

DETERMINANTS OF PRIVATE SECTOR INVESTMENT IN GHANA, 1970-2011

BY

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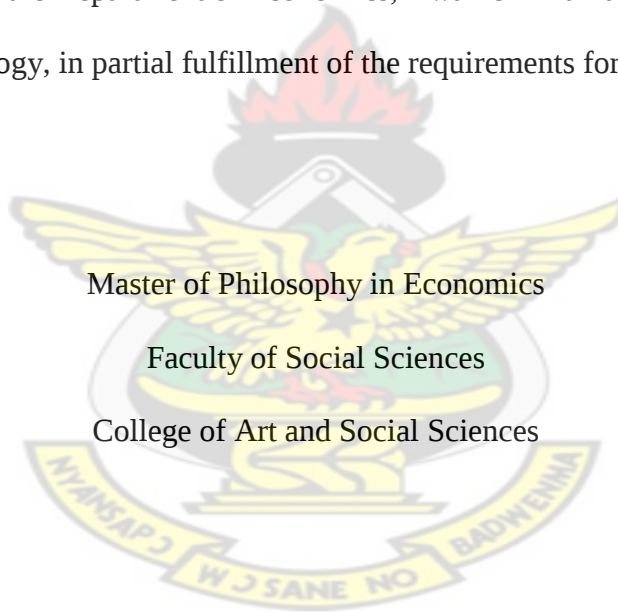
KNUST

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Master of Philosophy in Economics

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College of Art and Social Sciences



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DECLARATION

I hereby declare the submission is my own work towards the Master of Philosophy Economics and that, to my best of knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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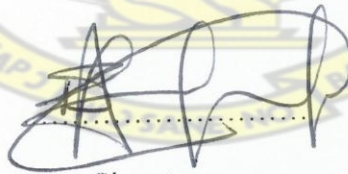
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DEDICATION

This study is dedicated to my parents, Mr. John K. Konor, Mrs. Edith Y. Aloroyo and to my brother Peter K. Konor and sister Mrs. Emefa Joana Sikpah for their support and encouragement.

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I am most grateful to the Almighty God who granted me strength, wisdom and understanding to undertake this research successfully.

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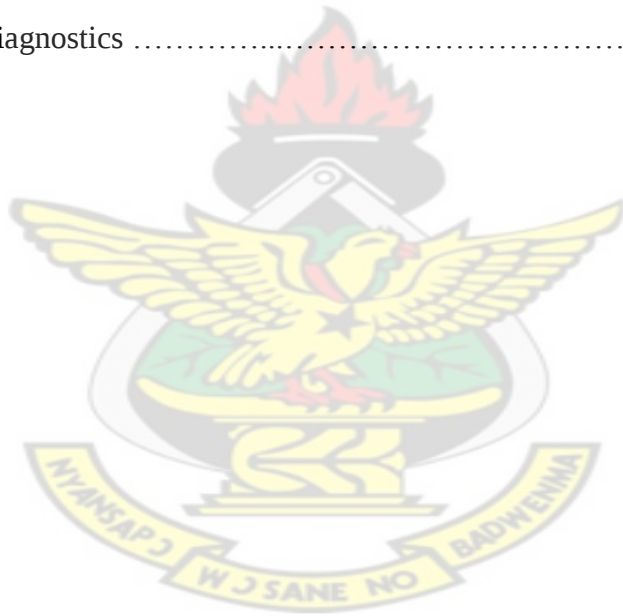
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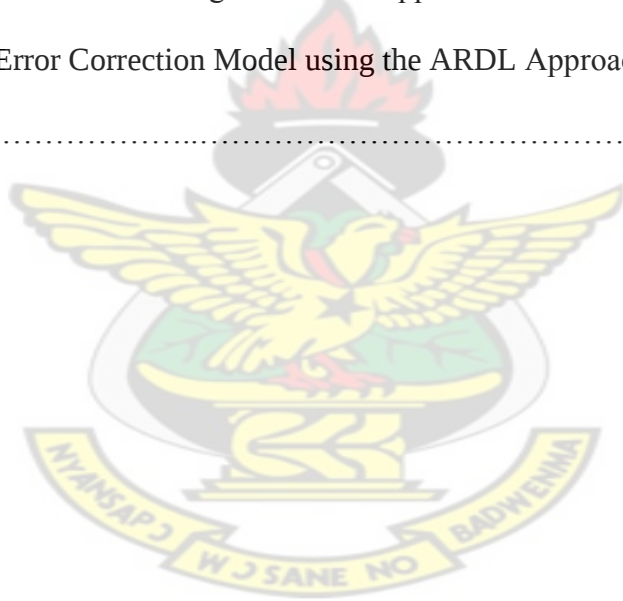
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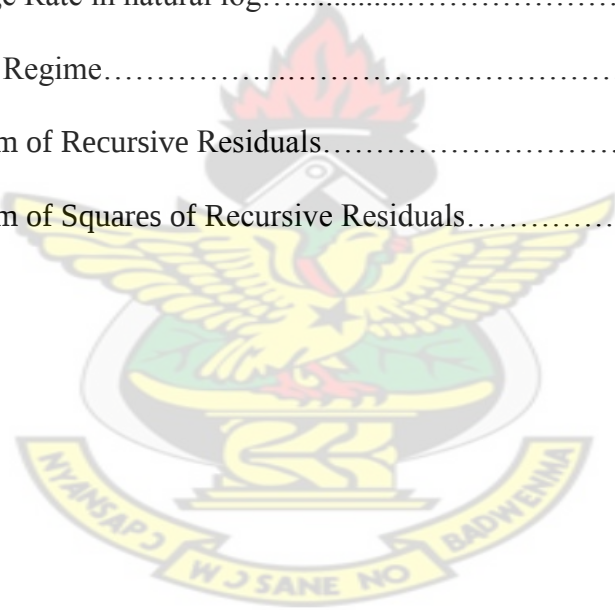
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LIST OF ACRONYMS

ADF.....	Augmented Dickey-Fuller
ADI.....	African Development indicators
AERC.....	African Economic Research Consortium
AIC.....	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
CUSUM.....	Cumulative Sum of Recursive Residuals
CUSUMSQ.....	Cumulative Sum of Squares of Recursive Residuals
DW.....	Durbin Watson
ECM.....	Error Correction Model
ECT.....	Error Correction Term
ERP.....	Economic Recovery Programme
FDI.....	Foreign Direct Investment
GDP.....	Gross Domestic Product
NRC.....	National Redemption Council
PNDC.....	People's National Redemption Council
PP.....	Phillips-Perron
SAP.....	Structural Adjustment Programme
WB.....	World Bank
WDI.....	World Development Indicator

ABSTRACT

Private investment is viewed as a powerful tool for maintaining and expanding the capital stock and production capacity of an economy. Many developed and developing countries have for several decades relied greatly on it to solve their macroeconomic problems, particularly those related to growth and development. For this reason the government of Ghana is taking steps to smooth the way for the private sector through various policies to increase their investment levels. Hence, this study seeks to focus on the various factors that either stimulate or hinder private investment in Ghana. Using annual time series data from 1970 to 2011 the study employed the ARDL methodology to estimate the results. The results indicate that gross domestic product affect private investment in the long run and inflation affect it in the short run. However exchange rate affects private investment both in the long and short run periods. This results suggest the need for the government to promote growth enhancing policies likes improvement of physical and human capital to stimulate private investment. The findings and recommendations of this study will therefore provide vital information relevant for policy formulation and implementation aimed at boosting private investment in Ghana.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Investment is a key macroeconomic variable necessary for economic growth and development of countries (Harrod 1939; Domar 1946). For this reason many developed and developing countries have for several decades relied greatly on it to solve problems, particularly those related to growth and development.

There exists a close connection between the level of investment and the rate of economic growth (Durham, 2004). Empirically, countries that were able to accumulate high levels of investment achieved faster rates of economic growth and development. It is in this respect that investment culture needs to be given a top priority by individuals in their country through their daily activities, government in his policy planning and implementation.

Investment has both private and public components, but in recent years, developing countries have placed greater emphasis on the development of the private sector since it has remained the main engine of growth in all modern economies across the globe. This sector enhances competitiveness of a country's products and services in both regional and global markets. Hence, the government of Ghana is taking steps to make the private sector to enable it lead the country's transition to upper middle-income status. Some of these steps taken include targeting to reduce its inflation rate, interest rate, ensuring currency stability, expanding access to medium and long-term finance etc.

Beddies (1999) and Ghura (1997) argued that private investment has a stronger and more favorable effect on growth rather than public investment since private investment is more efficient and less closely associated with corruption. Given the potential benefits of private investment, the Ghanaian government has been uneasy or impatient with policies to increase its level. To make this vision a reality the Ghana Investment Promotion Centre (GIPC) have been established to finance, promote and facilitate investment in various sectors of the economy. Also, governments over the years have used measures like the Economic Recovery Programme (ERP), Structural Adjustment Programme (SAP) and other financial reform programmes to improve the private sector. However, over the period, the investment level has not been sufficient enough to expand the capital stock and production capacity of the economy to generate the desired economic growth, as compared to other developed nations like the US, UK and Canada. It is therefore, very worrisome because even mildly robust growth rates can be achieved and sustained over long periods only when an economy is able to maintain its private investment as a sizeable proportion of GDP.

There has been mounting evidence that private investment depends on number variables which significantly contributes to its growth. Monitoring and maintaining these variables well is a precondition for growth and development and it is believed to be the most certain way of enhancing private investment. This study therefore attempts to investigate empirically the determinants of private sector investment in Ghana.

1.2 Statement of the Problem

Private investment is a crucial pre-requisite for economic growth because it allows entrepreneurs to set economic activity in motion by bringing resources together to produce goods and services. It has been widely acknowledged amongst economists that it exert a major effort to promote innovation, increase employment, reduce poverty and improve national welfare.

However, the expected role of private investment in developing countries like Ghana has not being materialised due to the country's inability to increase it to appreciable level. This situation is due to the reaping effects of the country's past experience of negative attitudes towards private investment, coupled with inappropriate domestic policies which eventually led to high inflation and exchange rate. Also, the establishment of a large number of state enterprises worsened the private investment climate and destroyed their incentives to invest and produce. As a result, private investment declined especially in the 1980s as it fell from 8.0% in 1975 to 2.9% in 1983 and 4.4% in 1984 to 2.5% in 1992 (African Development Indicators, 2011).

Although gradual improvements was made from 2.5% in 1992 to 11.1% in 1998, 16.0% in 2004 to 18.1% in 2008 and finally soared to 19.4% in 2011 (African Development Indicators, 2011). However private investment has not been able to generate the substantial economic growth to improve living conditions in the country as compared to other developing countries like South Africa, hence the need to assess how it is determined in Ghana and ways to improve it.

A number studies have been undertaken to establish the determinants of private investment e.g. Ouattara, (2005) for Senegal, Beddies, (1999) for Gambia etc., unfortunately, their findings cannot be directly applied to Ghana since their results may not accurately and adequately reflect the Ghanaian experience. It is equally important for Ghanaian policymakers to assess how

changes in certain macroeconomic variables respond to private investment in the country. Nevertheless, few works have been done in the past on the subject matter in Ghana using different macroeconomic variables and data set which differ in years e.g. Akpalu (2002), covered the 1970-1994 periods and later Marbuah and Frimpong (2010), also covered the period 1970-2002. This study will however provide policies on the need to mobilise all resources of development finance, both external and domestic, to stimulate private investment in order to improve living conditions of the citizens in the economy. Hence the motivation for this paper to investigate empirically the determinants of private investment in Ghana from 1970-2011.

1.3 Objectives of the Study

The general objective of this study is to determine the determinants of private investment in Ghana. Its specific objectives are:

- To determine the long run determinants of private investment in Ghana.
- To determine the short run determinants of private investment in Ghana.
- To determine the trends of the factors that influence private investments in Ghana.

1.4 Hypotheses of the Study

Accordingly, the study sought to test the following hypotheses:

- H_{01} : There is no long- run relationship between private investment and its determinants in Ghana.
- H_{02} : There is no short-run relationship between private investment and its determinants in Ghana.
- H_{03} : There is no trending behavior of the factors that influence private investment in Ghana.

1.5 Scope of the Study

The study covers a data set from the year 1970 to 2011. The study relies mainly on the use of secondary data drawn mainly from the Bank of Ghana (BOG), World Development Indicators (WDI) and the Africa Development Indicators (WDI).

1.6 Significance of the Study

The findings of the study will be important to a diverse number of people. Among those that would profit are policy makers, entrepreneurs, investment analyst and academics. The study will provide scientific findings on the subject of private investment; in particular, it will be of significant importance to policy makers in their quest of providing the appropriate incentives to promote private investment in Ghana. This will prevent the situation where limited resources will be directed towards wrong policies as far as promoting private investment is concern. For investors and investment analyst the findings will provide an insight of understanding the actions of governments and give proper interpretations to policy directions. Finally, researchers and academicians will find this work useful as there is limited research on the subject matter within the Ghanaian context. The study will therefore add to the existing knowledge in the subject area.

1.7 Organization of the Study

This study is organized into five chapters. Chapter one is the introduction and it covers background to the study, problem statement, objectives of the study, hypotheses, scope, significance and organization of the study. Chapter two presents review of relevant theoretical and empirical literature. The chapter also presents over view and improvement of private investment climate as well as the trend of private investment in Ghana. Chapter three discusses

the methods employed in the study, description and sources of data. Chapter four encompasses the presentation and analysis of empirical results obtained from the regressions. Chapter five which is the final chapter presents the summary, conclusions, limitations and policy recommendations of the study.

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CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the theoretical underpinnings of private investment and a number of empirical works done on the subject matter. It also extends to look at some issues of investment in Ghana.

2.2 Investment: Conceptual and Theoretical Background

In economics, the concept of investment is used to mean the purchase of capital goods that actually end up improving the welfare of a population i.e. goods which are used in the production of other goods e.g. railroads, a factory, clearing land, or putting oneself through education. In other words, they increase output.

Private investment behaviour is primarily influenced by profit motive and always characterised by risk and uncertainty. Risk is explained as a measurable possibility of losing money or not gaining interest on one's investment. Though investment is considered as a risky venture, individuals invest with the hope of earning a capital gain at the time of sale Weirich (1983). Again, people invest because they want a return to compensate them for the time, the expected rate of inflation (a general increase in the price of goods and services over time) and the uncertainty of the return (Pollack and Heighberger, 1998).

Investment theories can be broadly categorised into the simple accelerator theory associated with Clark (1917), flexible accelerator model associated with Keynes (1936), the neoclassical model

associated with Hall and Jorgenson (1971) and the Tobin's Q model also associated with Tobin (1969).

The simple accelerator model assumes that firms' desired capital-output ratio is roughly constant. The model begins with the notion that a certain amount of capital stock (K) is necessary to support a given level of economic activity. We define this relationship as being proportional to output (Y), i.e. $K_t = kY_t$ such that net investment is proportional to change in the desired output:

$$K_t - K_{t-1} = I_t = k\Delta Y_t \dots \dots \dots (1)$$

where k is the desired capital-output ratio, Y_t is output, I is net investment, K_t is the capital stock in period t while K_{t-1} is the stock of capital at the end of period t -1.

However, the simple accelerator approach is criticized for assuming that firms respond to changes in demand such that investment is always sufficient to keep the desired capital stock equal to the actual capital stock which is not necessarily true. In addition, the model also assumes that the ratio of desired capital to output is constant, yet it varies with a variation in the cost of capital and technology. The theory does not consider investors' expectations, profitability, and the cost of capital as determinant of investment behaviour.

Due to the above limitations of the simple accelerator, Keynesians have traditionally favored a more general form of the accelerator model called the flexible accelerator model designed by and Hall and Jorgenson (1971) which is also known as the partial adjustment model of investment based on the optimal accumulation of the capital suggested by Goodwin (1951) and Treadway (1974).

The model assumes that capital adjusts towards its desired level by a constant proportion of the difference between desired and actual capital. The basic notion behind this model is that the larger the gap between the existing capital stock and the desired capital stock, the greater a firm's rate of investment. Therefore firms plan to close a fraction of the gap between the desired capital stock (K^*) and the existing stock of capital goods left over from the past period (K_{t-1}). Hence the net investment equation can be written in the form of:

$$I = K_t - K_{t-1} = \lambda (K_t^* - K_{t-1}) \dots \dots \dots (2)$$

This theory again has other drawback by its underlying assumption of perfect competition which disregarded or over looked the role of dynamic expectations of investors behaviour regarding the future prices, interest rate and output, where K is actual level of capital; K^* is the capital stock desired by domestic firms; K_{t-1} is the last period's capital stock and λ is the partial adjustment coefficient. In our model, the desired level of the capital stock depends positively on expected GDP growth. This model is a version of the neoclassical investment model, best exemplified by Hall and Jorgensen (1967).

Another theory of investment is the Tobin's q model advanced by Tobin (1969). Tobin argues that firms' investment level depends on the ratio of the present value of installed capital to the replacement cost of capital. In the Tobin Q theory of investment, the ratio of the market value of the existing capital stock to its replacement cost (the Q ratio) is the main force driving investment (Chirinko, 1993, Ghura and Goodwin, 2000). That is to say, enterprises will want to invest if the increase in the market value of an additional unit exceeds the replacement cost. This ratio is Tobin's q . The q theory of investment assumes that firms will want to increase their capital when $q > 1$ and decrease their capital stock when $q < 1$. If $q > 1$, additional investment in

the firm would make sense because the profits generated would exceed the cost of firm's assets. Under those conditions, firms reap profits by investing in more capital, so we expect investment to be high. If $q < 1$, the firm would be better off selling its assets instead of trying to put them to use or the present value of the profits earned by installing new capital are less than the cost of the capital, therefore investment levels are expected to be near zero if $q < 1$. The ideal state is where q is approximately equal to one denoting that the firm is in equilibrium which is also called the general equilibrium theory or 'q' theory. The model is presented as follow:

$$q = (\partial/\lambda) \dots \dots \dots (3)$$

where ∂ stands for stock market value of a firm and λ stands for replacement cost of capital. The q model has been regarded as both a modified version of the neoclassical model (Hayashi, 1982) and as a profit model because of its emphasis on the role of profitability.

In relation to private investment, Rodrik (1991) introduced an element of policy uncertainty as a factor that drives private investment. He stated that when a policy reform is introduced, it is very unlikely that the private sector will see it as one hundred percent sustainable. A number of reasons may be adduced, among them is the expectation that the political-economic configuration that supported the earlier policies may resurface. There is also the fear that unexpected consequences may lead to a reversal. Investors must respond to the signals generated by the reform for it to be successful. This will therefore call for prudent measures to be taken to withhold investment until much of the uncertainty regarding the eventual success of the reform is eliminated i.e. if the anticipated loss is high it will deter private investors and vice versa.

Also, the rational choice theory influence private investment. This is an economic theory that assumes that individuals always make prudent and logical decisions that provide them with the

greatest benefit or satisfaction and that are in the best self- interest. It is a framework for understanding and often formally modeling social and economic behavior. Hence, it enables private investors to compare the costs of their activity against benefits to arrive at an action that maximizes their personal advantage. Rational choice theorists believe that most human decisions as in private businesses are based on maximizing a person's own benefits, while minimizing that which can hurt them. Private investors usually adapt this theory of rational choice into their business models to enable them predict and explain future consumer spending decisions and whether to engage in such business ventures.

According to Acosta and Loza (2004), the theory of investment irreversibility also affects private investment. This theory suggests that the cost of investing in machinery and equipment is usually not recovered by a future resale. However, stable prices improve the informative content of the price system, allowing a favorable allocation of resources. Emerging countries are usually characterized by a high degree of uncertainty. Hence, for investment decisions to be made to yield the desired results uncertainty factors of such economies must be taken into consideration, since any sharp decline in aggregate demand would generate an unsustainable excess in installed capacity (Caballero and Pindyck 1996). This accounts for the reason why advanced countries with lower uncertainty rate have high levels of private investment, as compared to developing economies with a higher uncertainty rate. The inflationary rate is normally use as a proxy for measuring uncertainty (Beaudry et al. 2001).

Again, private investment is hindered by restrictions on investment financing. Loungani and Rush (1995) suggested that small and medium enterprises (SMEs) are usually unable to finance

their activities directly through open market debt. Hence, they resort heavily to the bank credit markets, which are also characterized by imperfections due to information asymmetry between lenders and borrowers. Developing countries are normally faced with the challenge of accessing credit due to the absence of futures market and poor access to long term financing.

Foot and Stein (1991) argued that depreciation of the exchange rate can also stimulate private investment. They suggested devaluation does not only favour the export sectors but also enable foreign companies to acquire local assets at a much lower price to increase investment. However, McCulloch (1989) opposed the relationship between private investment and exchange rate, because he believed it is the rate of return that determines investment but not the price of the local asset. He suggested that when a country's currency is depreciated in real terms, both the price of the asset and the nominal gain of the investment fall. This effect becomes particularly relevant in sectors producing non-exportable goods

2.3 Empirical review on determinants of private investment

Many researchers have studied private investment from different perspectives in both developed and developing countries focusing on different variables that determine private investment.

Dailami and Walton (1992) examined the behavior of private investment in Zimbabwe over the period 1970 to 1987. The dependent variable was private investment and the explanatory variables were: GNP growth, relative price of capital goods, the real interest rate, the real effective exchange rate, real wage, the lagged dependent variable, and the real UK government bond yield. The results showed that private investment is positively related to GNP growth, real

interest rate, real effective exchange rate, and the lagged dependent variable and negatively related to the government bond yield, relative price of capital goods and real wage.

Oshikoya (1992) investigated how interest rate deregulation have affected private investment in Kenya over the period 1970-1989. The dependent variable was the private investment ratio, while explanatory variables were: the real economic growth rate, real deposit rate of interest, changes in terms of trade, public investment ratio, inflation rate, and the lagged debt service ratio. The results showed that the real rate of interest is significant and positively related to the private investment rate. The other variables like inflation rate, terms of trade, and external debt service payments have negative and significant coefficients. The coefficient on the public investment ratio was positive and significant, thus implying that public investment is complementary to private investment.

Ronge and Kimuyu (1997) examined the determinants of private sector investment for Kenya using data over the period 1964-1996. A double-logarithmic form of the investment equation was estimated using OLS. The results indicated that both the availability of credit and foreign exchange exerts significantly positive effects on private investment confirming the results in most empirical studies. Private investment however, was adversely affected by the stock of debt. Specifically, a 1% increase in the lagged debt to GDP ratio reduced private investment by 0.3%.

Serven (1998) used a large panel data set on developing countries to assess the impact of macroeconomic uncertainty on private investment. The study attempted to draw some distinction between sample variability and uncertainty by constructing alternative measures of the volatility in five macroeconomic variables – inflation, growth, the terms of trade, the real exchange rate

and the price of capital goods. These constructed measures were then added to an empirical investment equation which was estimated using alternative panel data econometric methods, allowing for simultaneity, country-specific effects and parameter heterogeneity across countries. The results underscored the robustness of the investment-uncertainty link and underscored the negative relation as existing in other empirical literature.

Jenkins (1998) estimated a model of private investment flows for Zimbabwe using annual data over the 1969-1990 periods using a two-step Engle-Granger method. The results show that in the long-run, gross profits have positive effects, while foreign capital inflows and the external debt-to GDP ratio negatively affect private investment whilst in the short run, the availability of foreign exchange and the relative price of industrial output have positive effects and the change in the relative cost of capital is negatively related to the cost of capital.

Asante (2000) examined the determinants of private investment in Ghana over the period 1970-1992. The results showed that the variables that had a significant positive relationship with investment are: lagged investment, public investment, private sector credit, real interest rate, and real exchange rate whilst trade, political instability, macroeconomic instability, and the growth rate of real GDP have had a negative relationship with private investment.

Ribeiro (2001) employs the Johansen (1988) multivariate co-integration technique and Engle-Granger Two Step approach to model private-sector investment in Brazil during the period 1956-1996. The findings of both long and short-term models reveal a positive impact of the output, public investment and financial variables and a negative effect of the exchange rate. A test for

weak exogeneity and superexogeneity were carried out and the result showed credit to the private sector and public investment to be an important economic policy instruments.

Akpalu (2002) used annual time series data from 1970 – 1994 to study the determinants of private investment. He employed the Engle-Granger Two Step procedure and the Johansen multivariate test. The study reveals that in relative terms private investment in the short-run responds more to real per capita income growth, credit availability and public investment. Public investment was found to crowd-out private investment. There was also a significant negative relationship between cost of capital and private investment in both the short and long run. Further, a significant positive relationship between real GDP and private investment was found in both the short and long run models but was not significant in the short- run. This result indicates a confirmation of the accelerator theory of investment in Ghana. The Consumer Price Index however was found not to be significant in both situations.

Badawi (2004) investigated the impact of macroeconomic policies on private investment in Sudan employing annual data over the period 1969-1998. He focused on public investment, credit, devaluation and interest rate policies while blending cointegration, vector autoregressive (VAR) and error correction techniques to estimate the long and short run coefficients. The results suggested significant crowding-out effect of public investment on private investment, devaluation policies discouraged private sector capital expansion and monetary policy in the form of restricting domestic credit appeared to have had a significant impact on private investment. This was indicated by the positive impact of banking sector credit on private investment. Increasing real interest rates also impacted negatively on private investment in Sudan.

Ouattara B. (2004) investigates the determinants of private investment in Senegal over the period of 1970-2000 using the Johansen cointegration techniques and the bounds test approach. The results looked similar for both tests except for the coefficient of TOT which appears to be slightly higher in Johansen results. Public investment and real income affects private investment positive and significantly. In contrast, the coefficient of credit to the private sector, foreign aid flows and terms of trade were negative and significant, thus implying that increases in each variable will discourage private investment.

Erden (2005) uses a panel data set of 19 developing countries from 1980 to 1997 using a reduced-form neoclassical model of private investment that allows the estimation of both the short-run and long-run determinants of private investment. The results show that in both the long and short run public investment had a positive effect on private investment. Real interest rate was negatively significant impact on the level of investment, but credit availability to the private sector was positively significant. Macroeconomic uncertainty also has a negative impact in the long run, although its short-run impact is insignificant. Public investment also serves as a stimulus to private investment in developing economies.

Lesotlho (2006) investigated the determinants of private investment in Botswana using a time series data over the period 1976-2003, in both the short and long run. It employed the techniques of co-integration and error correction modeling. The results show positive and significant coefficients for public investment, bank credit and real interest rates for the short run model. GDP growth and real exchange rates are significant in the long run. Inflation was insignificant in both cases. This means that in the long run, the variations in private investment level is underpinned by; GDP growth, public investment, and the real exchange rate, while real interest

rates, public investment and the availability of credit affect investment behaviour in the short term.

Arshad and Sajawal (2007) analysed the determinants of private investment over the period 1972-2005 in Pakistan. The ARDL co-integration approach was employed to check the existence of a long-run relationship as well as short-run dynamics of investment. The results show that most traditional factors have little or no impact on private investment. These results supported the idea that nontraditional factors such as quality of institutions, governance, entrepreneurial skill, etc. are prerequisites for private investment to flourish. A partial support for the accelerator principle and the crowding-out hypothesis in the case of Pakistan was found.

Gnansounou (2010) analysed the determinants of private investment using data from a panel of 123 firms in Benin and covering the 1997-2003 period using the generalized method of Moments (GMM) with instrumental variables. The findings showed that demand uncertainty had a negatively significant effect on private investment; fluctuations in the imports of manufactured goods from Nigeria also had a negative effect on private investment in Benin. The investment behaviour of the firms strongly hinges on the cost of capital utilization i.e. when this cost is high, it weighs negatively on the purchase and installation of new production infrastructure. The magnitude of the effect of this cost of capital utilization and of the demand uncertainty which investment firms face depends on the nature of their activities.

Hosamane and Niranjana (2010) used the neoclassical theory of investment to explore the determinants of private investment using fifteen years (1991-2005) panel data set comprising of ten manufacturing industries at an aggregate level in India. The study makes use of panel estimation models along with the IPS panel unit root test (Im, Pesaran and Shin, 2003). The

results of model indicate that output, profits, capital stock, and cost of capital are important variables in determining private investment behavior.

Ghura and Goodwin (2010) investigate the determinants of private investment in Asia, Sub-Saharan Africa (SSA), and Latin America with panel data for the period 1975-1992 using a pooled data for all the 31 countries. Econometric tests indicated a preference for the random effects estimation procedure over other alternatives. The results showed real GDP growth stimulated private investment in Asia and Latin America but its effect was not significant in SSA. Also, while government investment stimulated private investment in SSA, it had the opposite effect in Asia and Latin America. In addition, private investment was stimulated by increases in private sector credit in Asia and SSA, but not in Latin America. Also, increases in credit to the government had significant adverse effects on private investment in SSA and Latin America. Further, the adverse effects of external shocks were statistically significant only in SSA.

Marbuah and Frimpong (2010) used time series data covering 1970- 2002 to analyse the determinants of private investment in Ghana using an ARDL model. The results suggest that private investment is determined in the short-run by public investment, inflation, real interest rate, openness, real exchange rate and a regime of constitutional rule, while real output, inflation, external debt, real interest rate, openness and real exchange rate significantly influenced private investment response in the long-run.

Mehnatfar (2010) examines the relationship between the private investment and other macroeconomic variables using a regression model for 1971-2008 periods in Iran. The results show that GDP on private investment had a significantly positive effect, budget surplus had

negative effect i.e. whenever a government faces budget shortage, private investment is encouraged and vice versa. Total expenditures of government had a positive effect on private investment but among the government's expenditures, defensive, economic and social expenditures have negative effect and public expenditures had a positive effect on private investment. Total incomes of government also had a negative effect on private investment with a negative effect of tax incomes and oil incomes.

Gjini and Durres (2012) used a pooled cross sectional data analysis of eleven selected East European countries over the period 1991-2009 by using panel data regression analysis. The results show that there is no crowding out effect of public investments on private investments. The marginal effect of public investments on private investments is positive and it diminishes as country moves from less developed to more developed economy.

Bello and Lawanson (2012) explored the long run determinants of private investment in Nigeria over the period 1970 to 2010, employing an advanced econometric technique of Auto-Regressive Distributed Lag (ARDL) bounds testing approach. Public investment, real GDP, real interest rate, exchange rate, credit to the private sector, terms of trade, external debts and reforms dummy were the key long run determinants of private investment while public investment, real GDP and terms of trade are statistically significant in the short run.

Hugo and Silva (2013) analyze the determinants of private investment in Brazil for the 1996-2011 periods using a cross section econometric analysis. The results show evidences of crowding-in effect in infrastructure over the private investment, real interest's rates been

positively insignificant while credit to private sector, political and economic instabilities affected private investment negatively.

Ajide and Bello (2013) investigated the determinants of private investment placing greater emphasis on the role of governance, using an annual data over 1970 to 2010 periods in Nigeria. The Auto-Regressive Distributed Lag (ARDL) bounds testing approach was used to ascertain the long and short run association of various variables. Emanated from the estimated models showed that saving, real GDP, degree of openness, real interest rates, inflation rates and governance measures are strong determining variables on private investment but political stability and accountability indicators appear both to be negatively and significantly affect the private investment in Nigeria.

The empirical literatures reviewed clearly indicate that several macroeconomic variables are crucial determinants of private investment, and for that matter it becomes imperative that these determinants are known for each country. Hence, this motivates the present study in Ghana.

2.4 Overview of Investment Climate in Ghana

Investment climate is defined as the policy, institutional, and behavioral environment, both present and expected, that influences the returns and risks, associated with investment” (Nick Stern, World Bank). The key determinants of investment climate include economic and political stability, rule of law, infrastructure, approaches to regulations and taxes, functioning of labor and finance markets etc. The climate of private investment in Ghana over the years has been described as unfavourable and unstable. This condition is due to the fact that Ghana as a nation has had different governments with different policies and attitude towards private investment.

To start with, Dr. Kwame Nkrumah who was the first president of the Republic of Ghana sought to encourage private investment to improve the economy through the privatization of state owned enterprises. However, this vision to stimulate a major growth in private investment failed to be accomplished due to liberal- oriented policies he also initiated to augment the increase in private investment levels during the same period. According to Killick (1978), in the 1960s Nkrumah rescinded his decision to develop the economy by private individuals, because he believed there was little realistic prospect of fostering an indigenous entrepreneurial class capable of industrializing at the speed and scale he wanted within the economy, again he thought if Ghanaian private capitalism is encouraged it would hamper the country's advancement to socialism. He also feared the wealthy class of Ghanaian business people might pose a threat to his political environment. He then turned his attention to develop the economy through increased in foreign investment and hence a public proclamation was made to that effect on 11th March, 1964 in his 7-Year Development Plan presentation that "foreign investment as the private sector of our industrial development can play an important role in our economy. It has a valuable contribution to make to our economy and to the attainment of certain specific objectives. Among these will be production of consumer goods, the local processing of Ghanaian raw material and the utilization of Ghana's natural resources in those lines of economic activity where a large volume of investment is required". Nkrumah had the view that foreign investors compared to the local ones had the advantage to contribute personal initiative, managerial ability and technical skills towards the development of the country. He gradually shifted the productive and distributive sectors of the economy from the private to the public sector, making the public sector the engine of growth.

As much as the Nkrumah government wanted to develop the economy by the aid of foreigners he also feared their massive participation in the economic growth may later be a threat to the nation, therefore, he felt the need to control their activities and passed the Capital Investments Act in 1963 to offer a wide range of fiscal and other concessions to would-be investors with strings attached. He later made it clear in his statement that “The Government accepts the operation in the country of large-scale enterprises by foreign interests, provided that they accept the following conditions: first, the foreign private enterprises must give the government the first option to buy their shares, whenever it intends to sell all or part of their equity capital; and secondly the foreign private enterprises and enterprises jointly owned by the state and foreign private interests will be required to reinvest 60% of their net profits in Ghana” (Friedland and Rosberg 1964). He also reiterated at a Sessional Address to the National Assembly on 1 February 1966 that “We welcome foreign investment provided that there are no strings attached to it, and also provided that it fits in with our plans for national development and our socialist policy. Again, he insisted the foreign investors should not interfere or meddle with the political life of our country. (Pan African perspective, 2010)

Some years later Nkrumah was overthrown and the two successive governments, the National Redemption Council (NRC)/Supreme Military Council (SMC) era of Acheampong and Akuffo (1972–1979) came into power. This era was characterized by a return to a command economy and a resumed massive participation of the state in economic activities. Though the era existed for a very short period it was significant in that the development problems the nation faced came clearly into focus. These administrations rejected Nkrumah’s socialism system of governance and were determined to pursue even more open policies and therefore embarked on an

experiment with import liberalization to secure inflows of long-term public and private capital. Both governments increased foreign private investment, with the view to encourage entrepreneurship domestically. As a result cocoa prices declined while imports surged, precipitating a serious trade deficit. Despite considerable foreign assistance and some debt relief, the Busia regime also was unable to overcome the inherited restraints on growth posed by the debt burden, balance-of-payments imbalances, foreign exchange shortages, increasing corruption and a continued mismanagement of the economy resulting to a high inflation record. They also had the problem of uneven distribution of investment funds and favoritism toward certain groups and regions. The currency was devalued during this era too, and some observers even saw that the devaluation of the national currency and the encouragement of foreign investment in the industrial sector of the economy were conservative ideas that could undermine Ghana's sovereignty.

The National Redemption Council (NRC) was forced to hand over power to the Supreme Military Council (SMC) through a palace coup in 1975. The leadership of the SMC sought to create a truly military government and did not outline any plan for the return of the nation to democratic rule. Between 1977 and 1979 periods, there were four political events: a palace coup (1978), an attempted coup and a successful coup (both led by Flight Lieutenant Rawlings), later general elections were held on September 1979 and Dr. Limann's Peoples National Party won. As a result of the political turbulence, the investment climate became unfriendly and deterred private investors leading to a reduction in private investment.

Again, the era of Flight Lieutenant Rawlings under the People's National Redemption Council (PNDC I) (1979) and part of PNDC II (1981–1983), exercised extreme repression and control on

private sector activity. Furthermore, the leadership of the PNDC made various anti private sector statements thereby discouraging private investment and on 4 June 1993, the leader used his presidential platform to attack certain private Ghanaian investors for having contributed towards the financing of other political parties. The economic climate was therefore clouded by official actions that posed serious threats to private businesses. Properties were seized and people's lifetime savings confiscated because they carried out "an act with the intent to sabotage the economy of the state". Ghanaians as at then used to describe the business environment "mistrust", "harassment" and "the absence of support" (Leechor 1994).

In conclusion, though various liberal economic policies and investment codes have been introduced to create a conducive investment climate for private investors, the attitude of governments have continued to remain somehow hostile to the private sector due to the recent high inflation, interest rates, currency depreciation (Frimpong, 2012).

2.5 Improvement of Investment Climate in Ghana

A favourable investment climate is an important determinant of a country's success in raising investment levels. It fosters productive private investment and economic growth by creating opportunities for the private sector to invest, create jobs, and lay the foundations for long-term business success (World Bank, 2005). A good investment climate is the confluence of a number of factors like low inflation, falling interest rates, growing corporate earnings, political stability, and a high degree of consumer confidence. Ghana as a developing economy over the years has embarked on several reforms to promote an enabling environment for the private sector.

First of all, the introduction of various investment codes with several incentives beneath to provide a favourable investment climate to boost private investment. The Pioneer Industries and Companies Act of 1959 was the first investment promotion enacted during the post-independence Ghana to bring a ten year tax holiday into force. In the year 1963 the capital Investment Act was also enforced to offer a variety of fiscal and other concessions to potential investors provided they adhere to certain conditions, in addition the 1973 investment decree (NRCD 1413 and investment policy decree (NRCD 329) of 1975 were introduced to encourage local investment. Again, the investment code (Act 437) of 1981 was aimed at centralizing investment promotion functions in the capital investment. Moreover, the 1985 investment code (PNDCL 116) established the Ghana Investment Centre as a central investment promotion agency charged with the power to promote and regulate investment on behalf of the government. Later the Ghana Investment Promotion Center set up under GIPC Act 478 (1994) replaced the 1985 act with the aim of reviewing it in order to focus more attention on private sector investment as parameter for economic growth and development. According to the new act, the 1985 Code is too regulatory and discourages the Investment Centre to engage in promotional activities hence, the need to revise it to place more emphasis on private sector investments to accelerate economic growth. It was then established to promote and facilitate investments in some sectors of the economy, provide information on investment opportunities in Ghana, liaising the MDAs to create an enabling environment for investment to occur etc.

Again, an economic recovery programme (ERP) was established in 1983 under the PNDC to ensure economic stability and make private investment in Ghana a possibility. This reform sought to privatize state-owned assets, devalue the currency, reduce inflation, increase

productivity, increase exports, improve transport facilities etc. and by 1987 it made a lot of progress which were clearly evident thereby enhancing private investors' confidence to invest.

Also, during the years 1987 and 1988 periods, credit was expanded to ensure adequate financial support for the priority sectors of the economy. As part of the measures taken the Financial Sector Adjustment Programme (FINSAP) was also established in 1989 to liberalise the financial system, remove administrative and other bottlenecks, review the tax structure as it relates to private investment and reduce corporate tax for some enterprises to boost private investment.

Furthermore, Ghana ratified the convention establishing the Multilateral Investment Guarantee Agency (MIGA) of the World Bank on 29th April, 1988, to encourage equity investment and other forms of foreign direct investment (FDI) by providing an investment insurance facility or cover to encourage investment in developing countries.

In conclusion, a favourable private investment climate encourages and allows private sector-led growth therefore the need for the government to constantly review the investment codes to be applicable to current condition of the economy, fight corruption and streamline regulatory and tax policy to attract more private investment.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter describes the types and sources of data and the methods and techniques used in the estimation of the models discussed in Chapter four.

3.2 Data and Model Specification

The research used a time series annual secondary data over the 1970-2011 periods. The data were issued from the World Development Indicators (WDI), Africa Development Indicators (ADI) and the Bank of Ghana (BOG).

Following the model by Marbuah and Frimpong (2010), the model for this study can be stated as:

$$PRI = f(PUI, RIR, INF, GDP, DM, EXR) \dots \dots \dots (1)$$

Where PRI being the dependent variable represents private investment and the explanatory variables PUI is public investment, RIR is real interest rate proximate by prime rate, INF is inflation, GDP is gross domestic product, DM is dummy of military regime and EXR is exchange rate.

The economic model in Equation (1) can be transformed into an econometric model as natural logarithm is applied in order to obtain a linear exponential trend (if any) in the time series data.

$$\ln PRI_t = \alpha_0 + \alpha_1 \ln PUI_t + \alpha_2 \ln RIR_t + \alpha_3 \ln INF_t + \alpha_4 \ln GDP + \alpha_5 DM_t + \alpha_6 \ln EXR_t + u_t \dots \dots \dots (2)$$

Where the coefficients $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$ and α_6 are the parameters of the respective variables and α_0 the constant term, t denotes time and u_t is the error term.

3.3 Definition and Measurement of Variables

For the purpose of this study, the following definitions and a priori expectations were used for the variables being examined.

Public Investment

Public investment may either crowd-out or crowd-in private investment. In case of the former public investment may adversely affect private investment by increasing the cost of capital through competition of scarce resources by both the government and the private investors. However, public investment may crowd in to act as a catalyst through the provision of key infrastructure to complement private investment. The expectation of public investment in this study is therefore ambiguous and will be determined in the model.

Real Interest Rate

The real interest rate is the rate of interest an investor expects to receive after investment. It is proximate by the prime rate/bank rate. The Fisher equation, defined the real interest rate as the nominal interest rate minus the inflation rate. There are competing views about the effect of real interest rates on private investment. A high level of real interest rates raises the real cost of capital, and therefore dampens the level of private investment and vice-versa. On the other hand, poorly developed financial markets have inadequate access to foreign financing for most private

projects therefore the private investment is constrained largely by domestic savings. Hence, real interest rate is expected to exert negative effect on private investment.

Inflation

Inflation reflects a reduction in the purchasing power per unit of money. When there exists high inflation individuals have to spend more by using more money to buy fewer goods. High rates of inflation adversely affect private investment activity by increasing the riskiness of longer-term investment projects, reducing the average maturity of commercial loans, and distorting the information conveyed by prices in the economy. In addition, high inflation rates are often considered a sign of macroeconomic instability and the inability of government to control macroeconomic policy, both of which contribute to an adverse private investment climate. Hence, inflation rate is expected to negatively affect private investment.

Gross Domestic Product

The gross domestic product (GDP) is one of the primary indicators used to gauge the health of a country's economy. It represents the total value of all goods and services produced over a specific time period and therefore play an important role in an economy. The growth and the level of the GDP provide an indication about the investment opportunities open to the economy. If the economy exhibits an increasing real growth, there will be potential increase in profits which will drive investors to make more investments. There is general agreement among economists that a country's growth of GDP would have a positive impact on private investment. As a result, the study expects GDP to have a positive coefficient.

Dummy of Military Regime

A period of military regime promotes a socio-politically unstable environment and an impetus for unfavourable investment climate which distorts the well-functioning of institutions within an economy. It creates uncertainty that serves as a threat to private investors hence impeding private investment. The study captured military regime as a dummy variable by assigning 1 for years with military or unconstitutional rule (i.e. 1972-1979 and 1982-1991) and 0 for years with democratic rule (i.e. 1970-1971, 1980-81 and 1993-2011). The coefficient of the military regime (dummy) variable in the model is expected to be negative.

Real Exchange Rate

The exchange rate measures the impact of exchange rate policy on private investment (Fielding, 1997). The direction of it could have a considerable impact on the level of private investment in Ghana since the economy is open to the rest of the world. Depreciation of the cedi increases the demand for local goods compared to the foreign ones, hence serve as an incentive to private investors to increase investment and vice-versa. The sign of the exchange rate can therefore not be expected before hand and will be derived from the model.

3.4 Data Analysis and Estimation Procedure

This study employed both descriptive and quantitative analysis. Charts such as graphs and tables were presented to aid in the descriptive analysis. Unit root tests was carried out on all variables using Augmented Dickey–Fuller (ADF) and Phillip-Perron test to ascertain their order of integration to avoid the problem of spurious regression. Furthermore, to perform the cointegration and obtain both the short and long run parameters of the main variables involved in

the study, it adopted the Autoregressive Distributed Lag (ARDL) econometric methodology. All estimations were carried out using Microfit 5 and Eviews 5.0 packages.

The study first investigated the time series properties of the data by using the Augmented Dickey–Fuller (ADF) and the Phillip-Perron (PP) tests. The unit root test was used to check the stationarity properties of the data. It then proceeds to test for short-run and long-run relationships among the variables using Autoregressive Distributed Lag (ARDL) approach.

It has been established empirically by various literature that most time series variables are not stationary, hence the need to establish stationarity before using them in a model to avoid spurious regression and to also make precise prediction. A series is said to be stationary if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance or lag between the two time periods and not the actual time at which the covariance are computed (Gujarati, 2003). A non-stationary variable can be made stationary if differenced appropriately. The appropriate number of differencing is called the order of integration. Hence, if a time-series, for example X , becomes stationary after being differenced y times, X is said to be integrated of order y , denoted by $X \sim I(y)$.

Therefore, to know the stationarity condition of the time series data the Augmented Dickey-Fuller and Philips Perron (PP) tests were used. The essence of conducting two distinct stationarity tests is to be sure that series enter model to be estimated in non-explosive form and mainly to address the issue of tests with low power.

The stationarity test was conducted in two steps. Firstly to determine the degree of integration of the data series by testing the model with a constant but no linear time trend, and secondly, with

both constant and linear time trend. The null hypothesis to be tested is that the variable under investigation “has a unit root” against the stationarity alternative hypothesis the variable to be tested “has no unit root”. In each case, for both the ADF and Phillip-Perron test the lag-length is chosen using the Swartz Information Criterion (SIC). The sensitivity of ADF tests to lag selection renders the Phillips-Perron test an essential additional tool for making inferences about unit roots. The basic formulation of the ADF is specified as follows:

$$\Delta X_t = \alpha + \delta t + \rho X_{t-1} + \sum_{i=1}^P \lambda_i \Delta X_{t-1} + \varepsilon_t$$

Where Δ is the first difference operator, X_t denotes the series at time t , $\alpha, \delta, \beta, \lambda$ are parameters to be estimated and ε_t is the stochastic error term. Therefore, the hypothesis is specified as:

$$H_0 : \rho = 0$$

$$H_1 : \rho \neq 0$$

To make the decision, if the tau value or t-statistic is more negative than the critical values, we reject the null hypothesis and conclude that the series is stationary. Conversely, if the tau statistic is less negative than the critical values, we fail to reject the null hypothesis and conclude that the series is non-stationary. The critical values for this t-statistic are given in Mackinnon (1991).

3.4.1 Cointegration Test

Co-integration analysis refers to a group of variables that move together, although individually they are non-stationary, in the sense that they tend to go upwards and downwards over time (Harris, 2000). Generally, this property is possessed by some non-stationary time series data.

In order to avoid the problem of non-stationarity it is necessary to make use of first (or higher) differentiated data. Such differencing, however, may result in a loss of low frequency information or long-run characteristics of the series data. After establishing that variables are stationary, it is necessary to test the cointegration i.e. to determine whether or not there is any long-term relationship between private investment and its determinants.

3.4.2 Bounds testing/ARDL procedure

Over the decades, several studies have resulted to the use of other techniques like that of Johansen cointegration technique proposed by Johansen and Juselius (1990) for cointegration or to determine the long-term relationships between variables of interest. This remains the technique of choice for many researchers who argue that this is the most accurate method to apply for $I(1)$ variables. Recently, however, quite a number of studies have used an econometric technique developed by Pesaran et.al (2001) known as the Autoregressive Distributed Lag (ARDL) bound test. This approach has some econometric merits over other cointegration methods.

Firstly, while other cointegration techniques require all of the regressors to be integrated of the same order, the bounds test can be conducted regardless of whether they are purely $I(1)$, purely $I(0)$, or fractionally integrated meaning it does not require pre-testing of the series to determine their order of integration. Again, the ARDL model is the more statistically significant approach to determine the cointegration relation in small samples (Ghatak & Siddiki, 2001), while the Johansen cointegration techniques require large data samples for validity. Furthermore, Tang (2006) stated that the ARDL procedure is also applicable when the explanatory variables are endogenous and is sufficient to simultaneously correct for residual serial correlation. Also, the

long and short-run parameters of the model in question are estimated simultaneously. Last but not least, with the ARDL approach, it is possible that different variables have different optimal numbers of lags, where as in the Johansen-type models this is not permitted.

According to Pesaran and Pesaran (1997), the ARDL approach requires the following two steps.

a) To determine the existence of any long-term relationship among the variables of interest using an F-test.

b) To estimate the coefficients of the long-run relationship and determine their values, followed by the estimation of the short-run parameters of the variables with the error correction representation of the ARDL model. The ECM version of ARDL, also help in determining the speed of adjustment to equilibrium.

The general conditional ARDL modeling specifications for equation (2) is given by:

$$\begin{aligned} \Delta \ln PRI_t = & \delta_0 + \alpha_1 \ln PRI_{t-1} + \alpha_2 \ln PUI_{t-1} + \alpha_3 \ln RIR_{t-1} + \alpha_4 \ln INF_{t-1} + \alpha_5 \ln GDP_{t-1} + \alpha_6 DM_{t-1} \\ & + \alpha_7 \ln EXR_{t-1} + \sum_{i=1}^p \beta_{1i} \Delta \ln PRI_{t-i} + \sum_{i=1}^p \beta_{2i} \Delta \ln PUI_{t-i} + \sum_{i=1}^p \beta_{3i} \Delta \ln RIR_{t-i} \\ & + \sum_{i=1}^p \beta_{4i} \Delta \ln INF_{t-i} + \sum_{i=1}^p \beta_{5i} \Delta \ln GDP_{t-i} + \sum_{i=1}^p \beta_{6i} \Delta DM_{t-i} + \sum_{i=1}^p \beta_{7i} \Delta \ln EXR_{t-i} + \varepsilon_t, \dots \dots \dots (3) \end{aligned}$$

Where Δ is the first difference operator, the parameters α_i denote the long run parameters and β_{ji} are the short-run parameters of the model to be estimated through the error correction framework in the ARDL model, δ_0 is the constant term (drift) while ε_t is a white noise error term.

Before the F-test (Wald test) is used to test the existence of long run relationship among the variables, OLS is first applied to estimate equation (3). The null hypothesis of no long run

relationship among the variables in equation (3) and then tested against the alternative hypothesis of the presence of long run relationship among the variables.

This is specified as:

$$H_0 : \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = 0$$

$$H_1 : \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6 \neq 0$$

Given that the asymptotic distribution of F-statistic is non-standard without considering the independent variables being $I(0)$ or $I(1)$, Pesaran et al. (2001) generated and presented the appropriate critical values according to the number of independent variables in the model of presence or absence of constant term or time trend in the model. Therefore, the calculated F-statistic is compared with two sets of critical values developed on the basis that the independent variables are $I(d)$ (where $0 \leq d \leq 1$). The lower critical bound assumes that all variables are $I(0)$ whereas the upper critical bound assumes the variables are $I(1)$. If the calculated F-statistic exceeds the upper critical value, then null hypothesis of no cointegration is rejected irrespective of whether the variable are $I(0)$ or $I(1)$. This implies that there is a long run relationship among the variables. Conversely, if the F-statistic falls below the lower bound then the null hypothesis of no cointegration cannot be rejected. If the F-statistic lies within the lower critical and upper critical bounds, the test is inconclusive (Pesaran&Pesaran, 1997) However, when all the variables are integrated of order zero, $I(0)$, then the null hypothesis of no cointegration is rejected implying that there exist long-run relationship among the variables, otherwise they are not cointegrated.

In order to choose optimal lag length for each variable, the ARDL methodology estimates $(m+1)^{k+1}$ number of regressions. Where m is the maximum number of lags and k is the number of variable in the equation. The orders of the lags of the ARDL models are selected using Akaike Information Criterion (AIC),

3.4.3 Long and Short-Run relationships

To obtain the long run coefficients, the model is specified as.

$$\ln PRI_t = \delta_0 + \sum_{i=1}^q \alpha_1 \ln PRI_{t-i} + \sum_{i=0}^{p_1} \alpha_2 \ln PUI_{t-i} + \sum_{i=0}^{p_2} \alpha_3 \ln RIR_{t-i} + \sum_{i=0}^{p_3} \alpha_4 \ln INF_{t-i} + \sum_{i=0}^{p_4} \alpha_5 \ln GDP_{t-i} + \sum_{i=0}^{p_5} \alpha_6 DM_{t-i} + \sum_{i=0}^{p_6} \alpha_7 \ln EXR_{t-i} + v_t \dots \dots \dots (4)$$

To obtain the short-run parameters of the variables when there exist long run relationship among the variables, then the unrestricted ARDL error correction representation with the error correction representation is estimated as:

$$\Delta \ln PRI_t = \delta_0 + \sum_{i=1}^q B_{1i} \Delta \ln PRI_{t-i} + \sum_{i=1}^{p_1} \beta_{2i} \Delta \ln PUI_{t-i} + \sum_{i=1}^{p_2} \beta_{3i} \Delta \ln RIR_{t-i} + \sum_{i=1}^{p_3} \beta_{4i} \Delta \ln INF_{t-i} + \sum_{i=1}^{p_4} \beta_{5i} \Delta \ln GDP_{t-i} + \sum_{i=1}^{p_5} \beta_{6i} \Delta DM_{t-i} + \sum_{i=1}^{p_6} B_{7i} \Delta \ln EXR_{t-i} + \lambda ECT_{t-1} + U_t \dots \dots \dots (5)$$

Where $B_{1i}, B_{2i}, B_{3i}, B_{4i}, B_{5i}, B_{6i}$ and B_{7i} are the coefficients of the short-run dynamics, while δ_0 is constant, λ is the speed of adjustment to long-run equilibrium following a shock to the system and ECT_{t-1} is the error-correction term, the residuals from the cointegration equation lagged one (1) period is defined as:

$$ECT_t = \Delta \ln PRI_t - \delta_0 - \sum_{i=0}^q B_{1i} \Delta \ln PRI_{t-i} - \sum_{i=1}^{p_1} \beta_{2i} \Delta \ln PUI_{t-i} - \sum_{i=1}^{p_2} \beta_{3i} \Delta \ln RIR_{t-i} - \sum_{i=1}^{p_3} \beta_{4i} \Delta \ln INF_{t-i} \\ - \sum_{i=1}^{p_4} \beta_{5i} \ln GDP_{t-i} - \sum_{i=1}^{p_5} \beta_{6i} DM_{t-i} - \sum_{i=1}^{p_6} \beta_{6i} \ln EXR_{t-i} \dots \dots \dots (6)$$

When variables are cointegrated, their dynamic relationship can be specified by an error correction representation in which an error correction term (ECT) computed from the long-run equation must be incorporated in order to capture both the short-run and long-run relationships (Engle and Granger, 1987). The error correction term indicates the speed of adjustment to long-run equilibrium in the dynamic model. It is expected to be statistically significant with a negative sign which implies that any disturbance that occurs in the short-run model will be corrected in the long-run. The larger the coefficients of the error correction term in absolute terms, the faster the convergence to equilibrium.

To ensure the goodness of fit of model, the diagnostic and stability or cumulative (CUSUM) and cumulative sum of squares (CUSUMSQ) tests must be conducted. This test examines the serial correlation, functional form, normality and heteroscedasticity associated with the selected model. The CUSUM and CUSUMSQ statistics are updated recursively and plotted against the breaks points. If the plots of CUSUM and CUSUMSQ statistics stay within the critical bounds of five percent level of significance, the null hypothesis of stable coefficients in the given regression is accepted.

CHAPTER FOUR

RESULTS AND DISCUSSION

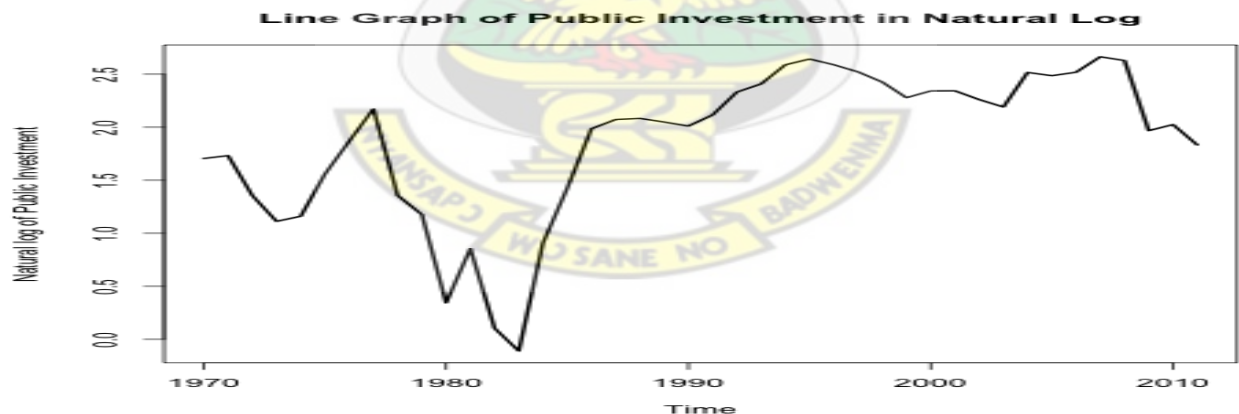
4.1 Introduction

This chapter presents and discusses the trending behavior of the factors that influence private investment, the estimation results of the ADF and PP unit root tests and the Autoregressive Distributed Lag (ARDL) approach to cointegration. These results were discussed in relation to the hypotheses of the study.

4.2 Trend Analysis of Independent Variables

The figures in this section show the trend of the determinants private investment in Ghana over the study period from 1970-2011.

Fig. 1

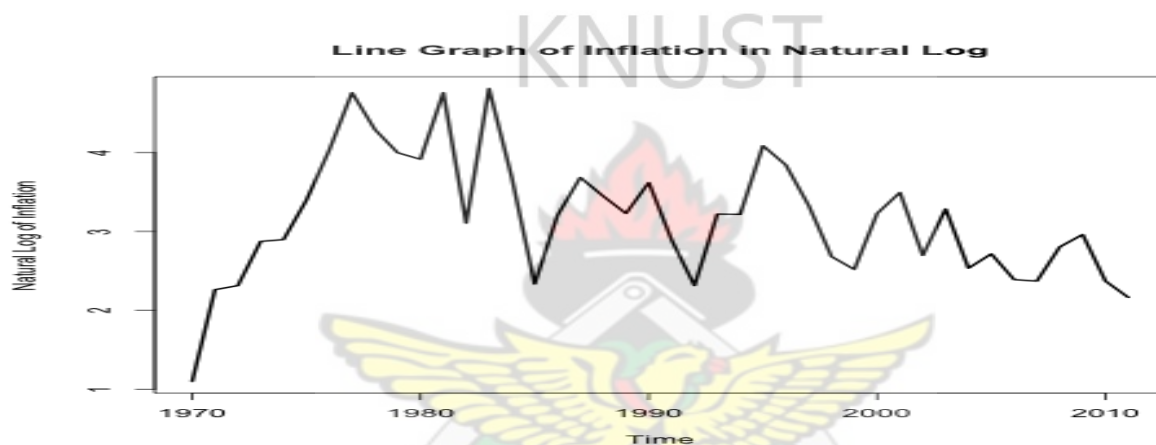


Source: Author's own construct using R programme.

From Fig. 1, it can be seen that public investment has been unsteady throughout the study period. It had its lowest decline in 1983 due to the background of the previous year's economic difficulties like the "Kalabule" or the lost decade period under the National Redemption Council (NRC) headed by Acheampong in 1982 where resources were mismanaged on "who you know

basis'', high internal corruption, illegal economic activities, unprecedented increase in petrol prices etc. contributed to a slowdown in the economic growth which resulted in the decline of public investment. The introduction of the Economic Recovery Programme (ERP) and the Structural Adjustment Programmes (SAP) as a means of reviving the economy raised public investment to 14.4% in 2007 and later fell again.

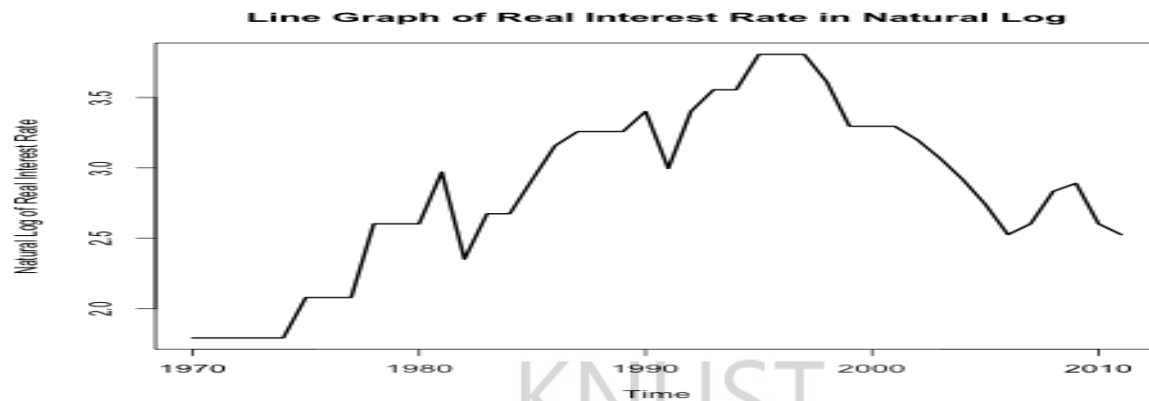
Fig. 2



Source: Author's own construct using R programme.

The trend of inflation from 1970 – 2011 as can be seen in Fig. 2 had a tremendous increases for the period 1970-1985. The inflation rate in the year 1983 of 123.9% was very severe due to a prolonged drought that hit the country, resulting in a decline in production thereby increasing prices of goods and services. The reason for the upward and downward trends is particularly as a result of changes in the prices of goods and services in the international markets especially on petroleum products. The years after 1990 were characterized by moderate and falling inflationary rates.

Fig. 3

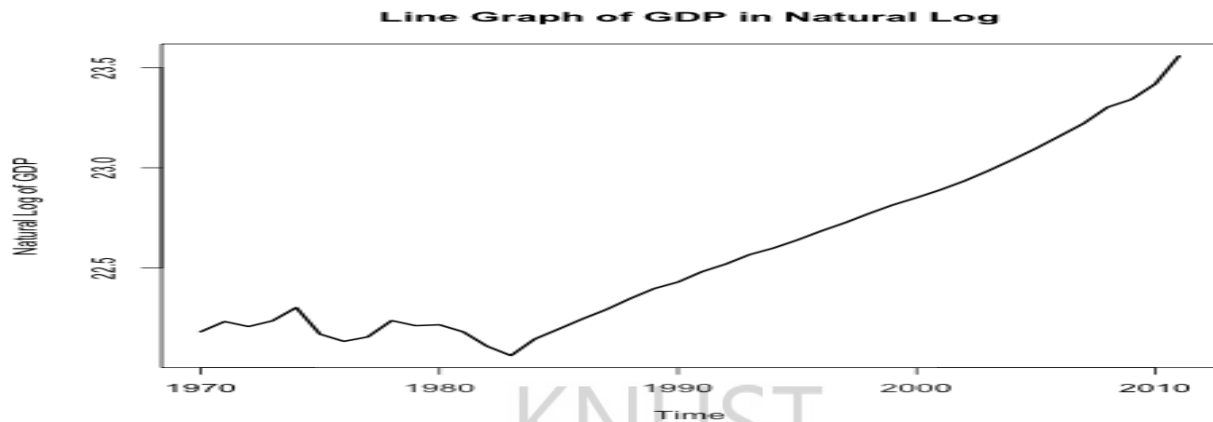


Source: Author's own construct using R programme.

Fig. 3 depicts the trend of real interest rate proximate by prime rate over the study period. It was initially stable of 3.8% from 1971-1974 periods. Thereafter it started to increase at a rate of 2.4 in 1982 and later dropped again. It attained a stabilized maximum point of 3.8% in both 1995 and 1997 periods, before being unsteady till 2011. The average inflationary rate within the study period was 37%. A high interest rate is therefore disincentive to private investors and will cause them to charge higher prices on their goods and services making the consumer to suffer and bear the full burden and vice-versa.

Fig.4

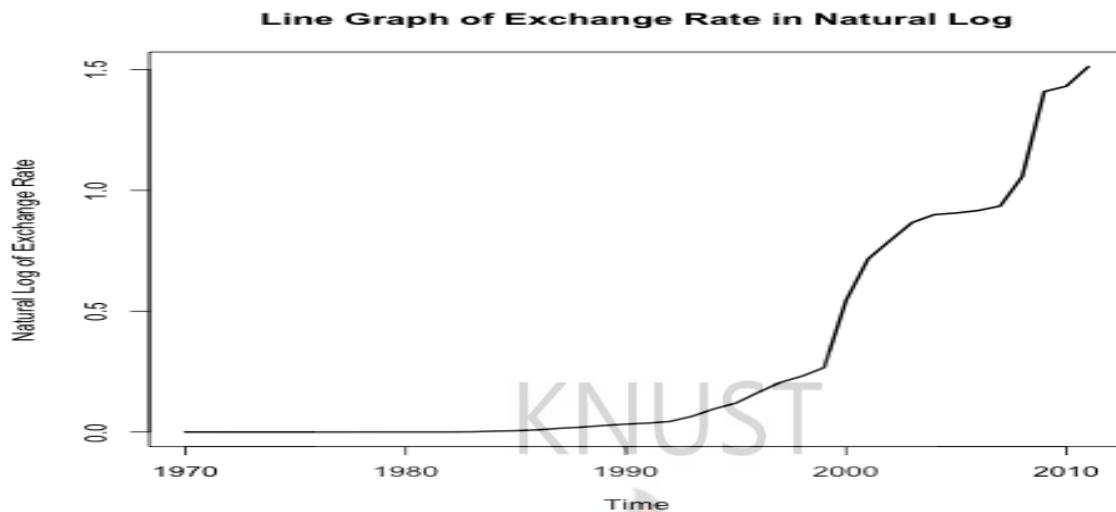
7



Source: Author's own construct using R programme

It is obvious from the Fig. 4 that GDP was unsteady from 1970 to 1983, with its minimum point in 1983 of about 22.1% due to unstable political atmosphere that disfavor economic activities. After the 1983 period the country was able to improve its economic performance through the introduction of various policies like the Economic Recovery Programme (ERP), Structural Adjustment Programme (SAP) and the Financial Sector Adjustment Programme (FINSAP) which made GDP remained positive till 2011.

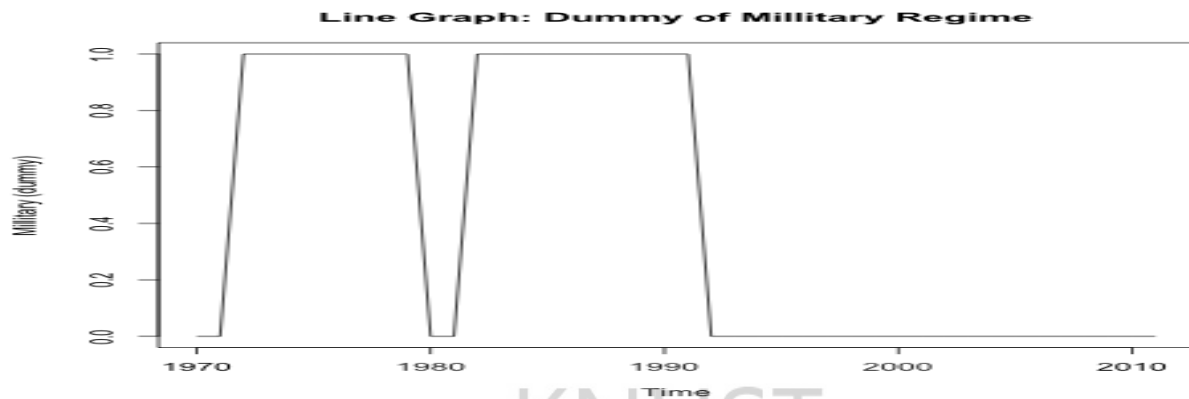
Fig. 5



Source: Author's own construct using R programme.

Fig. 5 depicts how the exchange rate has behaved during the study period. It can be noticed that the exchange rate has been positive throughout the period but initially it was relatively stable from 1970-1994 of and thereafter rose till 2011. The instability of the exchange rate had a negative effect on price of goods and services in the country. Price of goods and services from foreign countries became higher in the sight of local consumers since more cedi was needed for exchange causing inflation in the whole economy as well.

Fig. 6



Source: Author's own construct using R programme.

The line graph for dummy of military regime experienced upward and downward trends during the study period. The upward trends represents periods of military regime while the downwards trends are periods of constitutional regimes. During this military regime the economy suffered many challenges such as inflation, unstable exchange rate etc. The exchange rate was not determined by the forces of demand and supply and as a result the prices of goods did not reflect their true value. Inflation too was unchecked and the economy was stand still because our debt was too huge.

4.4 Unit root test

Although the bounds test (ARDL) approach to cointegration does not necessitate the pretesting of the variables for unit roots, it is however vital to perform this test to verify that the variables are not integrated of an order higher than one. The aim is to ascertain the absence or otherwise of $I(2)$ variables to extricate the result from spurious regression. Thus, in order to ensure that some variables are not integrated at higher order, there is the need to complement the estimated process with unit root tests.

For this reason, before applying the Autoregressive Distributed Lags approach to cointegration, unit root test was conducted in order to investigate the stationarity properties of the data. As a result, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were applied to all variables in levels and in first difference in order to formally establish their order of integration. In order to be sure of the order of integration of the variables, the test was conducted first with intercept and no time trend, and second with intercept and time trend in the model. The study used the p-values to make the unit root decision, (i.e. 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 the various tests for unit root for all the variables are presented below in a tabular form. The null and alternative hypotheses are that the series is non-stationary or contains a unit root and the series is stationary or does not contain a unit root respectively. The rejection of the null hypothesis for the test is based on the MacKinnon (1991) critical values as well as the probability values. Table 1 presents the ADF test for unit root with intercept only in the model for all the variables.

Table 1: Results of Unit Root Test with constant only: ADF Test

Levels			First Difference			
Variables	ADF-Statistic	Lag	Variables	ADF-Statistic	Lag	$I(x)$
lnPRI	-0.169315 [0.9341]	3	Δ lnPRI	-6.599849 [0.0000]	2	$I(1)$
lnPVI	-1.645312 [0.4509]	0	Δ lnPVI	-5.715165 [0.0000]	0	$I(1)$
lnRIR	-1.893300 [0.3322]	0	Δ lnRIR	-7.466731[0.0000]	0	$I(1)$
lnINF	-3.835440[0.0053]	0	-	-	-	$I(0)$
lnGDP	2.591234 [1.0000]	1	Δ lnGDP	-4.142652 [0.0023]	0	$I(1)$
DM	-2.075498 [0.2604]	0	Δ DM	-6.513923[0.0000]	1	$I(1)$
lnEXR	-0.752172 [0.8216]	2	Δ lnEXR	-3.755651 [0.0067]	0	$I(1)$

Note: Δ denotes first difference, and $I(x)$ is the order of integration. The values in parenthesis are the P-values.

Source: Computed by the author using Eviews 5.0 Package

From the unit root test results in Table 1, the null hypothesis of the presence of unit root for lnPRI, lnPVI, lnRIR, lnGDP, DM, and lnEXR became stationary at first difference whereas only lnINF variable was rejected in its level. All the variables were rejected at 1% level of significance. Table 2 presents the unit root test results obtained for the ADF test with both intercept and trend in the model.

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

Levels			First Difference			
Variables	ADF-Statistic	Lag	Variables	ADF-Statistic	Lag	$I(x)$
lnPRI	-3.996067 [0.0164]	0	-	-	-	$I(0)$
lnPVI	-1.645312 [0.4509]	0	lnPVI	-5.641176 [0.0002]	0	$I(1)$
lnRIR	-1.259167 [0.8843]	0	Δ lnRIR	-7.994343 [0.0000]	0	$I(1)$
lnINF	-4.602658 [0.0034]	0	-	-	-	$I(0)$
lnGDP	-1.070662 [0.9218]	1	Δ lnGDP	-5.843389 [0.0001]	0	$I(1)$
DM	-3.586139 [0.0432]	0	-	-	-	$I(0)$
lnEXR	-1.632482 [0.7624]	1	Δ lnEXR	-3.838302 [0.0246]	1	$I(1)$

Note: Δ denotes first difference, and $I(x)$ is the order of integration. The values in parenthesis are the P-values.

Source: Computed by the author using Eviews 5.0 Package

From the unit root test results in Table 2, it can be seen that lnPRI, lnINF and DM variables were stationary in their levels; lnINF was rejected at 1% level of significance while lnPRI and DM variables were also rejected at 5% level of significance. However, lnPVI, lnRIR, lnGDP and lnEXR variables were differenced for the first time before they became stationary at 1% level of significance, with the exception of lnEXR which was stationary at 5% significant level.

Table 3 presents the unit root test results obtained for the PP test with only intercept in the model.

Table 3: Results of Unit Root Test with intercept only: PP Test

Levels			First Difference			
Variables	PP-Statistic	Bwd	Variables	PP-Statistic	Bwd	$I(x)$
lnPRI	-2.066613 [0.2587]	6	Δ lnPRI	-10.01636[0.0000]	18	$I(1)$
lnPVI	-1.736892 [0.4057]	1	Δ lnPVI	-5.740306[0.0000]	2	$I(1)$
lnRIR	-1.875469 [0.3403]	3	Δ lnRIR	-7.406654 [0.0000]	3	$I(1)$
lnINF	-3.842824 [0.0052]	3	-	-	-	$I(0)$
lnGDP	3.449956 [1.0000]	2	Δ lnGDP	-4.155742 [0.0022]	1	$I(1)$
DM	-2.062320 [0.2604]	0	DM	-6.362792 [0.0000]	6	$I(1)$
lnEXR	-0.691974[0.8378]	3	Δ lnEXR	-3.637499 [0.0091]	4	$I(1)$

Note: Δ denotes first difference, Bwd is the Band Width, and $I(x)$ is the order of integration. The values in parenthesis are the P-values.

Source: Computed by the author using Eviews 5.0 Package

The unit root test results in Table 3 show that at first difference lnPRI, lnPVI, lnRIR, lnGDP, DM and lnEXR variables became stationary whereas only lnINF was stationary at the level. All the variables became stationary at 1% level of significance. Therefore, it can be seen that the PP unit root test results in Table 1 are in line with the results obtained from the ADF test in table 1, suggesting that all the variables are integrated of both order zero and one i.e. $I(0)$ and $I(1)$ respectively when only intercept is applied in the model. Table 4 presents the unit root test results obtained for the PP test with both intercept and trend in the model.

Table 4: Results of Unit Root Test with constant and trend: PP Test

Levels			First Difference			
Variables	PP-Statistic	Bwd	Variables	PP-Statistic	Bwd	$I(x)$
lnPRI	-3.873863[0.0221]	7	-	-	-	$I(0)$
lnPVI	-2.164757 [0.4957]	1	Δ lnPVI	-5.667697[0.0002]	2	$I(1)$
lnRIR	-1.068719 [0.9224]	2	Δ lnRIR	-7.994343 [0.0000]	0	$I(1)$
lnINF	-4.648839 [0.0030]	3	-	-	-	$I(0)$
lnGDP	-0.225245 [0.9903]	5	Δ lnGDP	-6.290125 [0.0000]	12	$I(1)$
DM	-3.567003 [0.0451]	2	-	-	-	$I(0)$
lnEXR	-1.299607 [0.8744]	3	Δ lnEXR	-3.608426 [0.0414]	5	$I(1)$

Note: Δ denotes first difference, Bwd is the Band Width, and $I(x)$ is the order of integration. The values in parenthesis are the P-values.

Source: Computed by the author using Eviews 5.0 Package

From the unit root test results in Table 4, the null hypothesis of the presence of the unit root for lnPRI, lnINF and DM variables in their levels were rejected (stationary) since the P-values of the PP statistic were statistically significant. However, at first difference, the variables lnPUI, lnGDP, lnRIR and lnEXR became stationary. All the variables were rejected (stationary) at 1% significant level with the exception of lnPRI, DM and lnEXR which were rejected at 5% level of significance. It can be seen clearly that the PP unit root test results in Table 4 are in line with the results obtained from the ADF test in table 2, suggesting that all the variables are integrated of both order zero and one i.e. $I(0)$ and $I(1)$ respectively when both intercept and trend were applied in the model.

It is therefore imperative to note that from all the unit root test results discussed above the variables are integrated of either order zero $I(0)$ or one $I(1)$. Since the test results have confirmed the absence of $I(2)$ variables or above, ARDL methodology is applicable for the estimation. The subsequent sections discuss the results of cointegration test, long and short-run analysis tests for the determinants of private investment in Ghana.

4.5 Bounds Test for Cointegration

In the first step of the ARDL analysis, the presence of long-run relationships in equation (2) using equation (3) is tested. Given that the study employed an annual data, a maximum lag length of 2 is used in the bounds test. After the lag length was determined, the F-test statistic computed within the bounds test framework is compared with the upper and lower critical values. The results of the bound test procedure for cointegration analysis between private investment and its determinant are presented in Table 5.

As shown in Table 5, the joint null hypothesis of lagged level variables (that is, variable addition test) of the coefficients being zero (no cointegration) is rejected at 5 percent significance level. This is because the calculated F-statistic value of 4.8833($F_{LNPRI(.)}=4.8833$) exceeds the upper bound critical value of 4.7141 at 95% and 90% levels. This means the null hypothesis of no cointegration between private investment and its determinants is rejected at both the 5% and 10% significance levels; hence there exist cointegration (a long run relationship) between private investment and its determinants.

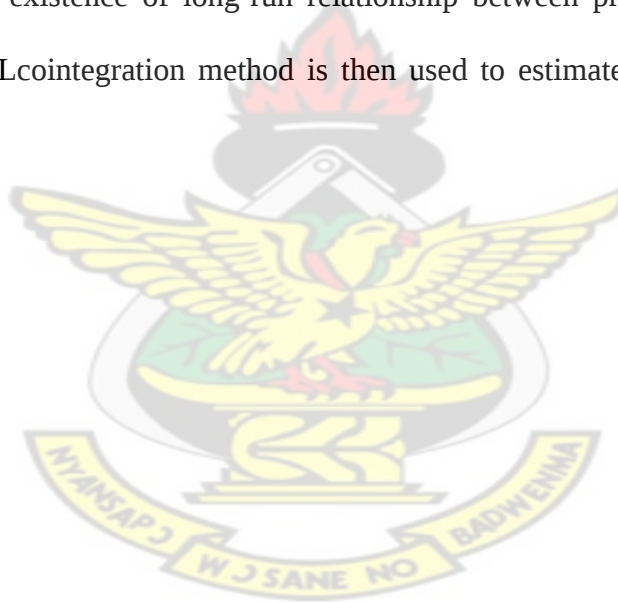
Table 5: Results of Bounds Tests for the Existence of Cointegration

95% Level			90% Level	
K	I(0)	I(1)	I(0)	I(1)
6	3.3458	4.7141	2.8277	4.0178
Dependent Variable				F-Statistic
$F_{LNPRI}(LN PRI LN PVI, LNRIR, LNINF, LNGDP, DM, LNEXR)$				4.8833

Note: K is the number of regressors

Source: Computed by the author using Microfit 5.0

Having established the existence of long-run relationship between private investment and its determinants, the ARDLcointegration method is then used to estimate long-run parameters of equation (4).



4.6 Long Run Relationship

Since private investment and its determinants are cointegrated, the long-run parameters of the ARDL model are estimated and the results are presented in Table 6.

Table 6: Estimated Long-Run Coefficients using the ARDL Approach

ARDL(2, 1, 1, 0, 1, 0, 0) selected based on AIC 40 observations used for estimation from 1972 to 2011				
Regressor	Coefficient	Standard Error	T-Ratio	P-values
C	-45.6055	18.0106	-2.5321***	[.017]
T	-.12451	.040522	-3.0727***	[.005]
LNPIUI	-.078501	.14932	-.52573	[.603]
LNRIR	-.27961	.26178	-1.0681	[.295]
LNINF	.075664	.10293	.73510	[.469]
LNGDP	2.3269	.80203	2.9012***	[.007]
DM	-.24940	.18330	-1.3606	[.185]
LNEXR	.35145	.11614	3.0260***	[.005]

Note: ***denote significance level at 1%, and C, T denotes constant and trend respectively

Dependent Variable: LNPRI

Source: Computed by the author using Microfit 5

From Table 6, it can be revealed that in the long run, public investment is negatively related to private investment but not significant. This indicates that an increase in public investment will reduce private investment due to crowding-out effect (public and private sectors compete for the same resources in the economy), though not significant. Economic theory suggests that if public investment is financed through borrowing it reduces loanable funds available to the private investor as it leads to an increase in interest rate, credit rationing and tax burden. Hence, it

increases the cost of financing private investment. This contrasts the findings by Marbuah and Frimpong (2010) where public investment indicated a positively insignificant effect i.e. public investment crowds-in or increases private investment.

Again, as suggested by the literature real interest rate had a negative and insignificant impact on private investment. The negative coefficient confirms the neoclassical theory on user cost of capital i.e. a rise in the real interest rate raises the cost of borrowing and reduces the ability of private investors to invest. However, the insignificant effect implies the animal spirit of investors as argued by Keynes as the zeal of investors to invest to earn profit regardless of the interest rate. This zeal of investors to invest is primarily caused by intrinsically motivated factors. This result contrasts the work done in Ghana by Marbuah and Frimpong (2010) and Akpalu (2002).

Also, contrary to the expectation, inflation was positive and insignificant. This confirms the Tobin effect which suggests that moderate inflation (ranges from 5% to 30%) causes individuals to substitute money into interest earning assets because inflation lowers the return on monetary assets relative to real assets, such as physical capital hence stimulating private investment. This result is consistent with Were (2001) for Kenya but contrasts Marbuah and Frimpong (2010) and Akpalu (2002) findings of positively insignificant effect of inflation in Ghana. They therefore, argued that enterprises respond to higher prices of goods and services by increasing output with other potential investors joining in to take advantage of soaring prices and profitability in the economy.

Furthermore, gross domestic product in the long run confirms the theoretical underpinnings by been positive and significant. Thus the GDP which represents the total value of all goods and services produced in the economy at a specified period of time acts on the accelerator principle

to increase businesses sales and profits in general. Since the main motive of investors is to make profit they would be encouraged to expand their operations. Also, it will serve as an incentive to attract other additional investors to invest, thereby stimulating private investment in the economy. The coefficient reveals a 1 percent increase in gross domestic product will increase private investment by 2.3 percent. This confirms the empirical works done in Ghana by Marbuah and Frimpong (2010) and Akpalu (2002).

The dummy of military regime is consistent with the theoretical expectation, depicting a period of military regime or political instability has an insignificantly negative impact on private investment. The negative coefficient implies that constitutional overthrows military takeovers create an unfavourable private investment climate, which threatens and discourages private investors to invest. The insignificance nature talks about the fact that, though military regime existed but for only a short period and not consistent so it did not have any influence on private investment in Ghana. The result is similar with findings of Bakare (2011) for Nigeria but contrasts the work done by Frimpong and Marbuah (2010) for Ghana, where political instability was positively insignificant.

Last but not least, exchange rate had a positive and significant impact on private investment. The positive coefficient depicts that an appreciation of the exchange rate increases private investment in the economy. The appreciation of the exchange rate simply means the value of the local currency has increased as compared to other foreign currencies. Hence this situation will compel private investors in Ghana to invest more locally to increase their returns as compared to investing outside the economy. Specifically, it signifies that in the long run, a 1% change in depreciation of the Ghana cedi relative to a foreign currency will cause an increase of about 0.35

% in private investments. The result is similar to findings by Marbuah and Frimpong (2010) and Akpalu (2002) for Ghana.

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4.7 Short Run Relationship

Once the long-run cointegrating model has been estimated, the next step is to model the short-run dynamic relationship among the variables within the ARDL framework. Table 7 presents the results of the estimated error-correction model of private investment determinants for Ghana using the ARDL technique.

Table 7: Estimated Short-Run Error Correction Model using the ARDL Approach

ARDL(2, 1, 1, 0, 1, 0, 0) selected based on AIC 40 observations used for estimation from 1972 to 2011				
Regressor	Coefficient	Standard Error	T-Ratio	P-values
dT	-.16875	.051984	-3.2461	[.003]
dLNPRI1	.30253	.16936	1.7863	[.084]
dLNUI	.26059	.23456	1.1109	[.275]
dLNRIR	-.90021	.42483	-2.1190	[.042]
dLNINF	.10255	.13658	.75083	[.459]
dLNGDP	-.97249	1.9759	-.49217	[.626]
dDM	-.33802	.26319	-1.2843	[.209]
dLNEXR	.47631	.15762	3.0220	[.005]
ECM(-1)	-1.3553	.25576	-5.2991	[.000]
R-Squared	.66004	R-Bar-Squared	.50894	
S.E. of Regression	.37718	F-stat. FF(9,30)	8.1242	[.000]
Mean of Dependent Variable	.020747	S.D. of Dependent Variable	.53825	
Residual Sum of Squares	3.8412	Equation Log-likelihood	-9.8959	
Akaike Info. Criterion	-22.8959	Schwarz Bayesian Criterion	-33.8736	
DW-statistic	2.0642			

Source: Computed by the author using Microfit 5.0

Dependent Variable: dLNPRI

The short run estimate of public investment contrasts the long run as it indicates a positively insignificant effect of public investment on private investment. This depicts a crowding-in effects, a situation where public investment is made on social and physical infrastructure (in the form of roads, energy and communication) to complement private investment. This ensures a proper functioning of the market system though according to the empirical results it was not significant. This result is similar to the findings of Erden (2005) for developing countries but contrasts studies by Marbuah and Frimpong (2010) and Akpalu (2002) who had public investment to be significantly positive in the short run.

Also, in the short run the real interest rate showed a significantly negative relationship to private investment confirming the theoretical underpinning by the neoclassical theory on user cost of capital. The coefficient specifically implies, a 1 percent increase in interest rate will induce a 0.9 percent reduction in private investment. The result is similar to empirical work by Lesotho (2006) for Botswana and Erden (2005) for developing countries, but contrasts the work by Marbuah and Frimpong (2010) and Akpalu (2002) who indicated inflation to be positively significant.

Again, as in the long run inflation was positive and insignificant. The coefficient depicts inflation stimulates private investment as suggested by the Tobin effect (moderate inflation stimulates private investment) though not significant. The results confirm the findings by Rehman et.al (2009) for Pakistan but contrast the work by Marbuah and Frimpong (2010) with inflation being significantly positive.

Furthermore, the gross domestic product differs from the long run results by being negative and insignificant. This implies the coefficient of GDP acts through the accelerator effect to hurt businesses by reducing their sales and profits thereby discouraging private investment. The insignificant coefficient could be that firms in Ghana in the short-run usually operate below full capacity hence increasing aggregate demand does not necessitate expansion of capital stock (Akpalu, 2002). The result contrasts the findings by Marbuah and Frimpong (2010) and Akpalu (2002) for Ghana, who had GDP to be positive and insignificant.

The dummy military regime is consistent to the theoretical expectation and similar to the long run results, depicting that periods of military regime or political instability had an insignificantly negative impact on private investment. The negative coefficient implies that constitutional overthrows or military takeovers deteriorate private investment in Ghana but because it lasted for only a short period it did not have any impact on private investment in Ghana. This result contrasts the findings by Marbuah and Frimpong (2010) who had political instability to be positively significant.

Lastly, exchange rate had a positive and significant impact on private investment as in the long run. The positive coefficient depicts exchange rate stimulates private investment in Ghana i.e. a 1% change in the depreciation of the Ghana cedi relative to a foreign currency causes an increase of about 0.48 % in private investments. The result is consistent with Marbuah and Frimpong (2010) and Akpalu (2002) for Ghana.

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

$$\begin{aligned} \text{ECM} = & \text{LNPRI} + .078501*\text{LNPUUI} + .27961*\text{LNRIR} -.075664*\text{LNINF} -2.3269*\text{LNGDP} \\ & + .24940*\text{DM} -.35145*\text{LNEXR} + 45.6055*\text{C} + .12451*\text{T} \end{aligned}$$

4.8 Model Diagnostics and Stability Tests

In order to check for the estimated ARDL model, the significance of the variables and other diagnostic tests such as serial correlation, functional form, normality and heteroskedasticity of the model are considered. As shown in Table 8, the model generally passes all diagnostic tests.

The diagnostic test shows that there is no evidence of serial correlation and the model passes the normality and the test proved that the error is normally distributed. Additionally, the model passes the test for heteroskedasticity.

Table 8: Model diagnostics

Diagnostics Test Statistic	
$X^2_{Auto}(1)$	.81110 [0.368]
$X^2_{F.form}(1)$	3.1582 [0.076]
$X^2_{Norm}(2)$	.20159 [0.904]
$X^2_{Hetro}(1)$	1.7905 [0.181]

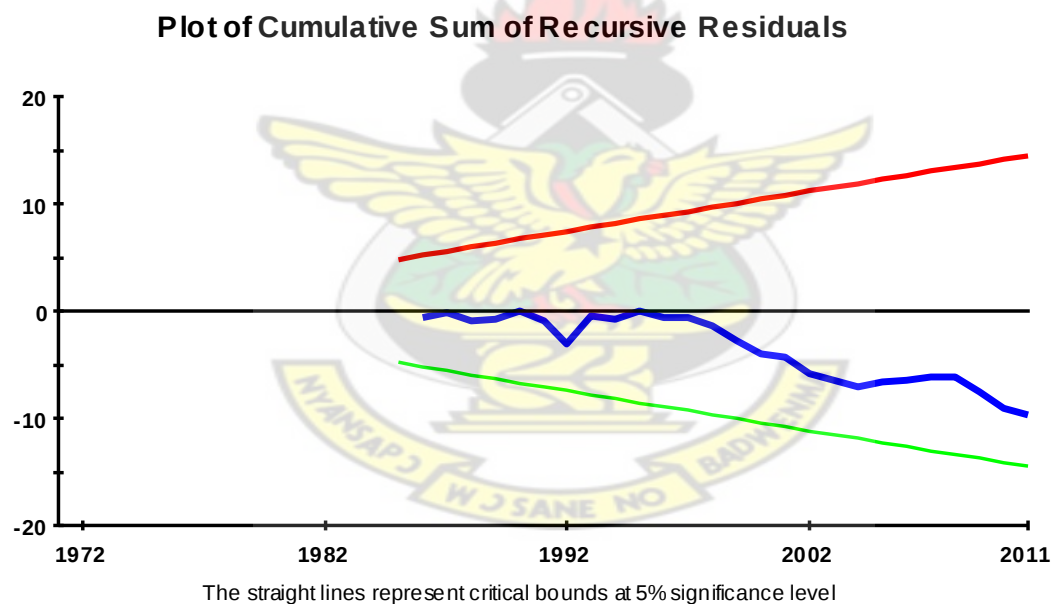
Note: X^2_{Auto} , $X^2_{F.form}$, X^2_{Norm} , and X^2_{Hetro} are Lagrange multiplier statistics for test of serial correlation, functional form specification, normal errors and heteroskedasticity respectively. These statistics are distributed as Chi-square values with degree of freedom in parentheses. Values in parentheses [] are probability values.

Source: Computed by the author using Microfit 5

Finally, when analyzing the stability of the coefficients, the Cumulative Sum (*CUSUM*) and Cumulative Sum of Squares (*CUSUMQ*) are applied. Following Pesaran and Pesaran (as cited in Bahmani-Oskooee, 2004), the stability of the regression coefficients is evaluated by stability tests and they can show whether or not the parameter estimates are stable over time. This

stability test is appropriate in time series data, especially when one is uncertain about when structural change might have taken place. The result for *CUSUM* and *CUSUMQ* are shown in Figure 1 and 2. The null hypothesis is that the coefficient vector is the same in every period and the alternative is that it is not (Bahmani-Oskooee, 2004). The *CUSUM* and *CUSUMQ* statistics are plotted against the critical bound of 5 percent significance level. According to Bahmani-Oskooee (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.

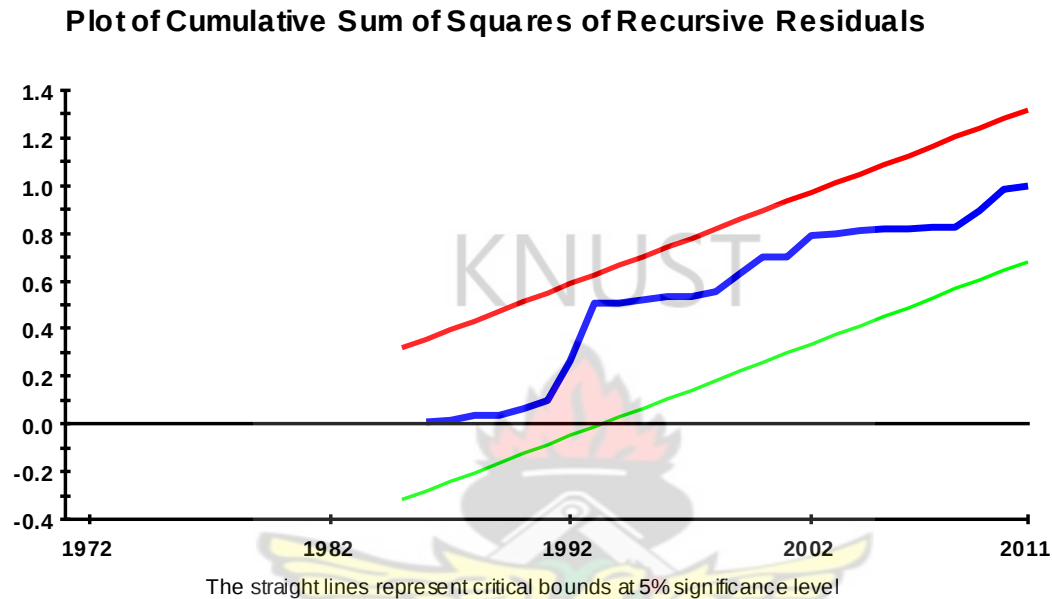
Fig. 8



Note: The variable on the vertical axis is the square of the residuals while the variable on the horizontal axis is years in quarters.

Source: Generated by the author using Microfit 5

Fig. 9



Note: The variable on the vertical axis is the square of the residuals while the variable on the horizontal axis is years in quarters.

Source: Generated by the author using Microfit 5

As shown in Figures 8 and 9, the plot of both the CUSUM and CUSUMSQ residuals are within the 5 percent critical bound (boundaries). That is to say that the stability of the parameters has remained within its critical bounds of parameter stability. It is clear from both graphs in Figures 2 and 3 that both the CUSUM and CUSUMQ tests confirm the stability of coefficients of the private investment functions.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter presents summary, conclusions and recommendations of the study. The summary presents a brief overview of the research problem, objectives, methodology and findings, the conclusions capture the overall outcomes regarding the findings of the study in light of the hypotheses. The chapter furthermore provides policy recommendations.

5.2 Summary of Findings

This study investigated the determinants of private investment in Ghana using a time series data from 1970-2011. The relevance of understanding the determinants of private investment lies in the fact that private investment has been the main engine of growth for countries over the decades. The study examined the trending behaviour of public investment, real interest rate proximate by prime rate, inflation rate, real gross domestic product, dummy of political regime and exchange rate, which are the factors that determine private investment over the study period. It specifically examined the determinants of private investment by employing the Autoregressive Distributed Lag (ARDL) bounds test approach to cointegration and a long run relationship was revealed. Public investment, real interest rate and the dummy of military regime were negatively related to private investment while inflation, gross domestic product and real exchange rate affected private investment positively. However, gross domestic product and the exchange rate were the only significant variables among the other variables. The error correction model showed in the short run indicated that the coefficient of real interest rate, gross domestic product and the dummy of military regime were negatively related to private investment while public investment,

inflation and exchange rate had a positive relationship. Unlike the other variables real interest rate and exchange rate were significant. The diagnostic tests results also indicated the model passed the test of serial correlation, functional form specification, normality and heteroscedasticity. The graphs of the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) showed the parameters were stable.

5.3 Policy Recommendations

Taking into consideration the findings from the study, the following recommendations are proposed.

First of all, to ensure development in the private sector in order to attract investment, there is the need for the government to promote growth enhancing policies such as development of physical infrastructure like roads, electricity, airports etc. and the human capital through education.

Again, the government must promote exchange rate stabilization policies through trade restrictions to cut down imports and promote the export sector through subsidies to stimulate private investment.

Lastly, the credit market for private investors must be given preferential treatment like tax holidays to increase the volume of their credit which will in turn reduce the level of interest rate to promote private investment, all things being equal.

5.4 Limitation of the Study

The study adopted an aggregate approach in its investigation of private investment. since there are other possible determinants of private investment ranging from macroeconomic factors, legal

and institutional factors, geographical factors, monetary and fiscal policy factors etc. Therefore this means future researchers could explore the other determinants of private investment other than those considered in this study.

5.4 Conclusion

Investigating the determinants of private investment has become a subject of interest for researchers. The reason is the mounting evidence that indicates the significant improvement private investment to economic growth. However, since private investment depends on a number of macroeconomic factors, the study therefore investigated the determinants of private investment in Ghana from 1970-2011 periods. It was revealed that although, variables like inflation rate, exchange rate, real interest rate and the dummy of military regime had a consistent relationship with private investment in both the long and short run, inflation and the dummy of military regime were insignificant in both periods. Exchange rate remained significant in both periods while real interest rate was significant in the long run but insignificant in the short run period. Again, public investment affected private investment negatively in the long run and positively in the short run its impact was considered to be insignificant in both periods Gross domestic product was positive and significant in the long run whilst being negative and insignificant in the short run.

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APPENDICES

APPENDIX A:

Autoregressive Distributed Lag Estimates

ARDL(2,1,1,0,1,0,0) selected based on Akaike Information Criterion

Dependent variable is LNPRI

40 observations used for estimation from 1972 to 2011

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LNPRI (-1)	-.052766	.18644	-.28302[.779]
LNPRI (-2)	-.30253	.16936	-1.7863[.085]
LNPIUI	.26059	.23456	1.1109[.276]
LNPIUI (-1)	-.36698	.22445	-1.6350[.114]
LNRIR	-.90021	.42483	-2.1190[.043]
LNRIR (-1)	.52126	.33511	1.5555[.131]
LNINF	.10255	.13658	.75083[.459]
LNGDP	-.97249	1.9759	-.49217[.627]
LNGDP (-1)	4.1261	2.1220	1.9444[.062]
DM	-.33802	.26319	-1.2843[.210]
LNEXR	.47631	.15762	3.0220[.005]
C	-61.8089	23.8690	-2.5895[.015]
T	-.16875	.051984	-3.2461[.003]

R-Squared	.83826	R-Bar-Squared	.76637
S.E. of Regression	.37718	F-Stat.	F(12,27) 11.6611[.000]
Mean of Dependent Variable	1.9008	S.D. of Dependent Variable	.78036
Residual Sum of Squares	3.8412	Equation Log-likelihood	-9.8959
Akaike Info. Criterion	-22.8959	Schwarz Bayesian Criterion	-33.8736
DW-statistic	2.0642		

Testing for existence of a level relationship among the variables in the ARDL model

F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
4.8833	3.3458	4.7141	2.8277	4.0178

W-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
34.1832	23.4205	32.9987	19.7942	28.1246

If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect can't be rejected. The critical value bounds are computed by stochastic simulations using 20000 replications.

20/03/2014

15:32:01

Estimated Long Run Coefficients using the ARDL Approach
ARDL(2,1,1,0,1,0,0) selected based on Akaike Information Criterion

Dependent variable is LNPRI

40 observations used for estimation from 1972 to 2011

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LNPII	-.078501	.14932	-.52573[.603]
LNRII	-.27961	.26178	-1.0681[.295]
LNINF	.075664	.10293	.73510[.469]
LNIGDP	2.3269	.80203	2.9012[.007]
DM	-.24940	.18330	-1.3606[.185]
LNEXR	.35145	.11614	3.0260[.005]
C	-45.6055	18.0106	-2.5321[.017]
T	-.12451	.040522	-3.0727[.005]

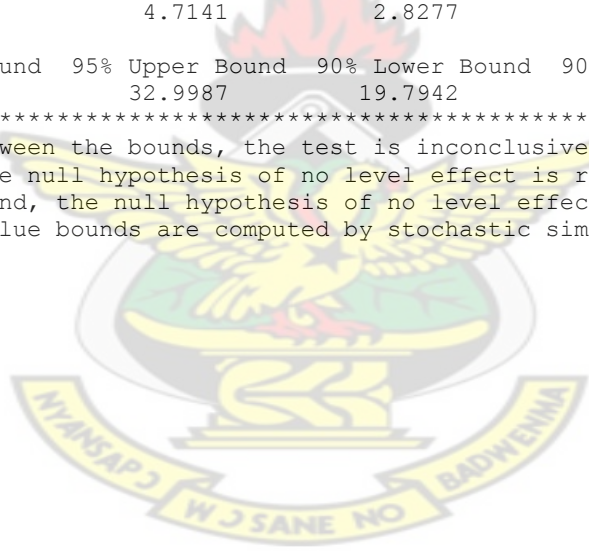
Testing for existence of a level relationship among the variables in the ARDL model

F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
4.8833	3.3458	4.7141	2.8277	4.0178

W-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
34.1832	23.4205	32.9987	19.7942	28.1246

If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect can't be rejected. The critical value bounds are computed by stochastic simulations using 20000 replications.

20/03/2014



15:32:21

Error Correction Representation for the Selected ARDL Model
ARDL(2,1,1,0,1,0,0) selected based on Akaike Information Criterion

Dependent variable is dLNPRI

40 observations used for estimation from 1972 to 2011

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dLNPRI1	.30253	.16936	1.7863[.084]
dLNPU1	.26059	.23456	1.1109[.275]
dLNRIR	-.90021	.42483	-2.1190[.042]
dLNINF	.10255	.13658	.75083[.459]
dLNGDP	-.97249	1.9759	-.49217[.626]
dDM	-.33802	.26319	-1.2843[.209]
dLNEXR	.47631	.15762	3.0220[.005]
dT	-.16875	.051984	-3.2461[.003]
ecm(-1)	-1.3553	.25576	-5.2991[.000]

List of additional temporary variables created:

dLNPRI = LNPRI-LNPRI(-1)

dLNPRI1 = LNPRI(-1)-LNPRI(-2)

dLNPU1 = LNPUI-LNPUI(-1)

dLNRIR = LNRIR-LNRIR(-1)

dLNINF = LNINF-LNINF(-1)

dLNGDP = LNGDP-LNGDP(-1)

dDM = DM-DM(-1)

dLNEXR = LNXR-LNXR(-1)

dT = T-T(-1)

ecm = LNPRI + .078501*LNPUI + .27961*LNRIR -.075664*LNINF -2.3269*LNGDP
+ .24940*DM -.35145*LNEXR + 45.6055*C + .12451*T

R-Squared	.66004	R-Bar-Squared	.50894
S.E. of Regression	.37718	F-Stat.	F(9,30) 5.8245[.000]
Mean of Dependent Variable	.020747	S.D. of Dependent Variable	.53825
Residual Sum of Squares	3.8412	Equation Log-likelihood	-9.8959
Akaike Info. Criterion	-22.8959	Schwarz Bayesian Criterion	-33.8736
DW-statistic	2.0642		

R-Squared and R-Bar-Squared measures refer to the dependent variable

dLNPRI and in cases where the error correction model is highly

restricted, these measures could become negative.

Testing for existence of a level relationship among the variables in the ARDL model

F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
4.8833	3.3458	4.7141	2.8277	4.0178

W-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
34.1832	23.4205	32.9987	19.7942	28.1246

If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect can't be rejected. The critical value bounds are computed by stochastic simulations using 20000 replications.

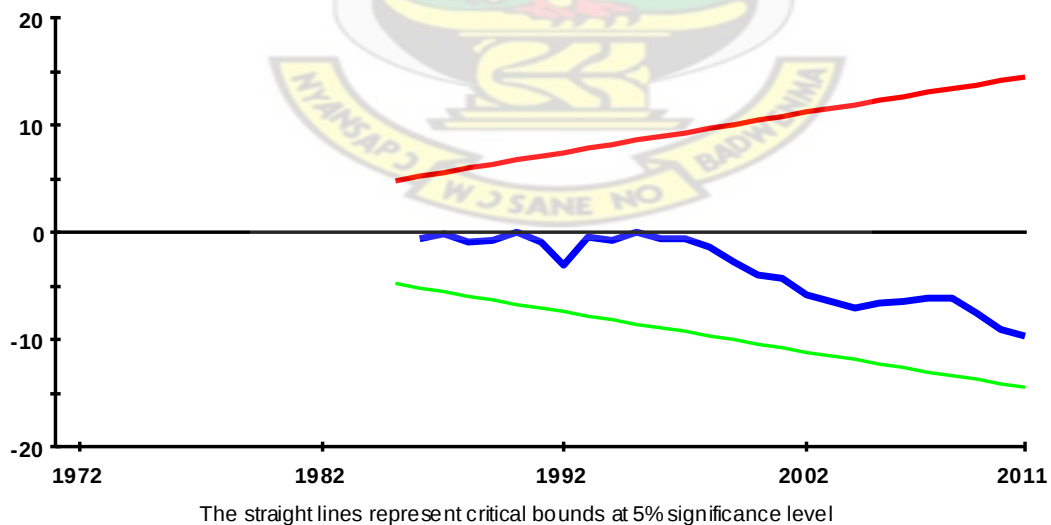
APPENDIX B: Model diagnostics

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Diagnostic Tests
*****
*      Test Statistics      *      LM Version      *      F Version      *
*****
*
* A:Serial Correlation*CHSQ(1) = .81110[.368]*F(1,26) = .53813[.470]*
*
* B:Functional Form *CHSQ(1) = 3.1582[.076]*F(1,26) = 2.2288[.147]*
*
* C:Normality *CHSQ(2) = .20159[.904]* Not applicable
*
* D:Heteroscedasticity*CHSQ(1) = 1.7905[.181]*F(1,38) = 1.7807[.190]*
*****
A:Lagrange multiplier test of residual serial correlation
B:Ramsey's RESET test using the square of the fitted values
C:Based on a test of skewness and kurtosis of residuals
D:Based on the regression of squared residuals on squared fitted values

```

Plot of Cumulative Sum of Recursive Residuals



Plot of Cumulative Sum of Squares of Recursive Residuals

