

**INVESTIGATING THE IMPACT OF INTEREST RATE ON DOMESTIC
PRIVATE INVESTMENT IN GHANA**

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**A THESIS SUBMITTED TO THE DEPARTMENT OF ECONOMICS, KWAME
NKRUMAH UNIVERSITY OF SCIENCE & TECHNOLOGY, IN
PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF
MSC ECONOMICS (GENERAL OPTION)**

SEPTEMBER, 2016

DEDICATION

This work is wholly dedicated to my wife, Mrs. Theresa Dapaaah-Yeboah who through her hard work, support and advice has brought me this far.

ACKNOWLEDGEMENT

I am most thankful to the Almighty God for His grace, guidance and protection throughout my life and for seeing me through to the successful completion of this thesis.

I wish to express my gratitude to my supervisor, Dr. Yusif Hardrat for the constructive criticisms, comments, suggestions, advice and guidance in writing this thesis. Am also indebted to Dr. Eric Arthur (Lecturer, Department of Economics, KNUST) who assisted and introduced me to the Microfit econometric software package for my data analysis. My sincere thanks also go to Ms. Linda Akoto (MPhil Student, Department of Economics, KNUST) for the shared data set that facilitated the analysis of this work.

The support of my family, friends and colleagues was also invaluable to the successful completion of this thesis.

ABSTRACT

The study investigated the impact of interest rate on private investment in Ghana for the period 1970 to 2015. To achieve these objectives, the study test for stationarity using the ADF test and the ARDL estimation techniques in the analysis. The long run results showed that interest rate positively influenced private investment. GDP was also found to impact positively on private investment while inflation, exchange rate and FDI were found to exhibit negative and significant impact, with public investment and credit to the private sector showing insignificant impacts on private investment. The short run results also revealed that previous values of private investment influenced current investment but positively and negatively as well. Interest rate was found to exert negative impact for current and two year values whilst lag one showed positive impact. Other short run determinants of private investment were exchange rate, inflation, GDP, FDI, public investment, and credit to the private sector. The trend analysis also showed that both private investment and interest rate in Ghana have been unstable over the study period. The results suggested that interest rate must be able to encourage higher private investment. This can be done by increasing the real interest rate on private savings or household savings so that larger amount of income would be saved to accumulate more capital and hence private investment. By this, the higher real interest rate would increase private savings which would also increase capital accumulation and hence private investment.

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CHAPTER ONE INTRODUCTION

1.1 Background to the Study

A central piece in economic studies and particularly in the analysis of development process is the role and the ramification of capital. Although there is no unanimity of views about the determinants of domestic investment, there is scarcely any doubt about the close connection between capital formation, the growth of output, the level of employment, the structure of income and the character of effective demand”.

Though conceptual differences exist, one way of narrowing down the analytical complexity involved is to concentrate on the core or the more immediate factors that are likely to influence the level of domestic investment generally in a given national economy. In such a simplified and generalized setting, we might identify three highly probable factors that would influence the level of investment. These are interest rate, amount of capital and the current level of economic activity. However, for the purpose of this research interest rate would be of prime concern”.

Investment is the change in capital stock during a period. Consequently, unlike capital, investment is a flow term and not a stock term. This means that capital is measured at a point in time, while investment can only be measure over a period of time. Investment plays a very important and positive role for progress and prosperity of any country. Many countries rely on investment to solve their economic problem such as poverty, unemployment etc. (Haron and Nasr 2004).Interest rate represents the cost of borrowing investment funds or the opportunity cost of using such funds in a

particular way rather than in other alternative ways.

The practice of applying interest rate differently to different sectors was begun in Ghana in the 1970s and intensified in the 1980s. The application of interest rates to different economic sectors may be regarded as less direct control mechanism in ensuring that priority sectors gained improved access to credit. This was based on the presumption that the market rate, if universally applied, would ration out some of the priority sectors”.

In this pursuit, interest rates were perceived by the monetary authorities as the cost of loanable funds, and were subsequently adjusted periodically to promote the level of investment among the different sectors and to ensure an inflation-free process of economic growth. The three priority sectors of agriculture, export trade and manufacturing were detailed to benefit from this arrangement. With this interest rate structure, it was certainly possible for small enterprises to obtain loans and advances from banks at concessionary rates, when banks were prepared to lend”.

Following the adoption of a financial sector adjustment programme in Ghana in 1985, it was generally expected that through a liberalization of formal finance system, banks would set lending and deposit rates that accurately reflected credit supply and demand conditions. However, developments in interest rates during the 1991 and 1992 reflected progress towards achieving the objectives. According to the State of the Ghanaian Economy (1992), in 1992, bank rates were revised downwards continuously

during 1991. It was revised from 35% in January 1991 to 32% in August the same year. For most of 1992 money market interest rates remained relatively stable until August, and so did deposit and lending rates which were positive in real terms during the period. The first two months of 1993 saw an unchanged bank rate, but lending rates climbed up to 31.5%”.

In March the same year the bank rate went up to 35% as monetary authorities intensified open market operations in a bid to control money supply. In support of the objective of controlling money supply in order to contain inflationary pressures, Bank of Ghana raised the bank rate so that the average for the year was 45% as against 41.5% in 1995. Following this, commercial banks raised most of their lending rates to an average of 47% throughout the year. Significantly, interest rates generally edged upwards from their second quarter levels along with the inflationary trend in 2000. Lending rates rose during the year. The range between all sectors rose from 28-49% in June to 34-56% in August to September 2000. However between 2000 and 2009 there was some stability in the rate of interest in Ghana between the range of 26% and 30%” (State of the Ghanaian Economy 1992).

Contrary to general expectations, almost twenty five (25) years after the introduction of a liberal climate, the monetary authorities in Ghana have been dissatisfied with the continuing rise in the interest rate spreads of various banks and the shrinking volume of loans being made out by banks. The interest rate trends described above are typical of the continuing widening spread between lending rate and deposit rates

long after financial sector reforms begun in Ghana. Undoubtedly, in a developing economy like Ghana, the speed and steadiness of the rate of investment has an influence in shaping the overall growth of the economy”.

Essentially, financing plans for most of the investment projects in the country are of foreign source, indicating that local participation in investment financing particularly in the form of local loan and local equity is negligible. At present in Ghana, private investment is very low as compared to rapidly developing countries. Indicators of enterprise performance such as capacity utilization, value added, productivity and others suggest that in most cases, private commercial activity is still very low. As the country making strides in the direction of fostering a positive climate for domestic investment, it needs to do more at reducing transaction costs and uncertainties faced by private investors.(Bawumia, 2010)

1.2 Statement of Problem

From the 1970s and 1980s, policy makers have used interest rate differentiation among the three major sectors of the economy. Interest rate was 9.6% for agriculture, 6.5% for export trade and 8.5% for manufacturing. These were detailed to benefit from this arrangement. Monetary authorities perceived interest rates as the cost of loanable funds, and were subsequently adjusted periodically to promote the level of investment among the different sectors. (State of the Ghanaian Economy, 1992).

Following the adoption of financial sector reforms (FINSAP) in 1988, the financial sector was liberalized in order to stimulate savings and investment thereby promoting

growth of the economy. With FINSAP, interest rate ceilings were abolished and credit controls were also abolished” (Bawumia, 2010).

In the 1990s interest rates declined from 35% in January 1991 to 32% in August 1991. Between 2000 and 2015 the rate of interest fluctuated between 26% and 35%. Almost thirty three (33) years after the liberalization of the financial sector climate, the monetary authorities have not been satisfied with the continuing rise in the interest rate spreads of various banks and the shrinking volume of loans being made out by banks. (State of the Ghanaian Economy, 2015).

Indeed investment decisions are taken by comparing the expected yield or MEC with the cost of capital which is the real interest rate”. “At lower rates of interest, more capital projects appear financially viable while higher interest rates lead to some projects being postponed or cancelled since the cost of borrowing to finance investment become higher” (Keynes, 1936).

Past studies (Fowowel 2011, Nair 2004, Bawumia 2010, Asante 2000, and Ouattara 2004) have examined how financial factors have indeed contributed to the increased levels of investment in some economies. However, to the best of the researcher’s knowledge no study has investigated the impact of interest rate on domestic private investment in Ghana. The present study thus seeks to fill this knowledge gap.

1.3 Research Objectives

Generally, the study seeks to the impact of interest rate on domestic private investment in

Ghana. Specifically, the objectives of this study are to”:

To examine the trend of investment and interest rate in Ghana

To find out determinants of private domestic investment decision in Ghana.

1.4 Research Hypotheses

The study seeks to test and validate the following empirical hypotheses:

H₀: Real interest rate has no significant impact on private investment H₁: Real interest rate has a significant impact on private investment

1.5 Justification

Despite all the attention devoted by policymakers to creating an enabling and congenial environment for private sector investment, available empirical literatures on investment behavior in Ghana, to the researcher’s best knowledge, has not yet exclusively been focused on investigating the impact of real interest rate in determining domestic private investment in Ghana”. “This study, as one of its central objectives, attempted to provide an empirical analysis of the impact of interest rate on private investment in Ghana. In line with this, the study suggested ways and means through which government policies can stimulate private investment to boost economic growth.

Whereas researchers have shifted their attention towards the role of financial determinants in explaining investment in many countries over time, none of the previous studies on investment behavior in Ghana explored this crucial role of interest

rate in the case of Ghana. This study is aimed at filling this research and knowledge gap in Ghana by assessing the effects of some selected financial development indicators on private investment in Ghana. The results of this study will have important implications for policymakers. This will help identify control measures to curb down these economic indicators especially interest rate and that achieve an appreciable level of domestic investment. This is exactly what the study sought to achieve”.

1.6 Scope of the Study

Conceptually, the study seeks to find out the impact of interest rate volatility and other specific financial variables on private investment in Ghana. This is because, private investment is very important in determining the level of both real output and total employment in an economy. More precisely, the study examined the impact of real interest rate, credit to the private sector, real exchange rate, and gross domestic investment to GDP, inflation rate, and real GDP growth rate on private investment in Ghana. These indicators were chosen because they capture both the financial and non-financial factors of private investment, thus giving a true representation of investment behavior of firms in Ghana. The study period is designed to have coverage on relevant data between the years 1970 and 2015. This period was chosen due to the availability of relevant data and yet considered reasonably long enough to provide adequate information on private investment decisions in Ghana”.

1.7 Organisation of the Study

The study is organized into five main chapters. Chapter One is the Introduction which deals with problem statement, research objectives, hypothesis, justification of the study and the scope and Organisation of the study. Chapter Two reviews both theoretical and empirical works on private investment, and interest rate. Chapter Three deals with the methodology, which includes, types and sources of data, the model specification, variable description, the unit root test, the ADF test and ARDL. Chapter Four analyses the data and presents the findings of the study. Finally, Chapter Five concludes the study by summarizing the findings, and enumerating the policy implications and recommendations and conclusion”.

CHAPTER TWO LITERATURE REVIEW

2.1 Introduction

This chapter focuses on the review of relevant literature on investment and interest rate. The chapter consists of three broad sections. The first section reviews the theoretical literature on investment while the second section reviews empirical works relating to investment and its determinants especially interest rate. Finally, section three discusses the various policies and the general trend of private investment in Ghana.

2.2 The concept of interest rate

Encyclopedia of Economics (1982); interest is the price paid for the use of money overtime. It is usually expressed as a rate charged or earned per period, hence interest rate. In the turn interest rate are typically expressed as a percentage of a principal borrowed or loaned. Thus, in the information, $S=P(1+it)$.

That is a sum S will result from a principal P if the interest rate i is a something percentage for one time period t .

According to Culbertson (1972), interest rate and prices, set like other prices in market by voluntary dealings between buyers and sellers. Interest rates are intimately involved with the role of time in economic activities and in the lives of the actors in the economic game. Like any other price, the elementary fact is that the interest rate is the price for a service, and must be determined in a broad sense by the demand and supply for that service. In other words the rate of

interest is determined as the service price by the demand for and supply of capital. Delong (2001), the rate of interest is the price at which the rate of purchasing power can be shifted from the future into the present- borrowed today with a promise to pay it back with interest in the future. Interest is not a single lump sum but an ongoing stream of payment. According to Crockett (1973), the rate of interest is a price and others prices, its economic function is as a mechanism, which balances supply and demand. Since interest rate is usually a price paid to borrow money it might seem obvious that interest rate is a monetary phenomenon. But looked at another way, when one person borrows money, another is purchasing a claim on the future, it be an equity share a bond or simply a promise to repay. We can regard the borrowing of money as the sale of future claim. The rate of interest can therefore be viewed as the price established by the interaction of the supply of and the demand for future resources.

2.3 Determinants of Interest Rate

Primarily the relationship between the supply of money and the demand of borrowers determines the current, or market, rate of interest. When the supply of money available for investment increases faster than the requirements of borrowers, interest rate tends to fall. Conversely, interest rate generally rise when the demand for investment funds grows faster than the available supply of funds to meet those demands. Business executives will not borrow money at an interest rate that exceeds the return they expect the use of the money to yield (Khan and Rheinart 1990).

Dailami. (1990) in sum, given the real interest rates are determined so as to equilibrate savings and investment, for estimation processes it is useful to separate their determinants into low- frequency and high frequency components. Low frequency determinants can be thought of as the fundamental that influence saving and investment trends, while high frequency determinants are those which proxy the movements in expectations about these fundamental factors.

2.4 Review of Investment Theories

The Keynesian theory of investment, the accelerator theories of investment specifically, the rigid accelerator theory provides traditional explanation of investment as an engine of growth and its determinants. Recently, more literatures have also illustrated on how uncertainty impacts on investment decisions of firms. Consequently, this section reviews the relevant theories of investment with the objective of identifying the key variables that would be relevant to the study.

2.4.1 The Keynesian Theory of Investment

In the General Theory, Keynes (1936) emphasized the central role of investment as the driving force of influencing aggregate output, employment, and short run fluctuations in economic activity. The theory emphasizes that investment is the result of firms harmonizing the expected return on new capital, referred to as the marginal efficiency of capital (MEC), and with the cost of capital, which depends primarily on the real interest rate. The theory maintains that at lower rates of interest, more capital projects appear

financially viable while higher interest rates lead to some projects being postponed or cancelled since the cost of borrowing to finance investment become higher.

To the Keynes since investment is volatile and dependent on firms' expectations of the profitability of investment, so long as the expected yield on their investment exceeds the real

interest rate, new investment will take place. Keynes rejected the notion that investment was based exclusively on technological conditions of capital productivity, but emphasized monetary factors and finance and uncertainty as the basic determinants of investment (Fazzari, 1989).

2.4.2 The Rigid Accelerator Theory

The simplest theory of investment demand is the rigid accelerator model formulated by Clark (1917). In its simplest form, the rigid accelerator theory of investment states that investment is proportional to the increase in output which is proxied by changes in demand in the coming period. Thus, the accelerator model relates investment to changes in demand and proposes that an increase in a firm's output will require a proportionate increase in its stock of capital.

The theory basically assumes that firms' desired capital-output ratio is roughly constant and net investment takes place when output is expected to increase. In effect, the theory implies that the level of output or the changes in aggregate demand determines investment or the change in capital stock. Mathematically, this proposition

of the theory is expressed as $K_t^* = \sigma Y_t$, where σ is the desired capital-output ratio which is assumed to be constant, K_t^* is the desired capital stock in period t , and Y_t is the level of output in the same period.

2.4.3 The McKinnon-Shaw Hypothesis

The neoliberal view by emphasizes the importance of financial deepening and high interest rates in stimulating growth through investment. According the work of McKinnon and Shaw (1973), which offered a theoretical and empirical foundation for the relationship between financial factors and investment in developing countries, developing countries suffer from financial repression and that their liberation from these repressive conditions, investment, savings and growth would be induced to increase. The important assumption of the model is that saving is responsive to interest rates, thus a higher saving rates would finance a higher level of investment, leading to higher growth”(Gemech and Struthers, 2003).

According to their argument, a repressed financial sector discourages both saving and investment because the rates of return are lower than what could be obtained in a competitive market. As a result, financial intermediaries do not function at their full capacity and fail to channel saving into investment efficiently, thereby hampering the development of the whole economic system (Reinert et al., 2008).

2.5 Economic Policy and Investment Relationship

According to the World Bank research observer (1996), monetary and fiscal policies

aimed at collecting unsustainable macroeconomic unbalances are bound investment decisions. The standard macro-economic package oriented toward improving the balance of payments, reducing inflation and interest rates includes restrictive fiscal and monetary policies.

Monetary Policies

According to de Melo and Tybout (1986) the restrictive monetary and credit policies included stabilization packages affect investment in two ways; they raise the real cost of bank credit; and by raising interest rate, they increase the opportunity cost of retained earnings. Both mechanisms raise the user cost of capital and lead to a reduction in investment.

However, other economies disagree, Dailami (1990), for example, find that in the repressed financial markets, typical of many developing countries, and credit policy affect investment directly, because credit is allocated to firms with access to preferential interest rates although interest rates affect firms that borrow in unofficial market as well. He thus argue that in determining the effect of monetary and credit policy on investment it is imperative to pay attention to the institutional structure of financial markets in developing countries.

Fiscal Policy

Van Wijnbergen (1982) has observed, “High fiscal deficit push up interest rate or reduce the availability of credit to the private sector, or both, thus crowding out private

investment". Hence, the reduction of the public deficit during macroeconomic adjustment should allow private investment to expand.

2.6 Uncertainty and Investment

The nature of investment projects is considered irreversible, hence most recent literature have introduced an element of uncertainty in the analysis of investment behavior (Pyndick, 1991).

Dixit and Pyndick (1994) in another development identified three main elements that characterize investment decisions: (1) the initial cost of investment, (2) the investors assessment of the probabilities of the outcomes associated with profits or loss, and (3) the timing of the investment decision. These three features characterizing the decision to undertake investment projects are tantamount in the process of determining the optimal investment decision making".

2.7 Empirical Review

In Africa, using panel data analysis, Ndikumana (2000) investigated the effects of financial development on domestic investment in a sample of 30 sub-Saharan African countries. The study was based on a dynamic serial-correlation investment model which included various indicators of financial development, and nonfinancial factors of investment. The positive relationship between financial development and investment was documented using four indicators, credit to the private sector, total liquid liabilities of the financial system, credit provided by banks, and an index combining these three indicators. This positive relationship was consistent with the expectation that it is

private investment that is most dependent on financial development. Thus higher financial development led to higher future levels of investment in the long run. The study also provided evidence on the negative effects of external debt, inflation, interest rate, black market premium, and government domestic borrowing on investment. All but the coefficient of interest rate was not significant. There was however no evidence of a negative effect of government consumption on investment as predicted by theory. The findings therefore implied that financial development could stimulate economic growth through capital accumulation.

Fowowel (2011) conducted a similar study on financial sector reforms and private sector

investment in some sub-Saharan African countries using panel data over the period 1980 to 2006. The results of the econometric estimations showed that private investment had a positive relationship with the financial sector reforms in the selected sub-Saharan African countries confirming the financial liberalization hypothesis which advocated financial reforms to boost private investment. From the results also private and public investment, rather than being complements were substitutes in the selected sub-Saharan countries. The accelerator theory was supported with the finding of a positive coefficient for output growth and also, the effect of macroeconomic uncertainty on private investment was found to be negative. An inverse relationship between private investment and inflation volatility was also confirmed in the study. The study thus concluded that the level of private investment increased after the liberalization policy in most of the countries that were studied.

Although the study improved upon previous empirical research by developing a broad and more comprehensive data set on financial sector reforms, it however failed to explore the impact of some of the financial development indicators (credit to the private sector, ratio of liquid liabilities to GDP, banks credit to the private sector, inter alia) on investment within the period under study”.

Ouattara (2004) in his paper investigated the long run determinants of private investment in Senegal by adopting the Johansen Cointegration technique and the ARDL bounds approach between the periods 1970 to 2000. The findings indicated that public investment, real GDP and foreign aid flows, positively and significantly affected private investment. Thus public investment crowds in private investment while the positive impact of aid on private investment was possible because the aid was used to finance a reduction in taxation towards the private sector since high taxes was regarded by some Senegalese entrepreneurs as harmful to investment.

A possible limitation of the study was that, it did not consider any macroeconomic instability variable as well as the various macroeconomic stabilization policies and financial reforms undertaken by the Senegalese government within the period under study and how they have imparted on investment. Thus the variables in the model do not give a holistic picture of the determinants of private investment in Senegal.

In a similar study, Asante (2000) analyzed the determinants of private investment in Ghana using time series analysis and complementing it with a cross-sectional one

from 1970 to 1992. The study found that the growth of real credit to the private sector, real exchange rate and public investment had a positive and statistically significant effect of 1 percent on private investment, with public investment confirming a possible complementary effect. The dummy variable representing political instability was highly significant and negatively related to private investment in all the trials. Lagged private investment to GDP ratio was also found to be positive and significant indicating a good investment climate acting as a good indicator for current investment decisions. GDP growth rate had a negative significant sign contrary to expectation but marginally significant in a few trials thus rejecting the accelerator theory of investment in Ghana. Finally, the measure of macroeconomic instability had a negative effect on private investment although significant at the 1 percent error level. The study therefore concluded that macroeconomic instability had been a major hindrance to private investment in Ghana and so policies that address only some components of macroeconomic instability may not be enough to revive private investment. Asante, focusing on most variables of both the financial and nonfinancial factors of investment, however failed to measure the gradual institutional changes involved with the financial sector reforms implemented in Ghana in the 1980's which falls within the period under study. Rather, the study focused on the controlled and liberalized regime of trade ignoring other financial sector reforms. Thus the study, concentrating on the macroeconomic variables, did not provide insight into how financial reforms have influenced investment behavior in Ghana within the stated period of study.

Other empirical works in Turkey, Ghana, Benin, Zimbabwe, inter alia, have also

considered how private investment had been influenced over the years by delving into both financial and the general determinants of investment.

For instance, in a study to investigate whether financial development had contributed to an increase in private investment in Turkey between 1970 and 2009, Ucan and Ozturk (2011) employed four indicators to test the effect of financial development on investment by using the Vector Autoregressive (VAR) Model. The indicators used were total liquid liabilities of financial intermediaries, domestic credit to the private sector, and credit provided by banks, and a composite index combining all the three indicators. The results indicated a positive relationship between domestic investment and all four indicators of financial development. The results also confirmed the relationship between inflation, real interest rate and real per capita GDP growth. Inflation and real interest rate negatively affected private investment, while private investment was positively affected by real per capita GDP growth.

Frimpong and Marbuah (2010) employed the Auto Regressive Distributed Lag approach to model the determinants of private sector investment in Ghana from 1970 to 2002 using a time series analysis. The investment model used incorporated the accelerator, neoclassical and uncertainty (macroeconomic and political) variables. “The results indicated that the coefficient of real GDP, real interest rate, external debt and inflation was statistically significant and positively related to private investment. Public (government) investment ratio and credit to the private sector had a positive but insignificant coefficient with public investment confirming a possible crowding-in

(complementarity) effect. Openness had a significant negative effect on private investment at the 5 percent significance level.

Using a capital demand function, Gnansounou (2010) analyzed the possible factors that explained the weakness of investment by private firms in Benin. The function was estimated using data from a panel of 123 firms in Benin and covering the period 1997 to 2003. The findings showed that demand uncertainty and the fluctuations in the imports of manufactured goods from Nigeria have had a negative effect on investment by private firms in Benin. The author further explained that the investment behaviour of these firms strongly hinges on the cost of capital utilization". Thus when this cost is high, it weighs negatively on the purchase and installation of new production infrastructure hence less investment. Furthermore, 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.

CHAPTER THREE RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methodology and the conceptual framework of the specified model for the study. The chapter focuses on the types and sources of data used for the study, the specification of the model and the definition, measurement and expected impact of the variables relevant to the study. It also focuses on the estimation technique with emphasis on the stationarity test, cointegration test and the autoregressive distributed lag (ARDL) model, otherwise called the Bounds Test and concludes with how the model was estimated using the ARDL Bounds testing procedure.

3.2 Theoretical framework

The neoliberal view by Galbis (1979) he emphasizes the importance of financial deepening and high interest rates in stimulating growth through investment. The proponents of this approach, McKinnon (1973) and Shaw (1973) offered a theoretical and empirical foundation for the relationship between financial factors and investment in developing countries. They argue that developing countries suffer from financial repression and that if these countries were liberated from their repressive conditions, savings, investment and growth would be induced to increase. The underlying assumption of the model is that saving is responsive to interest rates, thus a higher saving rates would finance a higher level of investment, leading to higher growth” (Gemech and Struthers, 2003).

Financial repressive policies such as interest rate ceiling, minimum/maximum lending

rates, quantity restrictions on lending, bank reserve requirements, capital controls, inter alia, cause real interest rates to be negative and unstable especially in the presence of high inflation in an economy. According to their argument, a repressed financial sector discourages both saving and investment because the rates of return are lower than what could be obtained in a competitive market. As a result, financial intermediaries do not function at their full capacity and fail to channel saving into investment efficiently, thereby hampering the development of the whole economic system (Reinert et al., 2008).

“McKinnon and Shaw proposed that financial liberalization, which involves the removal or elimination of restrictions and controls on financial markets and financial institutions associated with higher real interest rates would stimulate saving and investment by reducing the financial constraint of firms and stimulate financial intermediaries to become more efficient. All these will help to improve the efficiency of financial intermediation in a country, and contribute more to private sector investment thereby resulting in higher economic growth rates” (Hermes and Lensink, 2005).

“Thus in the neoliberal view, investment is positively related to the real rate of interest. The reason for this is what McKinnon calls the „conduit effect“ where a rise in interest rates increases the volume of financial savings through financial intermediaries and thereby raises investible funds. Thus, although demand for investment declines with the rise in the real rate of interest, due to the greater availability of funds, realized investment increases”.

3.3 Types and Sources of Data

The data used in this study is mainly secondary, sourced from reports and other

published information on private investment in Ghana. Specifically, these sources included the World Bank's World Development Indicators, African Development Indicators, and official documents of the Ghana Statistical Service, annual reports of the Bank of Ghana, and various issues of the State of the Ghanaian economy. In addition, the study employed the use of annual time series data which spanned over a forty five year period from 1970 to 2015 inclusive.

3.3.1 Model Specification

This section, in investigating the impact of interest rate on private investment, specifies model used to investigate the impact of interest rate on domestic private investment in Ghana.

Following both theoretical and empirical literatures, the study specifies the model as”;

$$IP = f (INTR, EXC, INFL, GDP, CRPV, GDI, FDI) \quad 3.0$$

The model is expressed in an econometric form as;

$$\ln Ip = \alpha + \beta_1 \ln INTR_t + \beta_2 \ln EXC_t + \beta_3 \ln INFL_t + \beta_4 \ln GDP_t + \beta_5 \ln CRPV_t + \beta_6 \ln GDI_t + \beta_7 \ln FDI_t + \varepsilon_t \quad 3.1$$

Where: I^P represents private domestic investment in Ghana cedi, EXC denotes real effective exchange rate, INFL denotes inflation; measured by CPI, CRPV is the ratio of private sector credit to GDP, GDI denotes gross fixed capital formation (as a share of GDP), GDP denotes gross domestic product; measured by GDP at current US\$ whilst FDI denotes foreign direct investment.

Where α and β_i are parameters to be estimated, ε is the error term, t is the sample period (1970 to 2015), \ln is natural logarithm and all other variables are as already defined.

3.4 Variable Description

3.4.1 Dependent Variable

Private Investment (IP)

Investment is the sum purchases of capital equipment which includes new plants or new machines; inventories; and structures (residential investment) which includes the purchase of new houses or apartments. Investment used in the study was private investment as a percentage of GDP, which was obtained by dividing the actual investment value by GDP and multiplying by 100 percent.

3.4.2 Independent Variables

This sections discusses the independent variables, namely, interest rate, exchange rate, inflation, credit to the private sector, gross fixed capital formation, gross domestic product and foreign direct investment.

Real Interest Rate (INTR)

The real interest rate is the rate of interest adjusted for either current or expected inflation. It is calculated by comparing the interest rate with the current or predicted inflation rates. According to the Fisher equation, it is the nominal interest rate minus the expected rate of inflation. The effect of the real interest rate on private investment is ambiguous. Thus the coefficient of the variable representing the real rate

of interest (β_1) is expected to be negative or positive. It can be negative because, a lower rate of interest will induce private economic agents to undertake investment activities due to the low cost of borrowing investment funds. This is in line with the neoclassical investment model which treated the real interest rate as a key component of the user cost of capital and therefore affects private investment negatively.

However, the premise of the complementarity hypothesis posed by McKinnon-Shaw, postulated a positive relationship between the real interest rate and private investment. The argument is that financial markets in most developing countries are financially repressed, thus investment funds may not be readily available to potential private investors. In such a case, the only way to induce people to mobilize investment funds through savings is by offering high interest rates. This in essence implies that the higher the interest rate offered by financial intermediaries, the more funds would be available for investment through savings and hence the higher the level of private investment. Consequently, a user cost of capital effect will imply a negative coefficient ($\beta_1 < 0$) while a positive coefficient ($\beta_1 > 0$) would support the complementarity hypothesis". In the Ghanaian case however, it is expected that the user cost of capital effect will be applicable since the complementarity hypothesis implicitly assumes that consumers be more sensitive to interest rate changes and save more when the interest rate rises, which is not the case for Ghana. Thus ($\beta_1 < 0$).

Exchange rate (EXC)

Exchange rate can be defined as domestic currency price of a foreign currency. The exchange rate influence FDI inflows in most developing countries. A depreciation of

host country currency reduces a country's production cost compared to that of the foreign country and as a result influences FDI inflows. Empirical studies show that a depreciation of host country's currency influences inflow of FDI (Xiao and Zhen, 2006; Osinubi and Amaghionyeodiwe, 2009). The risk in exchange rate has an inverse relationship with FDI inflows. Exchange rate movement influence FDI by affecting home country's currency of acquiring new asset in host countries. An appreciation of host country's currency has negative impact on FDI inflows. β_1 is therefore expected to be negative especially if the host country's currency appreciate but positive if host country's currency depreciates. However, if MNCs aim is to serve the local market, when a host country's currency appreciates, it ensures FDI inflows while depreciation inhibits FDI inflows as in the case of Ghana. Data on exchange rate is measured by real effective exchange rate and it is sourced from WDI (2015).

Inflation (INFL)

Inflation refers to the continuous and persistent rise in general price level. In this study, inflation rate acts as proxy for economic instability. Foreign investors prefer to invest in more stable economies with less degree of uncertainty. Hence it is reasonable to expect that inflation rate to have a negative impact on foreign direct investment. The higher the inflation rate, the more it is likely to deter FDI. β_2 is therefore expected to be negative. The measure used is inflation measured by consumer price index and the source is WDI (2015).

Credit to the Private Sector (CRPV)

Private firms in developing countries rely heavily on bank credit and other forms of

credit as a source of financing (Emran and Farazi, 2008). Credit to the private sector as a percentage of

GDP is an indicator and a measure of financial development via the level of activity and efficiency of financial intermediaries. It shows the extent to which the banking sector channels funds to the private sector to facilitate investment and growth. It therefore reflects a more efficient resource allocation in the economy since the private sector is able to utilize funds in a more efficient and productive manner as compared to the public sector” (Kargbo and Adamu, 2012).

“In emerging countries, many firms encounter restrictions in the credit market due to the information asymmetries between lenders and borrowers with the financial markets being generally repressed. As a result, most credit policies generally affect private sector investment via the stock of credit available to firms that have access to preferential interest rates. When resources of this type are available, it becomes viable to invest even when investors’ own funds are insufficient to finance their projects (Ribeiro and Teixeira, 2001). Thus an increase in financial resources leads to higher private investment (Ndikumana, 2000). The effect of credit to the private sector on private investment through the financial development indicator is therefore expected to be positive ($\beta_2 > 0$)”.

Gross fixed capital formation (GDI)

Gross fixed capital formation is used as a proxy for public investment. It includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools,

offices, hospitals, private residential dwellings, and commercial and industrial buildings. It is basically a measure of a country's level of infrastructure development. The availability of such infrastructure is expected to boost private investment. Hence, the variable is expected to be positively related to private investment. The measure used is the gross fixed capital formation as a share of GDP and sourced from WDI (2015).

Gross Domestic Product (GDP)

GDP refers to total value of all goods and services produced and provided in an economy over a period of time, usually a year. The measurement used is GDP at constant 2005 US\$. The effect of economic growth, measured by gross domestic product at constant 2005 US\$ on foreign direct investment inflows can be explained by the market size hypothesis. There is where larger market size influences FDI inflows in host countries. As a result, one expects a positive impact of economic growth on foreign direct investment inflows. FDI moves to countries with expanding markets and higher purchasing power, where firms can potentially receive higher return on their capital and by implication receive higher profit from their investments. β_5 is expected to be positive. Data was sourced from WDI (2015).

Foreign direct investment (FDI)

FDI refers to the process where residents of one country (the source country) acquire ownership of assets for the purpose of controlling the production, distribution and activities of a firm in another country (the host country). Shim and Siegel (1995)

defines FDI as a long term participation of source countries' management, joint venture, transfer of technology and expertise in to host countries. This involved investments of foreign funds into an enterprise that operates in a different country other than that of the investor's country. The proxy for FDI is net FDI inflows measured by current US\$ in millions and obtained from UNCTAD (2015).

3.5 Estimation Strategy

3.5.1 Unit Root Test (Stationarity Test)

In the use of time series, most macroeconomic variables are likely to be non – stationary and as a result, regression with non – stationary series is likely to generate spurious regression not suitable for making correct inferences. The study tested for stationarity using the Augmented Dickey Fuller (ADF) tests for unit root.

3.5.2 ADF Test

ADF test was introduced by Dickey and Fuller in 1979. This test is very sensitive to the lag length selected hence the based on the sample size, the Schwartz Bayesian Information Criterion was used to select the optimal lag length. ADF test is run with or without a trend at both levels and first difference. The ADF test can be expressed as below;

$$\Delta y_t = \alpha_0 + \alpha_1 t + \delta y_{t-1} + \sum_{i=1}^m a_i \Delta y_{t-i} + v_t \quad 3.3$$

where; y_t is a vector of time series variables under consideration in the regression, t denotes time trend, v_t denotes the stochastic term, m denotes the optimal lag length, Δ denotes first difference operator,

The test is conducted with a null hypothesis of $H_0: \delta = 0$ as against an alternative hypothesis that $H_1: \delta < 0$. The null hypothesis here again, states there is presence of unit root in the series whiles the alternative hypothesis states there is no unit root in the series. To determine the optimal lag length, possible models are estimated using information criteria and making sure there is no serial correlation.

3.5.3 Cointegration Test

After performing the unit root tests for stationarity, cointegration analysis is also employed to determine the long run relationship of the variables in the private investment model. Two or more series are said to be cointegrated, if they exhibit a well-established long run relationship or a common trend. Hence when two or more series are not cointegrated, there would be spurious regression problems with almost meaningless analysis to be made. However, if a long run relationship exists between two variables and the variables are rising as a result of them being trended, there would always be a common trend that would link them together. A cointegration test is best carried out for series after testing for stationarity to determine the long run

relationship among the variables in the model. The study tests for cointegration using the Bounds test with the Autoregressive distributed Lag framework.

3.6 Autoregressive Distributed Lag (ARDL) Bounds

The long run relationship among the variables would be estimated using the ARDL test for cointegration. The ARDL bounds test technique is most used to test for both long run and short run relationship when the variables in the model are mixtures of $I(0)$ and $I(1)$ series. Again, this estimation technique is adopted for its simplicity as compared to others such as the Johansen cointegration technique. This test is also more efficient with small sample size. The lag length selection is based on the Schwarz Information Criterion.

The ARDL test is performed using three steps. Firstly, an OLS is applied to an error correction model to determine the presence of long run relationship. When a long run relationship has been established, the estimates of the long run coefficients are then determined and used to make inferences. After this, the error correction model is then estimated to obtain the short run dynamic parameters.

3.6.1 The Error Correction Model (ECM)

The error correction model helps to reconcile short run and long run behaviour of all the economic variables. Two sets of asymptotic critical values for two cases are given; one in which all the regressors are assumed to be $I(1)$ and where all the regressors are assumed to be $I(0)$. With these two critical values providing critical

value bounds for all regressors, the procedure to use is the bounds testing procedure. Decision on existence of a long run relationship is based on an F – statistic. If the computed F – statistic falls outside the critical value bounds, a conclusive inference is drawn. If the F – statistic falls inside the critical values, an inconclusive inference is obtained and as a result the need to have knowledge of the order of integration of the individual variables before a conclusive inference is made”. “The conditional ARDL in error correction model can generally be specified as below;

$$\Delta \ln Y_t = a_0 + \delta_1 \ln Y_{t-1} + \delta_2 \ln X_{t-1} + \sum_{i=1}^p \gamma_1 \Delta \ln Y_{t-i} + \sum_{i=0}^q \gamma_2 \Delta \ln X_{t-i} + \psi ECM_{t-1} + \varepsilon_t \quad 3.5$$

where Y represents the dependent variable with its lags and X represents a list of independent variables with their lags, Δ denotes the first difference operator,

δ_1 and δ_2 are the long run coefficients and γ_1 and γ_2 are the short run dynamic coefficients of the model, ECM represents the error correction model and ψ represents the speed of adjustment”

CHAPTER FOUR PRESENTATION AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter entails the results and discussion of the model in chapter three. It is divided into five sections. Section 4.2 deals with the trend analysis while section 4.3 shows the unit root test results. Sections 4.4 and 4.5 show the cointegration test based on the ARDL bounds test and the long-run results respectively. Section 4.6 and 4.7 deal with the long run and the diagnostic and stability test respectively as well.

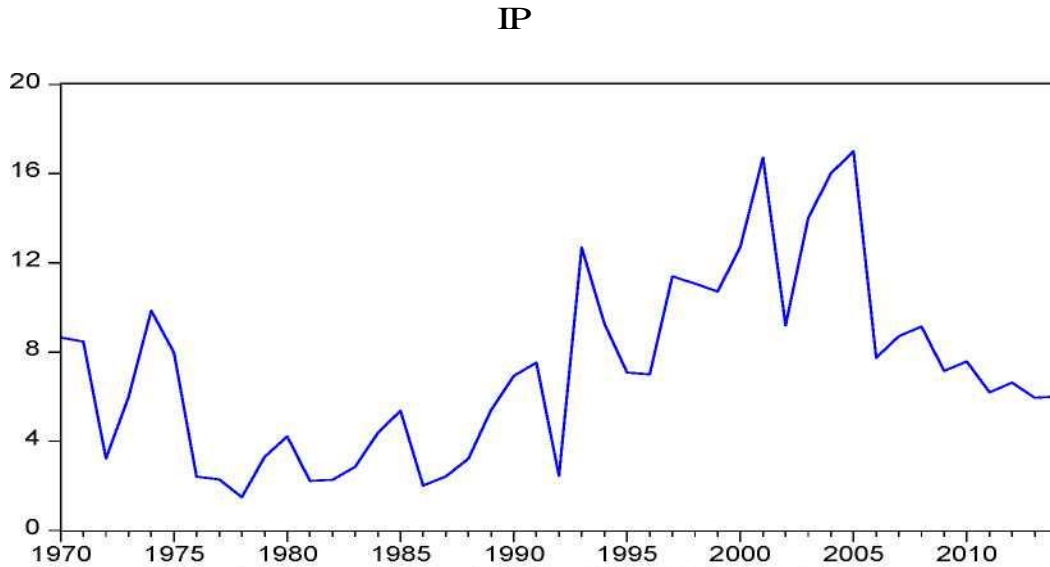
4.2 Analysis of Trends in Private Investment in Ghana

As part of the objectives of the study was to determine the trends in both private investment and interest rate over the study period. The trends and analysis done are shown in this subsection. Figures 4.1 and 4.2 below show the trends in private investment and interest rate respectively.

4.2.1 Trends in Private Investment in Ghana (1970-2015)

An overview of private investment in Ghana shows an increasing trend in most periods over specified sample period (see Figure 4.1). Though in the early periods, private investment showed a declining trend, for most periods in current times, there was an upward trend. In 1970 to 1972, private investment in Ghana was very low as it fell from 8.65% of the GDP in 1970 to 3.22% of the GDP by 1972. There was a quick recovery in private investment as by 1973 it increased sustainably to 5.99% of the country's GDP. Further there was a gradual increase in investment in the country from the private sector as by 1974 private investment recorded a high of 9.86% of the GDP.

Figure 4.1: Trends in Private Investment (1970-2015)



Source: Author's construction using data from WDI (2015)

This great increase in private sector could be attributed to the fact that during this period, Ghana economy was booming. This could also be attributed to the fact that just after independence the country implemented an import-substitution policy where state owned enterprises in various sectors of the economy ranging from agriculture to manufacturing were established. During this period the Ghana economy was somewhat favourable for various forms of investment including private investment.

However, by the end of the year 1975, private investment slightly declined to 7.98% of the GDP. It further declined drastically between 1976 and 1978 from 2.41% to 1.49% of GDP. Due to the unsustainability of the early policies implemented resulting from gross economic mismanagement coupled with various political instabilities and low factor productivity for most parts of the late 1970s and early parts of 1980s various macroeconomic indicators including private investment performed poorly. For

instance private investment in 1979 and 1980 was 3.30% of the GDP and 4.21% respectively. Between 1980 and 1983 private investment fell from 4.21% of GDP to 2.85% of GDP. As earlier stated, Ghana private sector investment was very low mainly because of the many economic imbalances faced by the financial sector at the time. These imbalances consisted of interest rate ceilings, low savings rate leading to low investment, high fiscal deficits, persistent trade deficits, repression in its financial sector amongst many others. In addition, Bawumia, (2010) notes that the low private sector recorded at time was partly attributed to the severe draught that hit the country and also due to tight credit ceiling policies implemented by the Bank of Ghana on commercial bank loan portfolios causing scarcity in the availability of credit to the private sector hence discouraging private investment.

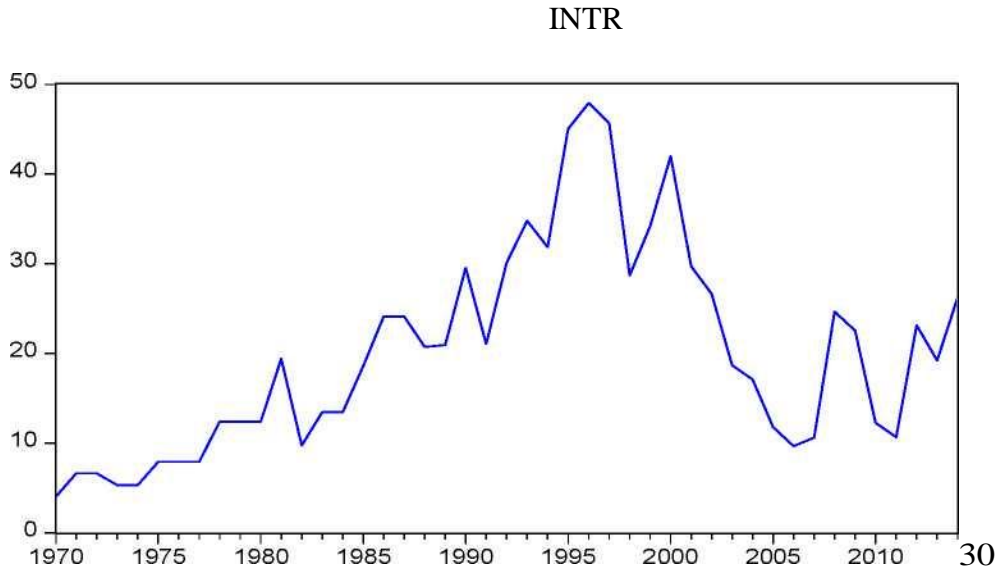
Due to the many imbalances in the financial sector of the country coupled with other economic imbalances that hit the country for the late parts of the 1970s and the early parts of the 1980s, the county opted for assistance from the World Bank and the International Monetary Fund (IMF). This was what precipitated the launch of the economic recovery program in 1983. After the trivial recovery of private investment through the implementation of the FINSAP in 1988, private sector investment in Ghana was 5.40% of the GDP in 1989 to 6.92% in 1990 to 7.53% of GDP by 1991 (see Figure 4.1). By 1993, the country's private investment increased to 12.68% of the GDP. This great recovery was also attributed to significant improvements in the country's economic infrastructures and the gradual removal of various trade restrictions and exchange rate controls (Asante, 2000).

Though there have been some fluctuations in private investment in the country, as by 1997 through to 2001, private sector investment increased greatly from 11.39% of GDP to 16.71% of GDP. In 2002 however, there was a drastic decline as it was recorded as 9.19% of GDP but between 2003 and 2005 there was a quick recovery as it was recorded to increase from 14.00% of GDP to 17.00% of GDP respectively. In recent times private investment has gradually decline as by 2007 it was 8.17% of GDP and further fell to 7.15% in 2009 and further to 5.95% in 2013 (see Figure 4.1). However, by 2014 there was a slight rise in private investment to 6.01% of GDP.

4.2.2 Trends in Interest Rate in Ghana (1970-2015)

The trend analysis for this study covers the periods from 1970 to 2014. From the trends, real interest rate has been rising systematically over time although it has been unstable for some years. In 1970, real interest rate was recorded at 4.04 percent but increased to 6.61% in 1972. However, the rate fell to 5.32 percent in 1974. After that the country experiences a stable interest rate of 7.90 percent from 1975 to 1977 and further rose to 19.40 percent in 1981. However, in 1982, the country recorded a fall in interest rate at 9.73 percent

Figure 4.2: Trends in Interest Rate (1970 -2015)



Source: Authors' construction using data from WDI (2015)

Notwithstanding these unstable rates, real interest rate rose from 13.44 percent in 1983 to 24.12 percent in 1987 but fell to 21.05 percent in 1991. The periods between 1992 and 1997 also recorded rising interest rate until 2000 where the rate of interest fell drastically to as low as 9.65 percent in 2006 and has since been unstable. On the average the periods from 1970 to 2014 recorded a rate of 20.15 percent with the lowest rate of 4.04 percent in 1970 and a maximum rate of 47.93 percent in 1996. The falling interest rates were due to the higher government borrowing and also depletion of foreign exchange reserves by government and various interest rate regulations in the country.

4.3 Stationarity Test

To investigate the stationarity properties of the variables included in the model so as to avoid any spurious (inefficient) results, the study conducts the Augmented Dickey Fuller (ADF) test. In this test, the null hypothesis of unit root (non-stationarity) was tested

against the alternative hypothesis of no unit root (series are stationary)”. The results are presented in Table 4.1.

Table 4.1: ADF Stationarity Test Results

Variable	ADF TEST		Decision
	Constant only	Constant and Trend	
LEVELS			
<i>LNIP</i>	-1.104114	-3.618117**	?
<i>LNINTR</i>	-2.527615	-2.433179	?
<i>LNEXC</i>	-0.862142	-1.119063	?
<i>LNINFL</i>	-3.934066***	-4.779292***	I(0)
<i>LNIGDP</i>	2.380224	-1.412233	?
<i>LNCRPV</i>	-0.541428	-2.075784	?
<i>LNIGDI</i>	-1.143346	-2.573940	?
<i>FDI</i>	-0.811217	-2.315012	?
FIRST DIFFERENCE			
<i>LNIP</i>	-6.632497***	-6.542205***	I(1)
<i>LNINTR</i>	-7.704636***	-7.654826***	I(1)
<i>LNEXC</i>	-6.001784***	-5.945956***	I(1)
<i>LNINFL</i>	-4.244034***	-5.841164***	I(1)
<i>LNIGDP</i>	-6.006999***	-6.511922***	I(1)
<i>LNCRPV</i>	-6.807817***	-6.773908***	I(1)
<i>LNIGDI</i>	-8.910601***	-9.167580***	I(1)

Note: ***, **, * denotes rejection of null hypothesis at 1%, 5% and 10% significance level.

Table 4.1 depicts the stationarity test results based on the Augmented Dickey fuller test. From the levels, all series except inflation was stationary at 1% level for both constant and constant with trend, hence integrated of order one. Also, private investment was only stationary at constant and trend. The non-stationary series were then differenced once and all became stationary. That is private investment, interest rate, exchange rate, GDP, credit to the private section, gross domestic investment and foreign direct investment were all found to the integrated of order one. As such the variables are integrated of orders zero and one.

4.4 Cointegration Results

In order to test for the existence of equilibrium long-run relationship (cointegration) among the variables, the study adopts the ARDL bounds test approach examine cointegration. The results are shown in Table 4.2.

Table 4.2: ARDL bounds test for cointegration relationship

Test statistic	8.378068**
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Source: Author's own construction

Note: bounds values 2.32 and 3.50 respectively; ** represent significance at 5% error level

The study employs the Schwartz Bayesian Criterion (SBC) for the ARDL model (3, 3, 3, 3, 0, 2, 3, 2) selected. According to the ARDL bounds test of cointegration, the null hypothesis of no cointegration is tested against the alternative hypothesis of the presence of cointegration among the variables in the model. The decision rule is that if the test statistic value (F-statistic) is greater than the upper bound critical value at 5% level, then the null hypothesis of no cointegration is rejected. However, if the test statistic is less than the lower bound critical value at 5% level, then there is no cointegration. However, if the value fall between the two critical value, then there is inconclusive evidence as to whether there is cointegration or not. From Table 4.2, since the F- statistic (8.3788068) is greater than the upper bound (3.5) critical value at 5% level, the null hypothesis of no cointegration is rejected hence there is evidence of long run relationship among the variables at 5% level”.

4.5 Log-run Results

Since long run relationship was established from the cointegration test, the study proceeded to examine the long run effect of the independent variables on the dependent variable and the results are presented in Table 4.3 below.

Table 4.3: Long run results

Variable	Coefficient	Standard error	Prob. Values
<i>LNINTR</i>	0.729511	0.313422	0.0343
<i>LNEXC</i>	-0.268677	0.115723	0.0347
<i>LNINFL</i>	-0.361729	0.160232	0.0393
<i>LNGDP</i>	2.241402	0.970477	0.0356
<i>LNCRPV</i>	-0.084174	0.277548	0.7658
<i>LNGDI</i>	0.534254	0.367968	0.1671
FDI	-18.274286	6.187103	0.0099
Constant	-55.570560	23.695879	0.0332

Note: *Dependent variable is $\ln I^P$*

From Table 4.3, the effect of interest rate on private investment is positive and significant in the long run at 5% level (as indicated by a p-value of 0.0343, which is less than 0.05). As such, a percentage increase in the real interest rate would lead to a percentage fall in the level of private investment by about 0.73 percent. “This implies that real interest rate in the long run has the potential of increasing private investment positively in the country. The results confirm the McKinnon-Shaw hypothesis as well as studies by Hermes and Lensink (2005)”.

The effect of exchange rate on private investment was negative and also significant at 5 percent level. From this result, a percentage increase in exchange rate would lead to a percent fall in private investment by about 0.27 percent in the long run. By implication, depreciation of the local currency reduces private investment due to higher cost that may be incurred and the lower returns on investment. Hence, as the currency depreciates, the cost of borrowing increases and this deter investors from borrowing to finance various activities hence, private investment would also fall. The findings confirm the neoclassical accelerator theory by Jorgenson (1963) and also consistent with studies by Jenkins (1998) and Asante (2000). As expected, the effect of inflation on private investment was negative and statistically significant at 5% level. As such when inflation increase by one percent, private investment would fall by 0.36 percent. By implication, instabilities within the economy reduce the level of private investment in Ghana. Studies by Ndikumana (2000), Asante (2000) and Ucan and Ozturk (2011) confirm the findings in this study while contradicting the findings of Frimpong and Marbuah (2010).

Confirming a prior expectation, the effect of economic growth on private investment is positive and significant at 5% level. From the results, a percentage increase in the level of GDP would lead to a percentage increase in private investment by about 2.24 percent in the long run. By implication, the level of private investment increases during periods of boom and hence likely to also fall during periods of recession. However, it is clear that when output increases, investment in new capital also increases and hence, there would be increase in overall incomes which influences private investment as

well. The results is consistent with findings by Carroll and Weil (1994), Nair (2004), Frimpong and Marbuah (2010) and Fowowe (2011) and also confirms the rigid accelerator theory by Clark (1917).

“However, the effect of financial development measured by credit to the private sector was negative and insignificant in the long run. Although the results do not meet a prior expectation, a percentage increase in credit to the private will lead to a fall in private investment by about 0.08% with an insignificant impact. Hence by implication, credit to the private sector does not have any influence on private investment in the long run. Although this results contradict the findings of Asante (2000), Frimpong and Marbuah (2010) and Ucan and Ozturk (2011), it however confirms studies by Ouattara (2004)”.

The effect of gross domestic investment (used to measure public investment) on private investment was also found to be positive but not significant in the long run. Hence even though a percentage increase in public investment may lead to a percentage increase in private investment by about 0.53 percent, its impact is not significant. Hence public investment may not have any significant impact on private investment in the long run. Results obtained are consistent with Asante (2000), Ouattara (2004) and Frimpong and Marbuah (2010), but contradict the findings of Fowowel (2011).

“Foreign direct investment on the other hand, was found to have a negative and significant impact on private investment. As a result, a unit increase in foreign direct investment would lead to a percentage fall in private investment by about 18.27 percent and the effect is significant at 1% level (since the p-value is less than 0.01).

This implies that by increasing foreign direct investment, private investment would fall in the economy. Findings confirm studies by Ndikumana and Vervick (2007) and Adams (2009)''.

4.3 Short-run Results

Further the study investigates the short-run dynamics among the variables. The results are presented in Table 4.4. is the error correction model associated with the estimated ARDL model. As evident, the estimated coefficient of the error correction term (ecm [-1]) is negative and statistically significant at 1 percent error level. The size and statistical significance of the coefficient of the error correction term indicates the extent to which private investment, interest rate, gross fixed capital formation, credit to the private sector, GDP, exchange rate, inflation and FDI has a tendency to return to long-run equilibrium after a short-run shock. The result indicates a reasonably high speed of adjustment in long-run equilibrium every year after a short-run shock. Specifically, long-run equilibrium will adjust by 72 percent every year after a short-run shock. Moreover, the negative and statistically significant coefficient gives further proof of the cointegration test result.

Table 4.4 Short-run Results

Variables	Coefficient	Standard Error	Prob. Value
$\Delta \ln I^P_{-1}$	0.156423	0.129732	0.2466
$\Delta \ln I^P_{-2}$	0.250950	0.106158	0.0320
$\Delta \ln \ln INTR$	-0.318731	0.130441	0.0274
$\Delta \ln \ln INTR_{-1}$	0.190755	0.144274	0.2059
$\Delta \ln \ln INTR_{-2}$	-0.645142	0.145008	0.0005
$\Delta \ln EXC$	0.044038	0.122265	0.7237
$\Delta \ln EXC_{-1}$	-0.453168	0.184191	0.0265
$\Delta \ln EXC_{-2}$	0.371110	0.134796	0.0148
$\Delta \ln INFL$	0.062311	0.075393	0.4215
$\Delta \ln INFL_{-1}$	0.055997	0.077473	0.4809
$\Delta \ln INFL_{-2}$	0.202990	0.066285	0.0079
$\Delta \ln GDP$	1.617407	0.554221	0.0106
$\Delta \ln CRPV$	-0.221857	0.176908	0.2290
$\Delta \ln CRPV_{-1}$	0.389062	0.205358	0.0776
$\Delta \ln GDI$	1.317649	0.188312	0.0000
$\Delta \ln GDI_{-1}$	0.511321	0.359593	0.1755
$\Delta \ln GDI_{-2}$	-0.982918	0.219132	0.0004
$\Delta \ln FDI$	0.410751	2.681253	0.8803
$\Delta \ln FDI_{-1}$	9.740089	3.085476	0.00065
$ecm (-1)$	-0.721605	0.134308	0.00001
R^2	0.961881		
\bar{R}^2	0.895808		
F-Statistics	14.55780***		

Source: *Author's construction*

The short-run results show that the lagged coefficient of private investment is positively related to current values of private investment. However the immediate lagged coefficient of private investment was insignificant. The coefficient of the two lag private investment showed that a one percent increase in past values of private investment causes a 0.250 percent increase in the current values of private investment at 5 percent level of significance in the short-run. This result implies that past values of private investment affects current values of private investment in the short-run.

It was revealed that interest rate in the short-run was negatively related to private investment. It was found that an increase in interest rate causes a 0.318 percent decline in private investment at 5 percent level of significance. Similarly the two lagged coefficient of interest rate was found to be negatively and significantly related to private investment in the short-run. Specifically one percent increase in past values of interest rate causes a 0.645 percent decline in private investment at 1 percent level of significance in the short-run. This result may be attributed to the fact that as interest rate increase individuals and firms are unlikely to pay off interest on loans and as such as not able to able for them to indulge in investment ventures. In effect causes a decline in private sector investment”.

“In the short-run the effect of exchange rate on private investment was found to be positive but insignificant. However the past values were found to have a significant effect on private investment. The result showed that one percent increase in the immediate past values of exchange rate leads to a 0.453 decline in private investment at 5 percent level of significance. Again the two lagged effect of exchange rate showed a that an increase leads to a 0.371 percent increase in private investment in the short-

run at 1 percent level of significance. This result maybe because foreign investor may find an increase (depreciation) in exchange rate favourable to invest as they need less of their foreign currencies to get more of the Ghana cedi as such it causes an increase in private investment. However, this intuition is not liable in the long- term.

Furthermore, the short-run results also showed that though inflation was positively related to private investment its effect in current periods and immediate past periods where insignificant. However the two lagged coefficient of inflation showed a significant effect. Specifically it was shows that a one percent increase in the two lagged past values of inflation leads to a 0.202 percent increase in private investment at 1 percent level of significance. As the country experiences short-term inflation, individuals purchase more goods and services; hence producers including private investors can produce more to expand their respective business. All odds being equal in the interim this will lead to increase in private investment. It was further revealed that economic growth was positively related to private investment in the short-run. More elaborately, the study finds that a one percent increase in GDP causes a 1.617 percent increase in private investment at 5 percent (5%) level of significance. This might be attributed to the fact that as an economy grows; it implies growth in all productive sectors and as such leads to more savings and investments in various sectors of the economy mostly by private individuals.

The short-run result also showed that the variable capturing the availability to credit to the private sector at current values was positively but insignificantly related to private investment. The insignificance of this results may be due to the fact that in the

Ghanaian economy, availability of credit provided to the private sector is somewhat inefficient hence has an insignificant effect on the trends in private investment. On the contrary, the immediate past values of credit to the private sector showed a positive and significant relationship with private investment. Specifically, it was showed that a one percent increase in the immediate past values of credit available to the private sector causes a 0.389 percent increase in private investment at 10 percent significance level.

The effect of gross fixed capital formation which measures public investment was found to be positive and significant in the short-run. Elaborately, a one percent increase in gross fixed capital formation leads to a 1.317 percent increase in private investment in the short-run at 1 percent level of significance. This result may be due to the fact that public investment in the form of provision of street lights, water, hospitals, schools and market centers helps boost private investments from both the domestic and foreign countries. Foreign investors will also feel safe in an economy with basic social amenities and infrastructural development. Again the result shows that in the short-run the immediate past values of gross fixed capital formation though was found to be positive, was insignificant. However the two lagged coefficient of gross fixed capital formation showed that a one percent increase may lead to a 0.982 percent decline in private investment at 1 percent level of significance. This result may also imply that a delay in public investment in the form of provision of basic social amenities and infrastructural development maybe a disincentive to investing in the domestic economy.

Lastly it was found that the current value of FDI was positively but insignificantly related to private investment. The insignificant of this result may be because FDI is a long-term investment so its effect on the economy is not so much felt in the short-run. Contrary to this result, the immediate past values of private investment showed a positive and significant relationship with private investment. Specifically, the study finds that a one percent increase in the immediate past values of FDI causes a 9.740 percent increase in private investment at 1 percent level of significance. This implies that previous year FDI causes a significant increase in private sector investment in the short-run.

4.5 Diagnostic Test

The study further conducts a diagnostic and stability test to check if the model is stable and free of any econometric problems. The results are presented in Table 4.5.

Table 4.5: Diagnostic and Stability Test

Test Statistic	Results
Serial Correlation	1.385080 (0.2948)
Functional Form	0.810117 (0.4314)
Normality	2.032488 (0.361952)
Heteroscedasticity	1.375997 (0.2627)
CUSUM	Stable
CUSUMSQ	Stable

The result shows that, there is the absence of serial correlation and heteroskedasticity in the model. Specifically, the probability value of the serial correlation test of 0.29 causes the non-rejection of the null hypothesis which states that the model has no autocorrelation. The probability value of the heteroskedasticity test of 0.26 causes the non-rejection of the null hypothesis. In addition, the probability values of the functional and normality test are all insignificant implying such issues are absent from the model. Again, to test if the estimated model is stable over the sample period, plots of the CUSUM and CUSUMQ as suggested by Brown et al. (1975) and further suggested by Pesaran et al. (2001) are performed within the ARDL framework. The CUSUM and CUSUMQ residual lines lie within the 5% critical value bounds, suggesting that, the estimated mode is stable throughout the sample period (see Appendix).

CHAPTER FIVE SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

The study sought to investigate the effect of interest rate on private investment in Ghana for the periods 1970 to 2014. Based on the previous chapter, the findings below are indicated as follows;

The study tested for stationarity among the variables using the Augmented Dickey Fuller test and the results showed the variables were integrated of orders zero and one. That is $I(0)$ and $I(1)$. As a result, the Autoregressive Distributed Lag (ARDL) estimation approach was employed. Based on the bounds test, there was evidence of cointegration and hence the study proceeded to estimate the long run and short run effects of the independent variables on the dependent variable.

From the long run results, real interest rate and GDP showed positive and significant impacts on private investment whiles inflation, exchange rate and foreign direct investment showed negative and significant impacts on private investment. Credit to the private sector and public investment on the other hand, were insignificant but showed negative and positive effects on private investment respectively.

The short results however, revealed that previous values of private investment influence current investment both positively and negatively as well. At the same time, real interest rate was found to show negative and significant impact on private investment whiles exchange rate, credit to the private sector and public investment showed mixed results

(both positive and negative impacts at lag 2 and 3). Inflation was also found to have positive impact on private investment significant at lag 3. Also GDP and foreign direct investment influenced private investment positively. Finally, the error correction coefficient was found to be negative and significant at 1% level, implying that the model was stable and that the economy would quickly adjust back to equilibrium should there be any shock resulting from the independent variables.

Finally, both the trends in private investment and interest rate showed unstable trends over the period of the study.

5.2 Conclusion

There are series of studies on what factors that influence private investment mostly and results have been mixed. This study does not only add to literature but focus more on how interest rate influence private investment in Ghana to serve as a guide to future researchers and policy makers. The study investigated the impact of interest rate on private investment in Ghana for the period 1970 to 2015. As such the study sought to investigate other determinants of private investment in Ghana as well as the trends of private investment in Ghana. To achieve these objectives, the study first test for stationarity using the ADF test and the ARDL estimation technique was employed after the stationarity test revealed the variables were integrated of orders zero and one. There was evidence of cointegration. With regard to the variable of interest, the long run results showed that interest rate positively influenced private investment. GDP was also found to impact positively on private investment whiles inflation, exchange rate and FDI were found to exhibit negative and significant impacts, with public investment and

credit to the private sector showing insignificant impacts on private investment. The short run results also revealed that previous values of private investment influenced current investment but positively and negatively as well. Interest rate was found to exert negative impact for current and two year values whilst lag one showed positive impact. Other short run determinants of private investment were exchange rate, inflation at lag two, GDP, FDI at lag one, public investment, and credit to the private sector at lag one. The trend analysis also showed that both private investment and interest rate in Ghana have been unstable over the study period.

Future studies may consider the impact of non-economic factors on private investment and not just macroeconomic factors as used in this study.

5.3 Recommendations

Based on the findings, the study recommends the following;

Interest rate must be able to encourage higher private investment. This can be done by increasing the real interest rate on private savings or household savings so that larger amount of income would be saved to accumulate more capital and hence private investment. By this, the higher real interest rate would increase private savings which would also increase capital accumulation and hence private investment.

Efforts to boost the economy by ensuring higher growth rates need to be adopted as increase in GDP enhances private investment. As such economic growth policies must be intensified to ensure more investment related activities in order to promote private investment. Worded differently, ensuring macroeconomic growth in the economy will undoubtedly enhance investment by the private sector.

Also, the rate and level of foreign investment inflows must be lessened in order to promote private investment since there exist negative relationship between them.

Further, economic policies to reduce inflation need to be practiced. In other words Ghana's inflation rate should be kept at a manageable level since uncertainty arising from persistent levels of inflation impedes the rate of private investment in the country. This can be done by reducing money supply. Therefore it is recommended that contractionary monetary policy is adopted

Empirical findings also showed that though credit available was positive in the long-run and short-run it was insignificant in both cases. This may be due to the fact that there are insufficient funds available to private investors hence impeding investment in the country. It is therefore recommended that policies aimed at increasing credit to the private sector and making it easily assessable should be enforced. Availability of funds ensures an adequate and efficient financial system easing funds from savers to investors that can expand the frontier of finance in private investments.

There is the need to adopt policies that can encourage appreciation of the local currency as depreciation inhibits private investment.

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APPENDICES

Dependent Variable: LNIP Method: ARDL

Date: 09/17/16 Time: 08:49 Sample (adjusted): 1973 2014

Included observations: 42 after adjustments Maximum dependent lags: 3 (Automatic selection) Model selection method: Schwarz criterion (SIC)

Dynamic regressors (3 lags, automatic): LNINTR LNEXC LNINFL LNGDP LNCRPV LNGDI FDI

Fixed regressors: C

Number of models evaluated: 49152 Selected Model: ARDL(3, 3, 3, 3, 0, 2, 3, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNIP(-1)	0.434823	0.118361	3.673710	0.0023
LNIP(-2)	0.094522	0.122864	0.769319	0.4536
LNIP(-3)	-0.250950	0.106158	-2.363929	0.0320
LNINTR	-0.318731	0.130441	-2.443491	0.0274
LNINTR(-1)	0.390763	0.133036	2.937263	0.0102
LNINTR(-2)	-0.190755	0.144274	-1.322175	0.2059
LNINTR(-3)	0.645142	0.145008	4.449025	0.0005
LNEXC	0.044038	0.122265	0.360186	0.7237
LNEXC(-1)	-0.319974	0.186558	-1.715145	0.1069
LNEXC(-2)	0.453168	0.184191	2.460313	0.0265
LNEXC(-3)	-0.371110	0.134796	-2.753131	0.0148
LNINFL	0.062311	0.075393	0.826483	0.4215
LNINFL(-1)	-0.064350	0.089248	-0.721024	0.4820
LNINFL(-2)	-0.055997	0.077473	-0.722791	0.4809
LNINFL(-3)	-0.202990	0.066285	-3.062358	0.0079
LNGDP	1.617407	0.554221	2.918342	0.0106
LNCRPV	-0.221857	0.176908	-1.254078	0.2290
LNCRPV(-1)	0.550179	0.216558	2.540565	0.0226
LNCRPV(-2)	-0.389062	0.205358	-1.894558	0.0776
LNGDI	1.317649	0.188312	6.997177	0.0000
LNGDI(-1)	-1.403726	0.285581	-4.915337	0.0002
LNGDI(-2)	-0.511321	0.359593	-1.421942	0.1755
LNGDI(-3)	0.982918	0.219132	4.485501	0.0004
FDI	0.410751	2.681253	0.153194	0.8803
FDI(-1)	-3.857481	2.678464	-1.440184	0.1704
FDI(-2)	-9.740089	3.085476	-3.156754	0.0065
C	-40.10000	13.45139	-2.981106	0.0093
R-squared	0.976779	Mean dependent var	-	
Adjusted R-squared	0.936530	S.D. dependent var	0.650388	
S.E. of regression	0.163855	Akaike info criterion	-	
Sum squared resid	0.402725	Schwarz criterion	0.593493	
Log likelihood	37.99519	Hannan-Quinn criter.	-	
F-statistic	24.26807	Durbin-Watson stat	2.581867	
Prob(F-statistic)	0.000000			

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

ARDL Bounds Test

Date: 09/17/16 Time: 08:50

Sample: 1973 2014

Included observations: 42

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K
F-statistic	8.378068	7

Significance	I0 Bound	I1 Bound
10%	2.03	3.13
5%	2.32	3.5
2.5%	2.6	3.84
1%	2.96	4.26

Dependent Variable: D(LNIP)

Method: Least Squares

Date: 09/17/16 Time: 08:50

Sample: 1973 2014

Included observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNIP(-1))	0.184911	0.128352	1.440661	0.1702
D(LNIP(-2))	0.205631	0.112236	1.832125	0.0869
D(LNINTR)	-0.313276	0.132298	-2.367951	0.0317
D(LNINTR(-1))	-0.436240	0.163004	-2.676255	0.0173
D(LNINTR(-2))	-0.647514	0.147502	-4.389866	0.0005
D(LNEXC)	0.061162	0.123323	0.495953	0.6271
D(LNEXC(-1))	-0.093705	0.132504	-0.707189	0.4903
D(LNEXC(-2))	0.414310	0.137947	3.003391	0.0089
D(LNINFL)	0.050177	0.076251	0.658050	0.5205
D(LNINFL(-1))	0.242688	0.079380	3.057271	0.0080
D(LNINFL(-2))	0.168685	0.064116	2.630922	0.0189
D(LNCRPV)	-0.222611	0.179566	-1.239715	0.2341
D(LNCRPV(-1))	0.289665	0.200776	1.442729	0.1697
D(LNGDI)	1.356033	0.192639	7.039250	0.0000
D(LNGDI(-1))	-0.515015	0.337784	-1.524687	0.1481
D(LNGDI(-2))	-0.893207	0.231714	-3.854776	0.0016
D(FDI)	0.583641	2.711188	0.215271	0.8325
D(FDI(-1))	8.391743	2.872766	2.921136	0.0105
C	-31.80320	11.03487	-2.882064	0.0114
LNINTR(-1)	0.456633	0.170541	2.677549	0.0172
LNEXC(-1)	-0.152063	0.055131	-2.758198	0.0146
LNINFL(-1)	-0.232458	0.102072	-2.277390	0.0378
LNGDP(-1)	1.278145	0.455491	2.806083	0.0133
LNCRPV(-1)	0.016843	0.190762	0.088291	0.9308
LNGDI(-1)	0.440063	0.274223	1.604760	0.1294
FDI(-1)	-11.23591	3.447116	-3.259511	0.0053
LNIP(-1)	-0.772673	0.132438	-5.834243	0.0000

R-squared	0.961881	Mean dependent var	0.014834
Adjusted R-squared	0.895808	S.D. dependent var	0.514703
S.E. of regression	0.166140	Akaike info criterion	-0.495874
Sum squared resid	0.414039	Schwarz criterion	0.621199
Log likelihood	37.41336	Hannan-Quinn criter.	-0.086422
F-statistic	14.55780	Durbin-Watson stat	2.391659
Prob(F-statistic)	0.000001		

ARDL Cointegrating And Long Run Form

Dependent Variable: LNIP

Selected Model: ARDL(3, 3, 3, 3, 0, 2, 3, 2)

Date: 09/17/16 Time: 08:50

Sample: 1970 2014

Included observations: 42

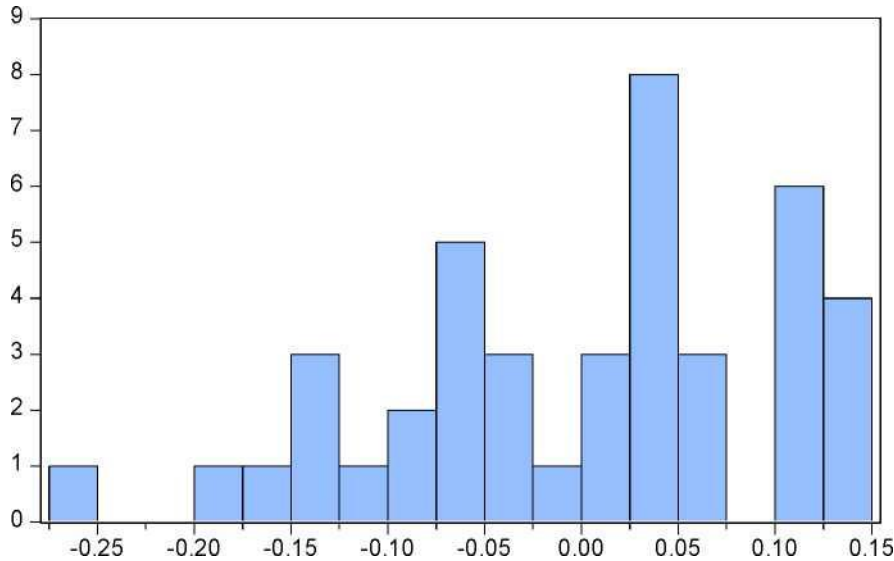
Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNIP(-1))	0.156428	0.129732	1.205780	0.2466
D(LNIP(-2))	0.250950	0.106158	2.363929	0.0320
D(LNINTR)	-0.318731	0.130441	-2.443491	0.0274
D(LNINTR(-1))	0.190755	0.144274	1.322175	0.2059
D(LNINTR(-2))	-0.645142	0.145008	-4.449025	0.0005
D(LNEXC)	0.044038	0.122265	0.360186	0.7237
D(LNEXC(-1))	-0.453168	0.184191	-2.460313	0.0265
D(LNEXC(-2))	0.371110	0.134796	2.753131	0.0148
D(LNINFL)	0.062311	0.075393	0.826483	0.4215
D(LNINFL(-1))	0.055997	0.077473	0.722791	0.4809
D(LNINFL(-2))	0.202990	0.066285	3.062358	0.0079
D(LNGDP)	1.617407	0.554221	2.918342	0.0106
D(LNCRPV)	-0.221857	0.176908	-1.254078	0.2290
D(LNCRPV(-1))	0.389062	0.205358	1.894558	0.0776
D(LNGDI)	1.317649	0.188312	6.997177	0.0000
D(LNGDI(-1))	0.511321	0.359593	1.421942	0.1755
D(LNGDI(-2))	-0.982918	0.219132	-4.485501	0.0004
D(FDI)	0.410751	2.681253	0.153194	0.8803
D(FDI(-1))	9.740089	3.085476	3.156754	0.0065
CointEq(-1)	-0.721605	0.134308	-5.372744	0.0001

$$\text{Cointeq} = \text{LNIP} - (0.7295 * \text{LNINTR} - 0.2687 * \text{LNEXC} - 2.2414 * \text{LNGDP} - 0.0842 * \text{LNCRPV} + 0.5343 * \text{LNGDI} - 18.2743 * \text{FDI} - 55.5706)$$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNINTR	0.729511	0.313422	2.327565	0.0343
LNEXC	-0.268677	0.115723	-2.321732	0.0347
LNINFL	-0.361729	0.160232	-2.257527	0.0393
LNGDP	2.241402	0.970477	2.309588	0.0356
LNCRPV	-0.084174	0.277548	-0.303276	0.7658

LNGDI	0.534254	0.367968	1.451904	0.1671
FDI	-18.274286	6.187103	-2.953609	0.0099
C	-55.570560	23.695879	-2.345157	0.0332



Series: Residuals	
Sample 1973 2014	
Observations 42	
Mean	-9.14e-15
Median	0.022033
Maximum	0.142947
Minimum	-0.255201
Std. Dev.	0.099109
Skewness	-0.484852
Kurtosis	2.529791
Jarque-Bera	2.032488
Probability	0.361952

Breusch-Godfrey Serial Correlation LM Test

F-statistic	1.385080	Prob. F(3,12)	0.2948
Obs*R-squared	10.80269	Prob. Chi-Square(3)	0.0128

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.37	5997	b. F(26,15)	0.2627
Obs*R-squared	29.5	9255	b. Chi-Square(26)	0.2848
Scaled explained SS	2.88	7143	b. Chi-Square(26)	1.0000

Ramsey RESET Test

Equation: UNTITLED
 Specification: LNPI LNPI(-1) LNPI(-2) LNPI(-3) LNGFCF LNGFCF(-1)
 LNGFCF(-2) LNGFCF(-3) LNGDP LNEXCR LNEXCR(-1) LNEXCR(-
 LNEXCR(-3) LNCPS LNCPS(-1) LNCPS(-2) LNINT LNINT(-1)
 -2) LNINT(-3) LNINF LNINF(-1) LNINF(-2) LNINF(-3) FDI_GDP
 FDI_GDP(-1) FDI_GDP(-2) C
 Omitted Variables: Squares of fitted values

Val	ue	df	Probability
t-statistic	0.810117	14	0.4314
F-statistic	0.656289	(1, 14)	0.4314

F-test summary:

	Sum of Squares	df	Mean Square
Test SSR	0.018033	1	0.018033

Restricted SSR	0.402725	15	0.026848
Unrestricted SSR	0.384691	14	0.027478

Restricted SSR	0.402725	15	0.026848
Unrestricted	0.384691	14	0.027478
SSR			

