy TT is truly exogenous and when not controlled for explicitly in the experiment, some of its impact could be transmitted through the indicator of external competitiveness. The real exchange rate is often considered to be the terms of trade of the country. However, for many countries, the movements in their terms of trade and real effective exchange rate are quite different. The link between economic growth and the explanatory variables can be expressed as follows:  $GDPG=f(EXHH, GOV, LLF, OPN, GFCE, FDI)$ .

The empirical model specification based on a logarithmic transformation of the variables above can be written as:

$$\ln GDPG = \beta_0 + \beta_1 \ln EXHH + \beta_2 \ln GOV + \beta_3 \ln OPN + \beta_4 \ln GFCF + \beta_5 FDI + \beta_6 \ln LLF + u_t \quad (3)$$

where,  $\ln$  denotes natural logarithm, time is represented by subscript  $t$ , GDPG, EXHH, GOV, GFCF, OPN, LLF and FDI represent real Gross Domestic Product Growth, real effective exchange rate, government expenditure, trade openness, labour force, gross fixed capital formation, foreign direct investment respectively while  $u$  stands for the error term. The signs of  $\beta_1, \beta_3, \beta_4, \beta_5$  and  $\beta_6$  are expected to be positive while  $\beta_2$  is expected to have a negative sign. The coefficient of  $\beta_1$  which captures the effect of real exchange rate devaluation on real output growth is the primary interest of this study and its sign cannot also be predetermined.

### **Justification of the Inclusion of the Variables**

#### **Gross Domestic Product Growth (GDPG)**

GDP Growth is a sustained improvement in aggregate output or Gross Domestic Product (GDP) over time. The rate of change of GDP was used as proxy for economic growth. This ideally measures how the real GDP of the Ghana changes and therefore it gives a much clearer picture of how the economy grows over time. The study used INF to deflate the Gross Domestic Product as a measure of economic growth and has been widely used by other researchers. In particular, Kargbo (2012) used GDP deflated by inflation as a measure of economic growth for Sierra Leone. This study employs real gross domestic product as a measure of economic growth and is measured by dividing nominal GDP by the consumer price index.

Erbaykal and Okuyan (2008) also used real GDP growth as a measure of economic growth for Turkey by deflating nominal GDP series with consumer price index based on 1987=100. Ahmed and Mortaza (2005) used GDP divided by the level of inflation as a measure of economic growth in examining the relationship between inflation and economic growth in Bangladesh. The data for the variable will be sourced from the 2017 edition of the WDI.

### **Real Effective Exchange Rate (EXHH)**

Real Exchange rate is the value of one currency in terms of the other. Unstable exchange rate has a consequence on the growth of an economy because it creates room for speculation, makes planning or forecasting difficult and breed economic instability. Increasing real exchange rate (Ghana Cedi Appreciation) for instance, makes domestic goods expensive in the eyes of the world and hence reducing export. It also makes import cheaper since importers require less of the amount in domestic currency (Ghana Cedi) they initially used to exchange for a unit of foreign currency (dollar). These results affect aggregate output (GDP) negatively and subsequently dampens economic growth.

### **Gross Fixed Capital Formation (GFCF)**

Gross fixed capital formation (K) includes plants, machinery and equipment. It also includes the construction of roads, railways, and others such as schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. The variable, gross fixed capital formation, is used as a proxy for capital. Gross fixed capital formation as a proxy for capital has been used in several other studies such as Aryeetey and Fosu (2003), Keran *et al*, (1971) and Mansouri (2005) who argue for its positive effect on real GDP growth.

The higher the rate of investment, the higher the growth rate of the economy, all things being equal, hence the variable (K) is expected to be positive coefficient. This is in line with both the neoclassical and endogenous growth predictions. The data for the variable will be sourced from the 2017 edition of the WDI.

### **Government Expenditure (GOV)**

The ratio of government expenditure to GDP (*GOV*) variable enters the model as a policy variable and also to complete the components of the GDP. Keran *et al* (1971) stated that changes in government spending affects total spending, corporate earnings and thereby affecting share prices. Government expenditure, according to the Keynesian proposition is expected to raise economic growth. It could, however, reduce economic growth because of the crowding out effect on private investment and the inflationary pressures Allen *et al* (2000).

According to the Keynesian proposition, an increase in government expenditure, if bond financed, raises aggregate demand, which leads to an increasing demand for cash balance. Government expenditure is expected to propel economic growth without a crowding out effect on the private sector.

This study follows the works of Easterly and Rebelo (1993) and Malla, (1997) but it would be used as a policy variable for economic growth in this study since an increase in government expenditure especially in productive activities like road construction, provision of electricity can boost economic growth. Nonetheless, given that all other things remaining constant and

following Keynesian proposition, we expect a positive coefficient. The data for government expenditure will be sourced from the 2017 edition of the WDI.

### **Inflation (INF)**

Inflation is used to measure the average change over time in the prices paid by consumers for a market of consumer goods and services. It is constructed using the prices of a sample of representative items whose prices are collected periodically. The annual percentage change in the INF is used as a measure of inflation. Inflation rate is a reflection of macroeconomic instability. A high rate of inflation is generally harmful to growth because it raises the cost of borrowing and thus lowers the rate of capital investment. However, at low levels of inflation, the likelihood of such a trade-off between inflation and growth is minimal.

Inflation is therefore used as an indicator to capture macroeconomic instability Asiedu and Lien (2004) and Asiedu (2006). It is expected that its coefficient will be negative (Stockman, 1981). The data for inflation will be sourced from the 2017 edition of the WDI

### **Labour Force (LLF)**

Labour force (labour force participation rate) is chosen instead of population growth because it denotes a proportion of the total population aged between fifteen (15) and sixty-five (65) years and is the active and productive population in the country. Solow (1956) and Swan (1956) advised that labour force should be included in an endogenous growth model because of its impact on the work force and this has been proven empirically in many researches that included labour force to be a good measure of economic growth.

Total labour force comprises people ages 15 and older who meet the International Labour Organization definition of the economically active population: all people who supply labour for the production of goods and services during a specified period. It includes both the employed and the unemployed. While national practices vary in the treatment of such groups as the armed forces and seasonal or part-time workers, in general the labour force includes the armed forces, the unemployed and first-time job-seekers, but excludes homemakers and other unpaid caregivers and workers in the informal sector. It is expected that its coefficient be positive (Ayibor, 2012). The data for labour force will be sourced from the 2016 edition of the WDI.

#### **Data Source and Data Analysis**

The data for this work were sourced from the 2017 edition of the databases of world bank (World Development Indicators). Due to significant differences between the magnitude of the variables, the natural logarithm forms were instead used to ensure that some of the coefficient were not pulled. Eviews 9.0 was the statistical and econometric package employed in all the regression analysis (unit root test, cointegration and impact analysis).

#### **Estimation Technique**

##### **Autoregressive Distributed Lag (ARDL) Model**

As already stated, equation (3) shows the assumed long-run equilibrium relationship. In order to establish and analyse the long-run relationships as well as the dynamic interactions among the various variables of interest empirically, the autoregressive distributed lag cointegration procedure developed by Pesaran and Pesaran (1997) was used. The basis for using the ARDL to estimate the model centred on the following reasons:

The ARDL cointegration procedure is comparatively more effective even in small sample data sizes as is the case in this study. This study covers the period 1984–2014 inclusive. Hence, the total observations for the study is 31 which is relatively small.

The ARDL enables the cointegration to be estimated by the Ordinary Least Square (OLS) technique once the lag of the model is known. This is however, not the case of other multivariate cointegration procedures such as the Johansen Cointegration Test developed by Johansen and Juselius (1990). This makes the ARDL procedure relatively simple.

The ARDL procedure does not demand pretesting of the variables included in the model for unit roots compared with other methods such as the Johansen approach. It is applicable regardless of whether the regressors in the model are purely  $I(0)$ , purely  $I(1)$  or mutually cointegrated.

### **Unit Root Test**

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

The study employed a variety of unit root tests. This was done to ensure reliable results of the test for stationarity due to the inherent individual



weaknesses of the various techniques. The study used both the PP and the ADF tests. These tests are similar except that they differ with respect to the way they correct for autocorrelation in the residuals. The PP nonparametric test generalizes the ADF procedure, allowing for less restrictive assumptions for the time series in question. The null hypothesis to be tested is that the variable under investigation has a unit root against the stationarity alternative. In each case, the lag-length is chosen using the Akaike Information Criteria (AIC) and Schwarz Information Criterion (SIC) for both the ADF and PP test. The sensitivity of ADF tests to lag selection renders the PP test an important additional tool for making inferences about unit roots. The basic formulation of the ADF is specified as follows:

$$X_t = \mu + \alpha X_{t-1} + \gamma t + \varepsilon_t \quad (4)$$

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

$$\Delta X_t = \mu + (1 - \alpha)X_{t-1} + \gamma t + \varepsilon_t \quad (5)$$

The t-test on the estimated coefficient of  $X_{t-1}$  provides the Dickey Fuller test for the presence of a unit-root. The Augmented Dickey Fuller (ADF) test is a modification of the Dickey Fuller test and involves augmenting the above equation by lagged values of the dependent variables. It is made to ensure that the error process in the estimating equation is residually uncorrelated, and also captures the possibility that  $X_t$  is characterized by a higher order autoregressive process. Although the DF methodology is often used for unit root tests, it suffers from a restrictive assumption that the errors are *i.i.d.* Therefore, representing  $(1 - \alpha)$  by  $\rho$  and controlling for serial correlation by adding lagged first differenced to equation (5) gives the ADF test of the form:

$$\Delta X_t = \mu + \rho X_{t-1} + \gamma t + \sum_{i=1}^{\rho} \phi_i \Delta X_{t-i} + \varepsilon_t \quad (6)$$

Where  $X_t$  denotes the series at time  $t$ ,  $\Delta$  is the first difference operator,  $\mu$ ,  $\gamma$ ,  $\phi$  are the parameters to be estimated and  $\varepsilon_t$  is the stochastic random disturbance term.

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

That is:

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

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

### **ARDL Technique and Bounds Testing Procedure**

The Autoregressive Distributed Lag (ARDL) Cointegration Test, otherwise called the Bounds Test developed by Pesaran, Shin, and Smith (2001) was used to test for the cointegration relationships among the series in the model. Two or more series are said to be cointegrated if each of the series taken individually is non-stationary with  $I(1)$ , while their linear combination are stationary with  $I(0)$ . In a multiple non-stationary time series, it is possible that there is more than one linear relationship to form a cointegration. This is called the cointegration rank. The study therefore applies the ARDL cointegration technique developed by Pesaran *et al* (2001) to the system of the six variables in the growth equation to investigate the existence or otherwise of long-run equilibrium relationships among the variables.

The ARDL Bounds testing procedure essentially involves three steps. The first step in the ARDL bounds testing approach is to estimate equation (9) by OLS in order to test for the existence or otherwise of a long-run relationship

among the variables. This is done by conducting an F-test for the joint significance of the coefficients of lagged levels of the variables.

The hypothesis would be:

$$H_0: \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = \theta_6 = \theta_7 = 0$$

$$H_1: \theta_1 \neq \theta_2 \neq \theta_3 \neq \theta_4 \neq \theta_5 \neq \theta_6 \neq \theta_7 \neq 0$$

The test which normalizes on Economic Growth (GDPG) is denoted by

$$F_{GDPG} (EXHH, GOV, OPN, FDI, GFCF, LLF)$$

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

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

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

$$\begin{aligned} \Delta \ln GDPG = & \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta \ln GDPG_{t-i} + \sum_{f=1}^{n^1} \beta_{2f} \ln EXHH_{t-f} + \\ & \sum_{g=1}^{n^2} \beta_{3g} \ln GOV_{t-g} + \sum_{k=1}^{n^3} \beta_{4k} \ln IND_{t-k} + \sum_{j=1}^{n^4} \beta_{5j} FDI_{t-1} + \\ & \sum_{r=1}^{n^5} \beta_{6r} \ln GFCF_{t-r} + \sum_{m=1}^n \beta_{7m} \Delta \ln LLF_{t-m} + \mu_t \end{aligned} \quad (10)$$

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

The third and the last step in the ARDL bound approach is to estimate an Error Correction Model (ECM) to capture the short-run dynamics of the system. The ECM generally provides the means of reconciling the short-run behaviour of an economic variable with its long-run behaviour.

The ECM is specified as follows:

$$\begin{aligned} \Delta \ln GDPG_t = & \gamma + \sum_{i=1}^p \beta_{1i} \Delta \ln GDPG_{t-i} + \sum_{f=1}^n \beta_{2f} \Delta \ln EXHH_{t-f} + \\ & \sum_{g=1}^n \beta_{3g} \Delta \ln OPN_{t-g} + \sum_{k=1}^n \beta_{4k} \Delta \ln GOV_{t-k} + \sum_{j=1}^n \beta_{5j} \Delta \ln GFCF_{t-j} + \\ & \sum_{r=1}^n \beta_{6r} \Delta FDI_{t-r} + \sum_{m=1}^n \beta_{7m} \Delta \ln LLF_{t-m} + \rho ECM_{t-1} + \mu_t \end{aligned} \quad (11)$$

From equation (11),  $\beta_i$  represent the short-run dynamics coefficients of the model's convergence to equilibrium.  $ECM_{t-1}$  is the Error Correction Model. The coefficient of the Error Correction Model,  $\rho$  measures the speed of adjustment to obtain equilibrium in the event of shocks to the system.

### Chapter Summary

This chapter developed and presented the methodological framework appropriate for conducting the study. The model was developed from the theoretical formulations of the Neoclassical (Solow) macroeconomic theories. Annual time-series data on GDP growth, real effective exchange rate, foreign Direct Investment, government expenditure, labour force, and gross domestic fixed capital formation, and trade openness from 1984 to 2014 was employed for the study. Stationarity test was conducted using ADF and PP tests. Moreover, the bounds testing approach to cointegration was used to determine the existence or otherwise of long run relationship between real exchange rate and economic growth.

## CHAPTER FOUR

### RESULTS AND DISCUSSION

#### Introduction

The estimation results of this study are presented in this chapter. The results of the descriptive statistics of the relevant variables, both Augmented Dickey-Fuller and Phillips-Perron unit root tests, Autoregressive Distributed Lag (ARDL) method to cointegration and Granger-causality test are presented and discussed. The results are analyzed in line with the various hypotheses of the study.

#### Descriptive statistics

The study computed the descriptive statistics of the relevant variables involved in the study. From Table 1, the variables have positive average values (means) with the exception of foreign direct investment. It can also be seen from Table 1 that, log of real exchange rate (LEXHH), log of capital stock (LGFCF), trade openness (LOPN) and log of foreign direct investment (LFDI) are negatively skewed implying that majority of the values are greater than their means. On the other hand, log of Gross Domestic Product Growth(LGDPG), log of government expenditure (LGOV) and log of labour force (LLF) are positively skewed implying that the majority of the values are less than their means. The minimal deviations of the variables from their means as indicated by the standard deviations which demonstrate that taking the logs of variables minimizes their variances.

**Table 1: Summary Statistics of the Variables**

	LGDPG	LGFCF	LLF	LOPN	LGOV	LEXHH	FDI
Mean	23.353	19.817	4.2647	2.2729	2.9579	2.31E-0	-0.1980
Median	23.307	19.858	4.2654	2.2985	2.8921	0.2586	0.0000
Maximum	24.235	24.115	4.3134	2.7850	4.0853	1.5538	2.1154
Minimum	22.638	14.432	4.2282	1.6094	2.1664	2.7225	-4.2795
Std. Dev.	0.4625	2.8690	0.0255	0.3215	0.5337	1.2100	0.9494
Skewness	0.3287	0.2200	0.1362	0.4716	0.2769	0.9126	-2.4543
Kurtosis	2.0982	1.9352	2.0154	2.4302	1.9836	2.8458	13.533
Jarque-Bera	1.6086	1.7144	1.3478	1.5684	1.7303	4.3345	174.45
Probability	0.4473	0.4243	0.5096	0.4564	0.4209	0.1144	0.0000
Sum	723.96	614.34	132.20	70.462	91.697	7.17E-0	-6.1385
SumSq. Dev.	6.4182	246.93	0.0196	3.1019	8.5467	43.929	27.043
Obs	31	31	31	31	31	31	31

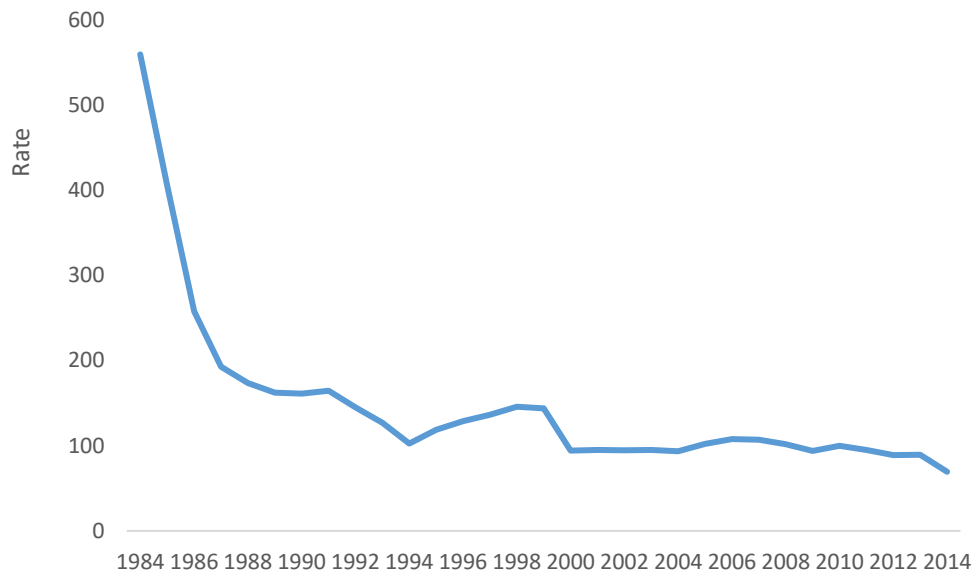
*Note: Std. Dev. represents Standard Deviation while Sum Sq. Dev. represents Sum of Squared Deviation while Obs is Observation.*

*Source: Author's Construct, Entsua-Mensah (2018)*

The structure of the data informed the researcher about the status of the variables under examination. Also, the Jarque-Bera statistic which shows the null hypothesis that all the series are drawn from a normally distributed random process cannot be rejected for LEXHH, LINF, LIND and LGPC implying that they are normally distributed. But the null hypothesis can be rejected at 5 percent and 1 percent levels of significance in the case of LGDPG and FDI respectively, and therefore the series are not normally distributed.

### Trend Analysis of Real Exchange Rate (1984 – 2014)

The figure below shows the trend of real effective exchange rate over the study period. It is clear that from 2000, the local cedi shows some recurrent appreciation and depreciation.



*Figure 1: Plot of The Trend of Real Effective Exchange Rate.  
Source: Author's Construct, Entsua-Mensah (2018)*

The local currency appreciated by 3% between August 2009 to March 2010, and as a consequence was worth US\$ 0.67 in April 2010. The Cedi has for now been very unstable. The beginning of January 2014 for instance saw the Ghana cedi worth US\$ 0.45 and by the close of September 2014, it was worth US\$ 0.31 representing about 44.65 percent depreciation. This fall in the value of the Ghanaian Cedi arguably led to a rise in consumer prices (inflation) from 13.8% in January 2014 to peg at 17% in December 2014. Economic growth dwindled as GDP growth fell to 8.8% in 2012 from 15.0% in 2011, and further fell in 2013 to 7.6% in 2013. In 2014, GDP growth rate fell much below the initial target of 7.1% to 4.2%. (Bank of Ghana Annual Report, 2009, 2010, 2011, 2013 & 2014).

### Unit Root Test Results

Although the bounds test (ARDL) approach to cointegration does not require the pretesting of the variables for unit roots, it is imperative to conduct this test to confirm that the variables are not integrated of an order higher than one. The purpose is to verify the absence or otherwise of  $I(2)$  variables to free the results from spurious regression. Therefore, the stationarity properties of the variables were determined at levels and first difference. There is the need to complement the estimated process with unit root test in order to ensure that some of the variables are not integrated of a higher order.

For this reason, a unit root test was conducted to ascertain the stationarity of the data before applying Autoregressive Distributed Lags approach to cointegration. As a result, the ADF and PP tests were applied to all the variables in levels and in first difference in order to formally establish their order of integration. To be certain of the order of integration of the variables, the test was conducted with intercept and time trend in the model. The optimal number of lags included in the test was based on automatic selection by Schwartz-Bayesian Criteria (SBC) and Akaike Information Criteria (AIC) criteria. The study used the P-values in the parenthesis to make the unit root decision, (that is, rejection or acceptance of the null hypothesis that the series contain unit root) which arrived at similar conclusion with the critical values.

The results of ADF and PP test for unit root with intercept and trend in the model for all the variables are presented in Table 2 and Table 3 respectively. The null hypothesis is that the series is non-stationary, or contains a unit root. The rejection of the null hypothesis is based on the MacKinnon (1996) critical values as well as the probability values.



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

Levels			First Difference		
Variables	ADF-Statistics	Lag	Variables	ADF-Statistics	Lag
LGDPG	-3.4710[0.0161]**	0	$\Delta$ LGDPG	-8.1773[0.0000]***	0 I(0)
LEXHH	1.9262[0.9997]	3	$\Delta$ LEXHH	-4.9840[0.0004]***	1 I(1)
LGFCF	-2.8139[0.2035]	1	$\Delta$ LGFCF	-5.5673[0.0005]***	1 I(1)
LOPN	-1.4676[0.8176]	1	$\Delta$ LOPN	-3.4480[0.0645]*	0 I(1)
LLF	-2.9787[0.1549]	0	$\Delta$ LLF	-1.6791[0.0875]*	1 I(1)
LGOV	-4.1927[0.0127]**	0	$\Delta$ LGOV	-4.4453[0.0082]***	3 I(0)
LFDI	-3.3618[0.0207]**	0	$\Delta$ LFDI	-6.4517[0.0000]***	0 I(0)

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

Levels			First Difference		
Variables	PP-Statistics	BW	Variables	PP-Statistics	BW
LGDPG	-3.5216[0.0143]**	2	$\Delta$ LGDPG	-9.5220[0.0000]***	6 I(0)
LEXHH	1.5994[0.9992]	18	$\Delta$ LEXHH	-4.7648[0.0007]***	27 I(1)
LOPN	-1.3894[0.8434]	3	$\Delta$ LOPN	-3.5787[0.0495]**	3 I(1)
LGOV	-4.0251[0.0186]**	11	$\Delta$ LGOV	-4.4453[0.0082]***	28 I(0)
LGFCF	-2.7136[0.2385]	3	$\Delta$ LGFCF	-10.9834[0.0000]***	8 I(1)
LLF	-1.6236[0.7593]	0	$\Delta$ LLF	-1.6791[0.0965]*	2 I(1)
LFDI	-3.3973[0.0191]**	1	$\Delta$ LFDI	-9.8097[0.0000]***	10 I(1)

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

Source: Author's Construct, Entsua-Mensah (2018)

From the unit root test results in Table 2, the null hypothesis of the presence of unit root for some of the variables (LEXHH, LGFCF, LOPN, LLF) in their levels cannot be rejected since the P-values of the ADF statistics are not statistically significant at any of the three conventional levels of significance with the exception of log of government expenditure, log of GDP growth, and

log of foreign direct investment of which were stationary at 5 percent significant levels. However, at first difference, the variables become stationary. This is because the null hypothesis of the presence of unit root (non-stationary) is rejected at 1 percent significant levels for all the estimates except log of labour force (LLF) and trade openness (LOPN) which are stationary at 5 percent.

The PP test results for the presence of unit root with intercept and time trend in the model for all the variables are presented in Table 3. From the unit root test results in Table 3, the null hypothesis of the presence of unit root for the variables in their levels cannot be rejected since the P-values of the PP statistics are not statistically significant at any of the three conventional levels of significance with the exception of log of GDP Growth, log of government expenditure, and log of foreign direct investment which were stationary at 5 percent significant levels. However, at first difference, the variables become stationary. This is because the null hypothesis of the presence of unit root (non-stationary) is rejected at 1 percent significant levels for all the estimates but log of trade openness and log of labour force which were significant at 5 percent and 10 percent respectively. The PP unit root test results in Table 3 are in line with the ADF test in Table 2, suggesting that most of the variables are integrated of order one,  $I(1)$ , when intercept and time trend are in the model.

It is therefore clear from the unit root results discussed above that all the variables are integrated of order zero,  $I(0)$ , or order one,  $I(1)$ . Since the test results have confirmed the absence of  $I(2)$  variables, the ARDL methodology was used for estimation.

### **Cointegration Analysis**

Since the main objective of this study is to establish how real effective exchange rate is related to economic growth, it is essential to test for the existence of long-run equilibrium relationship between these two variables within the framework of the bounds testing approach to cointegration. The study employs an annual data, and hence uses a lag length of 2 for annual data in the bounds test.

According to Pesaran, Shin and Smith (1999) a maximum of two lags can be used for annual data in the bounds testing to cointegration. An F-test for the joint significance of the coefficients of lagged levels of the variables was conducted, after the lag length was ascertained. In this regard, each variable in the model is considered as a dependent variable and a regression is run on the other variables. For instance, LGDPG is taken as the dependent variable and it is regressed on the other variables. After that another variable like inflation is taken as a dependent variable and regressed on all the other variables. This exercise is conducted for all the variables in the model. After this action is taken the number of regressions estimated would equate to the variables in the model.

According to Pesaran and Pesaran (1997) “this OLS regression in the first difference are of no direct interest” to the bounds cointegration test. What is important is the F-statistics values of all the regressions when each of the variables is normalized on the other. The joint null hypothesis that the coefficients of the lagged levels are zero is tested by the F-statistics. In order words, they are not related in the long run. The essence of the F-test is to determine whether there exist a long run relationship of cointegration among the variables or not. The results of the computed F-statistics when LGDPG is

normalized (that is, considered as dependent variable) in the ARDL-OLS regression are presented in Table 5.

From Table 4, the F-statistics that the joint null hypothesis of lagged level variables (i.e. variable addition test) of the coefficients is zero is rejected at 5 percent significance level. Further, since the calculated F-statistics for  $F_{\text{LGDPG}}(\cdot) = 13.6492$  exceeds the upper bound of the critical value of band (4.150), the null hypothesis of no cointegration (i.e. long run relationship) between economic growth and its determinant is rejected.

**Table 4: Bounds test results for cointegration**

Critical Value Bound of the F-statistic: intercept and no trend (case II)						
K	90% Level		95% Level		99% Level	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
6	2.080	3.000	2.390	3.730	3.060	4.150

Calculated F-Statistics: 13.6492\*\*\*

$F_{\text{LGDPG}}$  (LGDPG, LEXHH, LGFCF, LGOV, LGFCF, LFDI, LOPN)

Source: Author's Construct, *Entsua-Mensah (2018)*

This result shows a unique cointegration relationship among the variables in Ghana's economic growth model. It therefore means that all the determinants of economic growth can be treated as the "long-run forcing" variables for the explanation of economic growth in Ghana. Since this study is based on growth theory,  $\text{LGDPG}_t$  is used as the dependent variable. Therefore, there is existence of cointegration among the variables in the growth equation and hence we therefore proceed with the growth equation.

**Long-run results (LGDPG is dependent variable)**

Table 5 presents results of the long run estimates based on the Schwartz Bayesian criteria (SBC). The selected ARDL (1, 2, 1, 2, 2, 2, 2) passes the standard diagnostic test (serial correlation, functional form, normality and

heteroscedasticity) as can be seen beneath Table 5. The coefficients indicate the long run elasticities.

**Table 5: Estimated Long Run Coefficients using the ARDL Approach**

ARDL (1, 1, 0, 2, 1, 0, 2) selected based on SBC Dependent Variable: LGDPG

Variable	Coefficient	Std. Error	T-Ratio	Prob.
LGFCF	0.1764***	0.0120	14.672	0.0000
LLF	3.6540***	0.6042	6.0469	0.0001
LOPN	-0.4889***	0.0639	-7.6426	0.0000
LGOV	-0.3535**	0.1402	-2.5207	0.0303
LEXHH	-0.8716***	0.1660	-5.2485	0.0004
LFDI	-0.2044**	0.0677	-3.0156	0.0130
CONS	5.5240*	2.6269	2.1028	0.0618

*Note: \*\*\*, \*\*, \* imply significance at the 1, 5, and 10 percent levels respectively.*

*Source: Author's Construct, Entsua-Mensah (2018)*

From the results, the coefficient of trade openness is statistically significant at 1 percent, indicating that if the country were to open up to trade by 1 percent, economic growth will decrease by approximately 0.5 percent in the long run. According to economic theory, trade openness should rather induce economic growth by enhancing capital formation and efficiency, and by increasing the supply of scarce resources.

For Ghana, the results obtained suggests that the trade openness policy adopted since the structural reforms in the 1986 in Ghana has been detrimental to growth. This seem not to support the notion that emphasizes the fact that trade openness enhances competition and efficiency as well as transfer of technology and knowledge and hence enhancing growth. The results is in line with the findings of Ali and Abdullah (2015) in their study 'Impact of Trade Openness on the Economic Growth of Pakistan: 1980-2010' and Githanga (2015) for

Kenya. The findings by Ali and Abdullah (2015) showed a negative and statistically significant long-run relationship between trade openness and economic growth for Pakistan. Githanga (2015) on the other hand also found a negative and statistically significant long-run relationship between trade openness and economic growth for Kenya implying that trade openness is growth hampering in the long-run in Kenya.

The results obtained in this study in the long run does not absolutely resolve the conflicting results in the extent literature but contribute to the controversy in the literature by aligning itself with those studies such as Ayibor (2012) and Nduka, Chukwu, Ugbor, and Nwakaire (2013) which believe that trade openness positively affects economic growth. Moreover, (Nduka et al., 2013), and Hamad, Mtengwa, and Babiker (2014) also found a positive impact of trade openness on economic growth.

From the results, the coefficient of real effective exchange rate is statistically significant at 1 percent, indicating that if the country were to experience real exchange rate depreciation by 1 percent, economic growth will decrease by approximately 0.9 percent in the long run. The estimate of real effective exchange rate in is in line with the first objective of the study which is to investigate the long run relationship between real effective exchange rate and economic growth. The null hypothesis is rejected at 1 percent significance level which implies that there is a long run relationship between real effective exchange rate and economic growth and that the relationship is negative.

Theoretically, a depreciation of the domestic currency should make Ghanaian exports relatively cheaper and as such leads to increase in demand for exports and by extension economic growth whereas an appreciation of the

domestic currency makes exports more expensive and as such reduces economic performance. This is not the case and the possible explanation is that international competitiveness holds in relation to the Marshall-Lerner condition. Empirically, however, the demand and supply of exports and imports have proved fairly inelastic and therefore, a relative depreciation in effect hinders growth. This result is in line with most studies by Akpan (2008) and Asher (2012) in relation to exchange rate –economic growth nexus in the short run. However, this finding deviates from Adebisi, Adenuga, Abeng, and Omanukwue (2009) who identified an insignificant relationship between exchange rate and economic growth in both short and long run.

The long run results revealed yet another petrifying outcome which is in contravention with expectation as economic theory suggests. We found that the coefficient of foreign direct investment (FDI) has a negative impact on growth. It is statistically significant at 1 percent. There is statistical evidence that a 1 percent increase in FDI will lead to a fall in economic growth by approximately 0.2 percent, all other things remaining the same. This negative relationship between FDI and GDP growth in Ghana is consistent with a previous study by Frimpong and Oteng-Abayie (2006) but inconsistent with theory and other empirical findings by Vu, Gangnes, and Noy (2008). This interesting result obtained from the empirical study confirms the mining sector FDI dominance which does not generate direct growth impacts on the wider economy (Frimpong & Oteng-Abayie, 2006). Some conditions that are often associated with official FDI to developing countries, Ghana inclusive, might not be directly favourable to initiating higher levels of industrial performance as well as economic growth. For instance, substantial FDI go to non-manufacturing

sectors of the economy, particularly services sector for which reason FDI will not make any significant impact on industrial performance and also on economic growth (Ahortor & Adenutsi, 2008).

The coefficient of capital stock was 0.1764 meaning that a 1 percent increase in capital stock would result in approximately 0.2 percent increase in economic growth, holding all other factors constant and is statistically significant at 5. The sign of the capital variable supports the theoretical conclusion that capital contributes positively to growth of output since the coefficient of capital in this long-run growth equation is positive and significant. This positive relationship between capital stock and output is consistent with the expectation of the classical economic theory. The finding is line with the findings of Shaheen, Ali, Kauser, and Bashir (2013); Falki (2009) and, Khan & Qayyum (2007). It is also consistent with conclusions reached by Ibrahim (2011) and Asiedu (2013) in the case of Ghana. Ibrahim (2011) and Asiedu (2013) found positive and statistically significant effect of capital on economic growth for Ghana. It is consistent with conclusions reached by Aryeetey and Fosu (2003) and Magnus and Fosu (2006) in the case of Ghana.

Moreover, the results showed that the coefficient of labour force was positive and statistically significant signalling a positive influence on economic growth. With a coefficient of 3.6540, it means that a 1 percent increase in labour force would result in an increase in economic growth by approximately 3.7 percent. This is consistent with the argument of Jayaraman, Singh, and others (2007) and Ayibor (2012) who asserted that there can be no growth achievement without the involvement of labour as a factor input hence, the positive and significant coefficient. This result however contradicts the works of Frimpong



and Oteng-Abayie (2006), and Sakyi (2011) who found a negative effect of labour on economic growth.

The effectiveness of government expenditure in explaining economic proxied by GDP growth in the country is negative and is statistically significant at 5 percent significance level. A 1 percent increase in government expenditure will cause economic growth (GDP growth) to decrease by approximately 0.4 percent, *ceteris paribus*. This result obtained means that government has not been spending more on productive sectors (provision of safe water, primary health care, education, etc) of the economy. This result obtained is not in line with finding by Ram (1986) and Aschauer (1989) but consistent with other findings obtained by Landau (1986) and Barro (1990).

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

$$ECM = LGDPG - (0.1765*LGFCF + 3.6541*LLF - 0.4889*LOPN - 0.3535*LGOV - 0.8716*LEXHH - 0.2044*FDI + 5.5240)$$

#### **Short Run Estimates (DLRDPG is the dependent variable)**

The presence of a long run relationship between economic growth and its exogenous variables allows for the estimation of long run estimates. This is reported in Table 5. The short run estimates also based on the Schwartz Bayesian Criteria (SBC) employed for the estimation of the ARDL model are reported in Table 6.

Some descriptive statistics can be obtained from Table 6. From the Table, it can be observed that the adjusted  $R^2$  is approximately 0.60. It can

therefore be explained that approximately 60 percent of the variations in economic growth is explained by the independent variables. Also, a DW-statistics of approximately 2.641 reveals that there is no autocorrelation in the residuals.

The results also showed that the coefficient of the lagged error correction term ECT (-1) exhibits the expected negative sign (-0.8125) and is statistically significant at 1 percent. This indicates that approximately 81 percent of the disequilibrium caused by previous years' shocks converges back to the long run equilibrium in the current year. According to Kremers, Ericsson, and Dolado (1992) and Bahmani-Oskooee (2001), a relatively more efficient way of establishing cointegration is through the error correction term. Thus, the study detects that the variables in the model reveal evidence of reasonable response to equilibrium when there is a shock in the short-run.

Theoretically, it is argued that whenever there is a cointegrating relationship among two or more variables there exist an error correction mechanism. The error correction term is thus derived from the negative and significant lagged residual of the cointegration regression. The ECM stands for the rate of adjustment to restore equilibrium in the dynamic model following a disturbance. The negative coefficient indicates that any shock that whenever there is a disturbance in the short-run, it will be corrected in the long-run. The rule of thumb is that, the greater the error correction coefficient (in absolute terms), the faster the variables adjust back to the long-run equilibrium when shocked and therefore shows that the adjustment in the study in restoring equilibrium following a shock is quite swift (Acheampong, 2007).

**Table 6:** Estimated Short-Run Error Correction Model using the ARDL Approach  
ARDL (2, 2, 0, 0, 1, 0, 2) selected based on SBC Dependent Variable: LGDPG

Variable	Coefficient	Std. Error	T-Ratio	Probability.
LGFCF	0.8541***	0.0596	14.3096	0.0000
LGFCF(-1)	-0.2796**	0.1019	-2.7420	0.0208
LLF	-0.8697*	0.3930	-2.2129	0.0513
LOPN)	-0.6825**	0.2618	-2.6060	0.0262
LOPN(-1)	0.1902***	0.0392	4.8461	0.0007
LGOV	-0.2709***	0.0449	-6.0215	0.0001
LGOV(-1)	-0.7112**	0.2835	-2.5083	0.0310
LEXHH	-0.1801***	0.0468	-3.8418	0.0033
LEXHH(-1)	0.3165***	0.0539	5.8659	0.0002
FDI	-0.5377**	0.1766	-3.0447	0.0124
FDI(-1)	0.1181***	0.0157	7.5219	0.0000
ECT(-1)	-0.8125***	0.0596	-13.6245	0.0000
R-squared	0.7826	Mean dependent variable		1.6463
Adjusted R-squared	0.5942	S.D. dependent variable		0.3260
S.E. of regression	0.2076	Akaike info criterion		0.0006
Sum squared residual	0.6469	Schwarz criterion		0.6607
Log likelihood	13.990	Hannan-Quinn criterion		0.2073
F-statistic	4.1548	Durbin-Watson stat		2.1413
Prob (F-statistic)	0.0051			

*Note:* \*\*\*, \*\*, \* imply significance at the 1, 5, and 10 percent levels respectively. *Source:* Computed by Author using Eviews 9 Package.

Table 6 reports the short run dynamic coefficients of the estimated ARDL model. Interestingly, all the variables are significant with some having counter intuitive signs.

Consistent with the long run results, the contemporaneous effect of real effective exchange rate on economic growth is negative. With a coefficient of -0.1801, it implies that a 1 percent depreciation of the exchange rate leads to reduction in economic growth by approximately 0.2 percent in the short run. The result is statistically significant at 1 percent level of significance. Possible explanation for this result is that exchange rate variations might impact negatively on exporters and trend economic growth by discouraging firms from

undertaking investment, innovation and trade. It may also discourage firms from entering into export markets (OECD, 2007). Large fluctuations in the exchange rate over shorter periods prevalent in developing countries can also impose adjustment costs on the economy as resources keep shifting between the tradable and non-tradable sectors. This could permanently shift resources to the non-tradable sector if firms are put off entering, or staying in, export markets due to high exchange rate variability. This result is in line with most studies by Akpan (2008) and Asher (2012) in relation to exchange rate –economic growth nexus in the short run. However, this finding deviates from Adebisi et al. (2009) who identified an insignificant relationship between exchange rate and GDP in both short and long run. Also, Aghion et al. (2009) and Isola, Oluwafunke, Victor, and Asaleye (2016) all attested to the fact that no short or long run relationship exist between exchange rate and economic growth.

Nonetheless, the lag effect of exchange rate on economic growth proved growth inducing. The coefficient is positive and statistically significant at 1 percent. The results show that a 1 percent depreciation of the local currency leads to a 0.3 improvement in economic growth. The possible explanation could be that real depreciation enhances a country's international competitiveness, leading to increases in exports and foreign exchange supplies and, hence, increasing official capacity of a country to import the needed inputs for production. This finding is inconsistent with the findings of Prasad (2000) who found that short run changes in real effective exchange rate leads to increased exports and economic growth for Fiji.

From the results, the coefficient of trade openness is statistically significant at 1, indicating that if the country were to open up trade by 1 percent,

economic growth measured as GDP growth would decrease by approximately 0.7 percent in the short run. The results is in line with the findings of Ali and Abdullah (2015) in their study 'Impact of Trade Openness on the Economic Growth of Pakistan: 1980-2010' and Githanga (2015) for Kenya. The findings by Ali and Abdullah (2015) showed a negative and statistically significant long-run relationship between trade openness and economic growth for Pakistan.

However, the lag of trade openness openness has the theorized positive impact on economic growth in short run. The coefficient of trade openness is statistically significant at 1 percent, indicating that if the country were to open up trade by 1 percent in the short run, economic growth would increase by approximately 0.2 percent. This result aligns itself with studies such as Dollar and Dollar and Kraay (2003), Ali and Abdullah (2015) and Falki (2009) which believe that trade openness positively affects real GDP in the short run.

Furthermore, it can be observed that foreign direct investment (FDI) exerts a negative influence on economic growth. Its coefficient of (-0.5377) suggests that, 1 percent increase in FDI inflows leads to approximately 0.5 decrease in economic growth. The result is statistically significant at 5 percent. Some conditions that are often associated with official FDI to developing countries, Ghana inclusive, might not be directly favourable to initiating higher levels of industrial performance as well as economic growth. For instance, substantial FDI go to non-manufacturing sectors of the economy, particularly services sector for which reason FDI will not make any significant impact on industrial performance and also on economic growth (Adenutsi, 2008). This negative relationship between FDI and GDP growth in Ghana is consistent with a previous study by Frimpong and Oteng-Abayie (2006) but inconsistent with

theory and other empirical findings by Balasubramanyam, Salisu, and Sapsford (1999), Asheghian (2004) and Vu, et al. (2006). The findings also contradicts the findings of Asiedu (2013); Frimpong and Oteng-Abayie (2006) for Ghana and Falki (2009) in the case of Pakistan. These studies found a negative and statistically significant effect of FDI on economic growth in the short run. This interesting result obtained from the empirical study confirms the mining sector FDI dominance which does not generate direct growth impacts on the wider economy (Frimpong & Oteng-Abayie, 2006). The study is however inconsistent with the work of De Mello (1997). De Mello (1997) argued that FDI influences economic growth by serving as an important source of capital, which complements domestic private investment in developing productive capacity. To add, Lall (1985) argued that foreign investments come to host country with a package, including capital, technology, and management and marketing skills. They can, thus, improve competition, efficiency; provide additional jobs and financial resources in an economy and hence leading to robust economic performance.

Interestingly, however, it can be observed that the lag of foreign direct investment (FDI) exerts a positive influence on economic growth. Its coefficient of (0.1181) suggests that, a 1 percent increase in FDI leads to approximately 0.1 percent increase in economic growth. The result is statistically significant at 1 percent. The positive effect of FDI reemphasizes the fact that Ghana has benefited positively from the spillover effect of foreign investors in the country mostly in the short run. The study is consistent with the work of De Mello (1997). De Mello (1997) argued that FDI influences economic growth by serving as an important source of capital, which complements domestic private

investment in developing productive capacity. He further observed that FDI has the potential to generate employment and raise factor productivity via knowledge and skill transfers, adoption of new technology which helps local firms to improve their productive capacity thereby enhancing economic performance. The finding, however, contradicts the findings of Asiedu (2013); Frimpong and Oteng-Abayie (2006) for Ghana and Falki (2009) in the case of Pakistan. These studies found a negative and statistically significant effect of FDI on economic growth in the short run.

From the short run results, the effect of government expenditure and its lag in explaining GDP growth in Ghana is negative and is statistically significant at 1 percent. The effect of government expenditure and the lag of government expenditure were -0.2709 and -0.7112 respectively meaning that one percent increase in government expenditure will cause GDP growth to decrease by approximately 0.3 percent, and 0.7 percent, *ceteris paribus*. This result obtained means that most government have not channeled resources into productive sectors (provision of safe water, primary health care, education, etc) of the economy. The result found is not mimic the findings obtained by Barro (1990).

The coefficient of Gross Fixed Capital Formation proxying capital stock is positive and statistically significant at 1 percent. With a coefficient of 0.8541, it means that a 1 percent increase in capital input would result in a 0.9 percent increase in economic growth, holding all other factors constant. The sign of the capital variable supports the theoretical conclusion that capital contributes positively to growth of output since the coefficient of capital in this long-run growth equation is positive and significant. This positive relationship between

capital stock and economic growth is consistent with the expectation of the classical economic theory. Nonetheless, coefficient of lag of gross fixed capital formation proxying capital stock is negative and statistically significant at 5 percent significance level. With a coefficient of (-0.2796), it means that the lag effect of a 1 percent increase in the labour force will cause economic growth in Ghana to fall by approximately 0.3 percent in the short run.

The finding supports the findings of Shaheen *et al.*(2013); Falki (2009) and Khan and Qayyum (2007). It is also consistent with conclusions reached by Ibrahim (2011) and Asiedu (2013) in the case of Ghana. Ibrahim (2011) and Asiedu, (2013) found positive and statistically significant effect of capital on economic growth for Ghana.

Finally, the results show that the coefficient of labour force is negative and statistically significant signalling a negative influence on economic growth. This result is counter intuitive. Labour force is significant at 10 percent with a coefficient of -0.8697 indicating a decrease in economic growth by approximately 0.9 percent if there is a 1 percent increase in the labour force. This result supports the works of Frimpong and Oteng-Abayie (2006), and Sakyi (2011) who found a negative effect of labour on economic growth. This is however, inconsistent with the findings of Jayaraman *et al.* (2007) and Ayibor (2012) who asserted that there can be no growth achievement without the involvement of labour as a factor input hence, the positive and significant coefficient.

#### **Post Estimation Tests (Diagnostic and Stability Tests)**

Table 7 reports the results of the diagnostic test for the estimated ARDL model. From the table, the results show that the estimated model passes the



Langrangean multiplier test of residual serial correlation, Normality based on the skewness and Kurtosis of the residuals and heteroscedasticity test based on the regression of squared residuals on fitted values.

**Table 7: Diagnostic Tests**

Test Statistics	Version	F-statistic and Probability
Serial Correlation	F	F (2, 8) = 1.2211 [0.3445]
Normality	Chi-Square	CHSQ = 0.1343 [0.9350]
Heteroscedasticity	F	F (18, 10) = 0.6237 [0.8153]
Ramsey RESET	F	F(2, 8) = 0.5365 [0.7158]

*Source: Author's Construct, Entsua-Mensah (2018)*

Diagnostics test were conducted for the ARDL model. The tests as reported in table 6 indicate that the estimated model passes the Langrangean multiplier test of residual serial correlation among variables. Also, the estimated model passes the tests for Functional Form Misspecification using square of the fitted values. The model also passed the Normality test based on the Skewness and Kurtosis of the residuals. Thus, the residuals are normally distributed across observations. Finally, the estimated model passes the test for heteroscedasticity test based on the regression of squared residuals on squared fitted values.

Specifically, The Table 7 shows the Breusch-Godfrey Serial Correlation LM test for the presence of autocorrelation. The result of the test shows that the p-value of 0.3445 which is about 34 percent is greater than the critical value of 0.05 (5%). This shows the non-existence of autocorrelation.

The White Heteroscedasticity test above shows that the p-value of about 0.8153 which is approximately 82 percent is more than the critical value of 0.05 or 5 percent. That is, we accept that there is no heteroscedasticity. This shows that there is no evidence of heteroscedasticity since the p-value are considerably

in excess of 0.05 and conclude the errors are not changing over time. Table X also shows that the normality test shows that the p-value of approximately 92 percent (0.9193) and this is greater than the critical value of 0.05 or 5 percent. This shows that there is no apparent non-linearity in the regression equation and it would be concluded that the linear model is appropriate. From the table, the estimated ARDL model passes the specification test (RESET test) since the f-statistics has a probability of 72 percent (0.7158) which is greater than the traditional 0.05 (5%). Therefore, the model is correctly specified.

### **Stability Tests**

Pesaran and Pesaran (1997) suggests that the test for the stability for parameters using cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) plots be conducted after the model is estimated. This is done to eliminate any bias in the results of the estimated model due to unstable parameters. Also, the stability test is appropriate in time series data, especially when one is uncertain about when structural changes might have taken place.

The results for CUSUM and CUSUMSQ are depicted in Appendices (1) and Appendices (2) respectively. The null hypothesis is that coefficient vector is the same in every period and the alternative is that it is not Bahmani-Oskooee and Nasir (2004). The CUSUM and CUSUMSQ statistics are plotted against the critical bound of 5 percent significance level. According to Bahmani-Oskooee and Nasir (2004), if the plot of these statistics remains within the critical bound of the 5 percent significance level, the null hypothesis that all coefficients are stable cannot be rejected.

Appendices A (1) depicts the plot of CUSUM for the estimated ARDL model. The plot suggests the absence of instability of the coefficients since the plots of all coefficients fall within the critical bounds at 5 percent significance level. Thus, all the coefficients of the estimated model are stable over the period of the study.

Appendices A (2) depicts the plot of CUSUMSQ for the estimated ARDL model. The plot also suggests the absence of instability of the coefficients since the plots of all coefficients fall within the critical bounds at 5 percent significance level. Thus, all the coefficients of the estimated model are stable over the period of the study. It is therefore clear that the parameters will neither be changing systematically or erratically. There is convergence.

### **Chapter Summary**

The chapter concentrated on the empirical estimations of the relationship between real effective exchange rate and economic growth using the Autoregressive Distributed Lagged (ARDL) Model. The results revealed a long-run cointegrating relationship between economic growth and real effective exchange rate as well as some selected macroeconomic variables that were used for this study.

The short-run estimates reveal a negative and statistically significant impact of some of the variables (government expenditure, capital stock, foreign direct investment, labour force and trade openness) on economic growth. However, variables (real effective exchange rate, trade openness and capital stock) proved growth inducing with regards to their contemporaneous effects.

The long-run estimates, however, reveal a positive and statistically significant impact of labour force and capital stock economic growth. This

result shows that, in Ghana the increase in capital stock and labour force result in a favourable impact on economic growth. Furthermore, a depreciation of the exchange rate leads to a favourable impact on the Ghanaian economy through international competitiveness.

The diagnostic and parameter stability tests reveal that the model passes the tests of serial correlation, non-normal errors and heteroscedasticity and the graphs of the CUSUM and CUSUMSQ indicate the absence of any instability of the coefficients because the plots of these graphs are confined within the 5 per cent critical bounds of parameter stability suggesting that all the coefficients of the estimated ARDL model are stable over the study period.

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

#### Introduction

This chapter summarized, concluded and gave policy recommendations based on the study for the consideration of planners and managers of the economy. The aim was to show the major findings in the study and also suggest policy recommendations as to the way forward to ensure a steady and sustainable growth. This chapter first summarized the findings of the study and then concluded the major findings of the study before prescribing policy recommendations. The target of the research was to investigate empirically the relationship between the real effective exchange rate and economic growth using Ghanaian data set.

#### Summary

The focus of this study was to find out the relationship between real effective exchange rate and economic growth. In sum, the study examined real effective exchange rate together with some control variables and economic growth using an Auto Regressive Distributed Lag Model that was developed by Pesaran *et al.* (2001).

In the empirical literature analysis reviewed, the study explored the relationship between real effective exchange rate and economic growth for this study on Ghana over the period 1984 to 2014 and it was clear that the bulk of the literature produced mixed interactions between real effective exchange rate and economic growth.

In order to estimate the long and short-run dynamic parameters of the model, the Autoregressive Distributed Lagged Model (bounds testing) approach

to cointegration was employed. We then started the estimation process by testing for the stationarity properties of the variable using the Augmented-Dickey Fuller (ADF) and Phillips-Peron test statistics. The unit roots results suggest that all the variables were stationary after taking first difference while Gross Domestic Product Growth stationary at levels with a constant and trend under the Philip Peron test statistics. The study then proceeded to examining the long-run and short-run relationship between real effective exchange rate and economic growth.

The bounds tests results revealed that in the long-run, only exchange rate and gross domestic product per capita exerted a statistically significant positive impact on economic growth. The result supports Aksoy and Salinas (2006) findings that the overvaluation of the real effective exchange rate was a key factor limiting the supply reaction of trade reforms. They further argued that real depreciation/devaluation enhances a country's international competitiveness, leading to increase exports and foreign exchange supplies and, thereby, increasing official capacity to import needed inputs for industrial production and therefore economic performance.

The short-run results revealed that the variables trade openness, exchange rate and capital stock have a positive and significant influence on economic growth. However, labour force and foreign direct investment proved harmful to economic growth.

The long-term relationship that exist between real exchange rate and GDP growth is further confirmed by a negative coefficient which is statistically significant on the lagged error correction term and the size of this coefficient suggest that, the disequilibrium forced by previous years' disturbance converges

back to the long-run equilibrium in the current year. The relationship shows that depreciation of the currency is detrimental to growth in the long run.

The diagnostic tests result show that the model passes the test of serial correlation, non-normal errors and heteroscedasticity. The graphs of the cumulative sum of recursive residual (CUSUM) and the cumulative sum of squares of recursive residual (CUSUMSQ) exhibit that there exists a stable relationship between real effective exchange rate and the selected macroeconomic variables used for the study.

### **Conclusions**

The study has empirically examined the real effective exchange rate and economic growth in Ghana using Ghanaian data set for the period 1984 to 2014. The empirical evidence revealed the following findings: First, both the long-run and short-run results found statistically significant positive effects of foreign direct investment, government expenditure, and real effective exchange rate on Ghana's economic growth. This means that, continuous degree of depreciation of the exchange rate (local currency), FDI which largely goes into mining sector and unproductive government spending will hamper the growth of the economy.

However, the long run dynamics also showed a positive impact of capital stock and labour force improvements also induces growth. on economic growth. The impact of real effective exchange rate on economic growth is however more pronounced in the long run than in the short run.

### **Recommendations**

Based on the findings from the study, the following recommendations are proposed.

First, the Government of Ghana should pay critical attention to the exchange rate. The exchange is often thought of to enhance international competitiveness but largely it been revealed in this study that it is rather growth hindering. This is true in that the elasticity of demand of demand for imports and exports for Ghana is still inelastic. Therefore, Ghana is better off ensuring appreciating cedi.

Government expenditure yielded a negative relationship with Economic Growth over the study period for Ghana. This implies that government expenditure or resources were not channelled into productive of the economy. The government should therefore take it upon itself to keep on directing it's spending into productive sectors of the economy such as education, health, establishment of Small and Medium Scale Enterprises, and infrastructural development. The rippling effect of these ventures would help ex[and the economy.

Moreover, labour force proved very potent in explaining growth of Ghana. The labour force variable was found to have a positive relationship with GDP growth. From the results, a policy suggestion is that the government should continue to devote more resources to expanding technical and vocational education. Government of the day should also map out strategies or policies to ensure that most of the labour force are employed. The agricultural sectors need to be revamped since it is one of the key sources of employment in the country. New small or medium scale productive enterprises should be established to absorb the increasing labour force.

Also, regarding foreign direct investment, the government of the day should review contracts and policies to ensure that the growth hindering impact



of FDI in the interim is reduced. These investments in the service sector have been resource sapping and therefore the country would be better off if FDI are encouraged or channelled into productive ventures like the establishment of new small or medium scale enterprises.

Capital had a positive impact on growth in this study. This suggests that government should continue to invest tremendously in plants, machinery, raw materials, industrial buildings, engineering, technology and other capital stock that are central to production and at the same time develop the human resource capacity by increasing investment in the educational sector to ensure an efficient use of the equipment and technology that may be available.

### **Limitations**

The major drawback to this study was the availability of data which is common to Sub-Saharan African countries. We could not use large sample size which was due to unavailability of data.

Moreover, this work used the ARDL approach to cointegration and one main weakness of this method is that it is sensitive to both model specification and lag length selection. The selected lag length has implications for the outcome of the cointegration.

### **Directions for Future Research**

The author suggests that for future research on this work, other researchers can expand the sample size and include other macroeconomic variables that are not considered in this model. This can help improve and identify some variables that are crucial to economic growth.

Finally, instead of looking at the real effective exchange rate and economic growth, one could study the comparative impact of different exchange rate regimes on economic growth.

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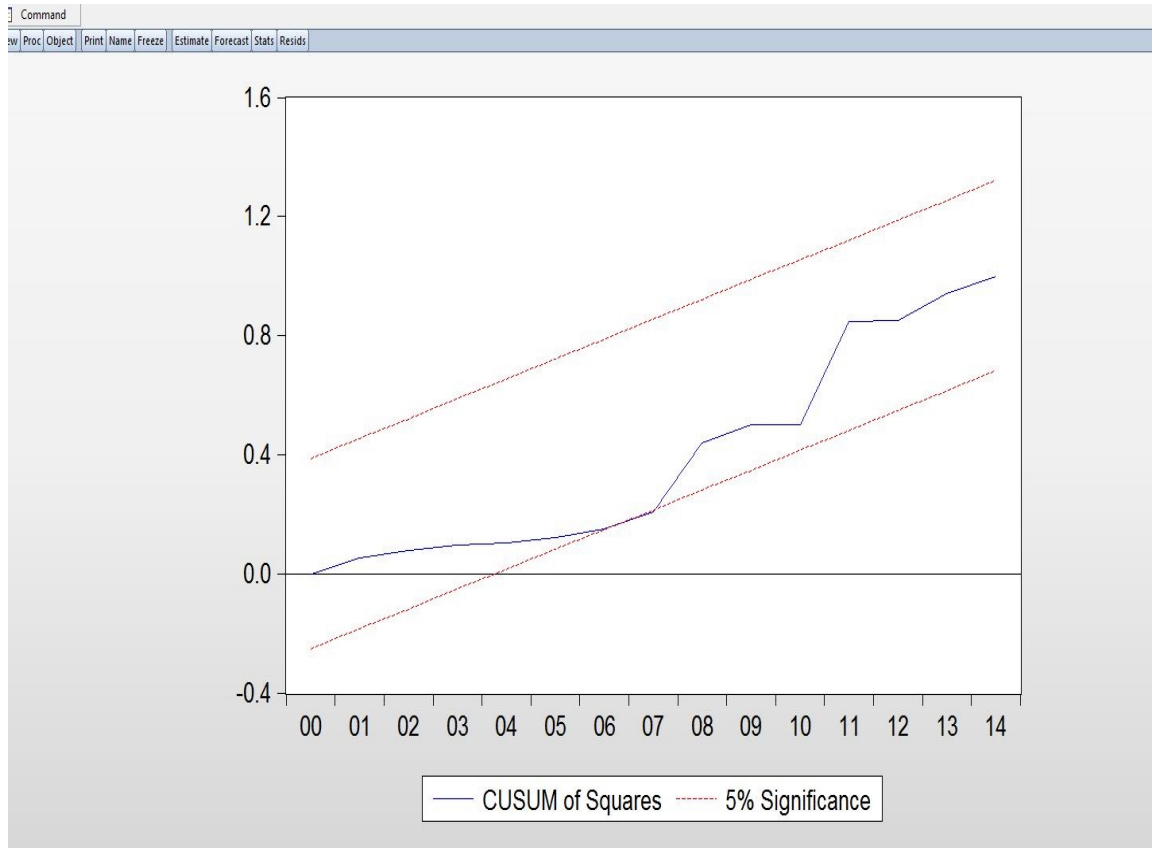
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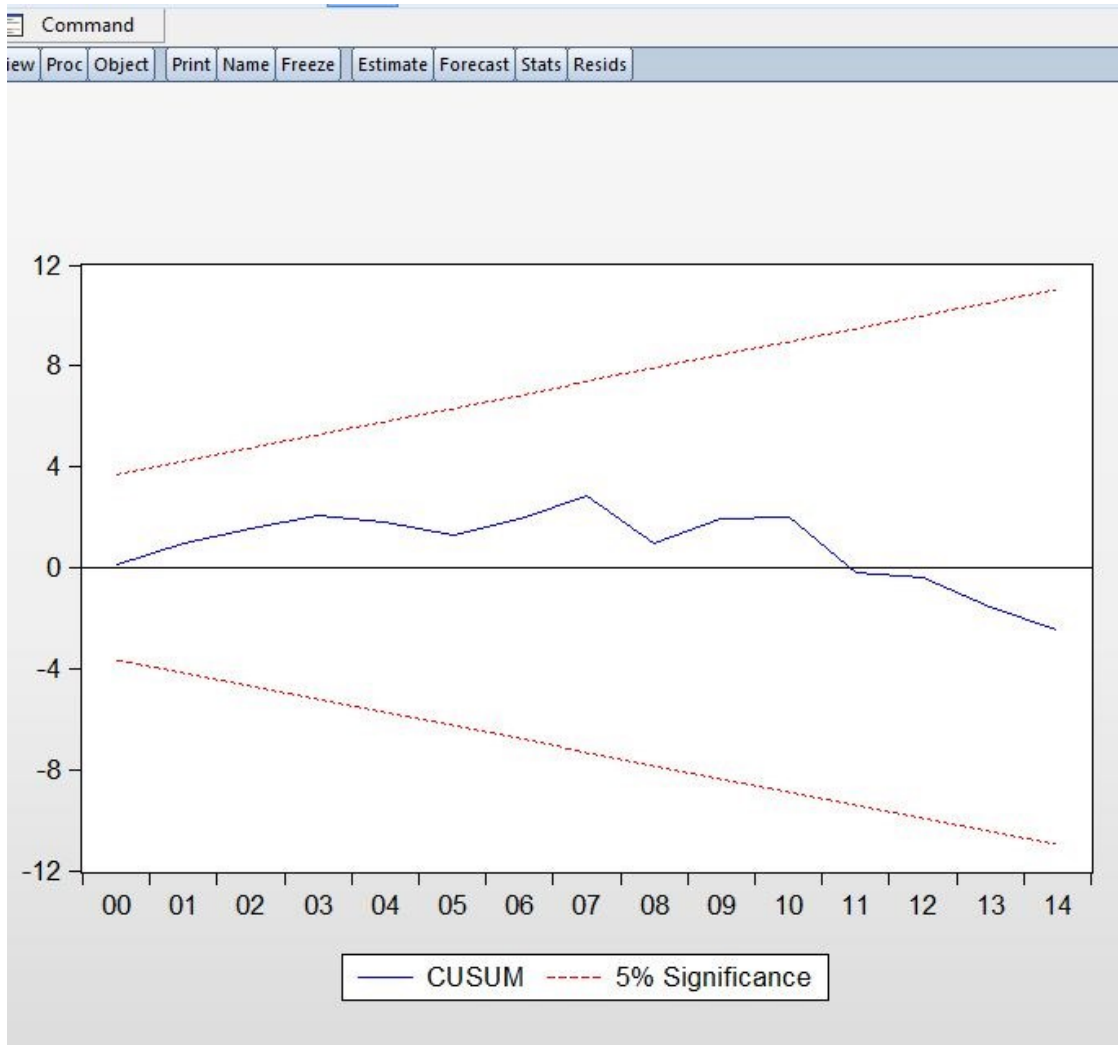
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### APPENDIX A



### APPENDIX B



### APPENDIX C

