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THE FINANCIAL DETERMINANTS OF PRIVATE INVESTMENT IN GHANA

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Abstract

This paper examines the financial determinants of private investment in Ghana using annual time series data from 1970 to 2010. Based on the autoregressive distributed lag (ARDL) bounds testing procedure to cointegration, the paper finds existence of cointegration among the variables. The empirical results support the view that private investment declines in both the short run and long run if the real interest rate is high and investors face severe financing constraints when credit is made scarce to the sector. Recommended were policies that would eliminate the financing constraints to make credit easily accessible to private investors.

Keywords: private investment, bounds test, cointegration, Ghana

Introduction

The promotion of the private sector has become an integral part of Ghana's broad economic development strategy since it embarked on its Economic Recovery Program (ERP) and the Structural Adjustment Program (SAP) in 1983 and 1986 respectively. Private sector development, which involves the improvement of the investment climate is crucial for sustaining and expanding businesses, stimulating economic growth, and has been the backbone of most developed and developing economies. The private sector is recognized as a critical stakeholder and partner in economic development, by helping people escape poverty through the provision of jobs and income, as well as the availability of necessary goods and services needed to enhance people's standard of living (International Finance Corporation, 2011). Private investment is thus a powerful catalyst for economic growth and innovation as well as a poverty reduction facilitator and hence its role is important both in terms of its contribution to GDP and its ability to allocate and employ resources efficiently.

Since the 1970s, successive governments in Ghana have realized the significant role of the private sector in enhancing sustainable economic growth. Government policy packages over the years have focused on long-term structural adjustment programs, sectoral reforms and the formulation of appropriate government policies in a bid to provide the necessary incentives for the development of the private sector. These policies included the enacting of various investment codes and acts, large-scale privatization of some public enterprises, and financial sector reforms in the mid 1980s and early 1990s.

After more than a decade of implementing market-oriented and structural reforms aimed at improving both the micro and macro environment, Ghana continues to be confronted with a number of economic constraints. Among these constraints are the low level of savings and investment that are too low to allow self-sustained growth. Although the level of savings and investment has been increasing in Ghana, it is however inadequate to fuel the growth needed to raise living standards and generate sufficient productive employment. For instance in 1990,

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2000, and 2010, the level of savings recorded as a percentage of GDP was 5.47 percent, 5.5 percent, and 9.28 percent respectively (African Development Indicators, 2012). Private investment has generally shown an upward trend from 5.4 percent of GDP in 1989 with a consistent and marginal improvement to 12.7 percent in 2000 and subsequently to 17.87 percent by 2010 (African Development Indicators, 2012). It is therefore evident that the perceptible rate of increase in the ratio of private sector investment to GDP is slow which is all the more worrying. Also, the expected role of the private sector as an engine of growth has not materialized to a large extent. An improvement in the real interest rate which would help boost private investment was anticipated after the reforms, however the real interest rate continued to be negative for some period declining from -10.45 percent in 1984 to -15.56 percent in 1986. It continued to be negative throughout the rest of the 1980's till 1992, 1993, and 1994 when it attained positive values of 3.4 percent, 6.3 percent and 6.8 percent respectively (African Development Indicators, 2012).

Ghana's financial sector has achieved some development with accelerated levels of investment and economic growth. However, the issue as to whether the improvement in the financial factors has induced investment remains indistinct. The objective of this paper is to identify which financial indicators/variables matter for private investment decision and hence serve as intermediate target variables for driving private investment in Ghana. Though this paper is not the first to examine the determinants of private investment in Ghana (see for instance: Frimpong and Marbuah, 2011; Asante, 2000), the paper makes an important contribution to the growing literature in that area. That is, whereas most researchers have shifted their attention towards the general factors in explaining investment in Ghana over time, none of the previous studies on investment behavior explored this crucial issue of the financial factors 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. Whilst controlling for the effect of non-financial factors, the findings would provide empirical information on how effectively the financial sector deregulation and its accompanying reforms have influenced private investment in Ghana.

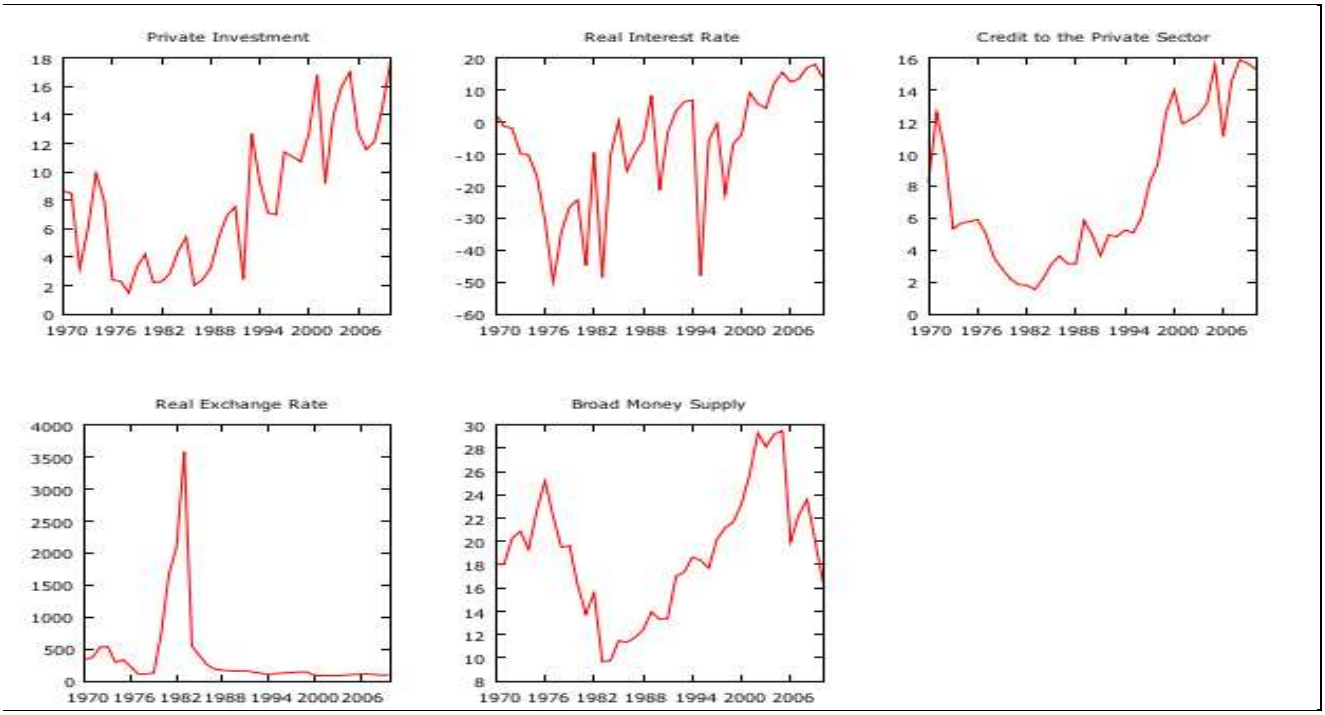
Using annual time series data from 1970 to 2010, the model was estimated using the autoregressive distributed lag (ARDL) model where the short run and long run effects were established. The empirical results of the study suggested that in the short run only the real GDP growth rate and credit to the private sector affected private investment positively whereas in the long run only the rate of inflation and the real interest rate significantly affected private investment negatively with all the other variables exerting a positive influence.

The rest of the paper is organized as follows: Section 2 of the paper reviews relevant literature related to the study, Section 3 and Section 4 presents the methodological framework and analysis of the results of the study respectively, while Section 5 concludes the paper with summary of key findings and policy implications.

Some Stylized Facts about Private Investment and its Determinants

A proper analysis of investment activities in Ghana with the selected financial determinants could be attempted by first looking at the pattern of these variables over the years specified for the study using trend analysis. This would be of much help in an attempt to portray a better picture of private investment behavior in Ghana. These trends are shown in the graphs displayed in Figure 1 (see appendix). Also shown in Table 1 are descriptive statistics of these selected financial indicators for the period under study.

Figure 1: Trends in Private Investment and its Selected Financial Determinants in Ghana Over the period 1970 to 2010



Source: Author's own drawing with data from World Bank WDI Database

Table 1: Descriptive Statistics of Private Investment and its Selected Financial Determinants

INDICATOR	***Mean (%) (Average Size)***	***Standard Deviation***	***Minimum***	***Maximum***
Private Investment (% of GDP)	8.160	4.584	2.01	17.87
Real Interest Rate	-7.597	19.052	-50.01	18.00
Credit to the Private Sector (Credit/GDP Ratio)	7.557	4.643	1.54	15.88
Real Exchange Rate (Index)	370.025	650.406	91.49	3578.93
Broad Money Supply (M2/GDP Ratio)	18.963	5.292283269	9.68	29.49
Inflation Rate	32.742	29.10235	3.03	122.87
GDP (Annual Growth)	3.415	4.0607	-6.7	9.3

Source: Author's Calculations using data from World Bank WDI database

As shown in Figure 1, private investment (as a percentage of GDP) in Ghana has generally shown an upward but fluctuating trend over the period under study. In spite of the fluctuations, private investment averaged at 8.16 percent of GDP between 1970 and 2010, with a

highest rate of 17.87 percent of GDP in 2010. Between 1970 and 1986, notwithstanding the volatilities, there was a consistent reduction in the rate of private investment from 8.64 percent to 2.01 percent which was the lowest recorded during the period.

A major reason for this decline in private investment could be attributed to the tight financial system that was operated throughout the 1970's to the mid 1980's which was characterized by credit and interest rate ceilings imposed on commercial bank loans. Investors faced severe constraints in credit during the 1970 and 1983 period as a result of the large public sector borrowing requirements which restricted the supply of bank credit to the private sector. Credit was also reduced by the credit ceilings imposed, as well as the adverse inflation rates, overvalued exchange rates and negative real deposit interest rates which discouraged savings, thereby making less funds and credit available to private investors (Bawumia, 2010).

Also remarkable within the period 1971 and 1988 was the negative real interest rates recorded amidst the high inflationary rates. These discouraged private savings and consequently led to a decline in private investment. This period of negative interest rates was due to excessive borrowing and spending on the part of government with dependence on the credit created by the banks. The depletion of the foreign exchange reserves by government, interest rate regulation, coupled with the adverse supply shocks and burgeoning inflation rate which peaked at 122 percent in 1983 also contributed to the possibly negative real interest rate.

As observed by Sackey (2001), the real exchange rate changed over time depending on whether inflation was more or less rapid in Ghana than in the USA (or in the economies of Ghana's major trading partners in the case of the real effective exchange rate). From 1977 onward, the failure to adjust the official exchange rate in line with the deteriorating relative price situation strongly appreciated the real exchange rate from 1977 onwards (Sackey, 2001).

Private investment however accelerated after 1987 following the implementation of long term structural adjustment programs, sectoral and financial reforms, removal of the credit and interest rate ceilings, privatization of public enterprises, inter alia. These positive developments resulted in a sharp rise in the rate of private investment from 2.01 percent in 1986 to 7.53 percent in 1991. After 1991, up until 2010, private investment has generally shown a progressive trend; apart from the occasional lapses recorded in 1992, 1996, and 2000 with private investment plummeting to 2.45 percent, 6.99 percent, and 10.71 percent respectively. These years were election years marked by political unrest, and excessive government spending, which deteriorated the macroeconomic structure of the economy; high inflationary rates, a collapse in savings, low confidence in the banking system, with a subsequent decline in private investment.

Literature Review

Traditional explanations of investment as an 'engine of growth' and its determinants are rooted in the Keynesian theory of investment; the accelerator theories of investment; the adjustment cost theory; and the Tobin's Q. McKinnon and Shaw (1973) also provide both theoretical and empirical explanations on how financial repressive policies and financial liberalization impart on investment and growth in developing economies. More recent literature have also expounded on how irreversibility and uncertainty imparts on investment decisions of firms. Thus this section reviews the relevant theories of investment with the objective of identifying the key variables that would be relevant to the study.

The Keynesian theory of investment (Keynes, 1936) asserts that investment is the result of firms balancing the expected return on new capital also referred to as the marginal efficiency

of capital (MEC), with the cost of capital, which depends primarily on the real interest rate. Thus 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 also asserted that investment is volatile because it depends on firms‟ expectations of the profitability of investment.

In its simplest form, the rigid accelerator theory of investment (Clark, 1917) states that investment is proportional to the increase in output which is proxied by changes in demand in the coming period (Reinert et al, 2008). The theory's basic underlying assumption is 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.

According to the flexible accelerator model by Koyck (1954) and Chenery (1952), the rate of investment by firms is determined by the size of the gap between the existing capital stock and the desired stock needed to raise output to the desired level required to meet a demand shock. Thus the larger the gap between the existing capital stock and the desired capital stock, the greater will be a firm‟s rate of investment.

In the Q theory of investment associated with Tobin (1969), he reasoned that if the market value of physical capital of a firm exceeded its replacement cost, then capital has more value in the firm than outside the firm. Tobin's Q, formally defined as the ratio of the market value of the existing capital stock to its replacement cost is the main driving force of investment. According to Tobin, firms accumulate more capital when $Q > 1$ and should draw down their capital stock when $Q < 1$. If $Q = 1$, then the market value equals the replacement cost and hence there would be no change in the capital stock. Thus net investment in physical capital should depend on where Q is in relation to one.

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).

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). The key assumption in this argument is that, capital has a low resale value and mostly considered firm specific. Thus disinvestments will be very costly since employing these firm specific capital goods in other alternative projects will be virtually impossible. Due to the irreversible nature of certain investment projects, Pyndick further argues the need for the net present value (NPV) rule (which says, one should undertake investment if the value of a unit of capital is at least as large as its cost) to be modified owing to the fact that it may be costly for the firm to disinvest should market conditions change adversely.

Previous empirical works have also sought to explain the relationship between selected macroeconomic and financial variables and their effect on private investment. Ndikumana (2000) investigated the effects of financial development on domestic investment in a sample of 30 sub-Saharan African countries based on panel data econometric techniques. 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. 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.

Fowowe (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. Constructing a financial reforms index and including other variables on the basis of the accelerator theory and uncertainty variables, 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 and inflation on private investment was found to be negative.

Nair (2004), using a Vector Auto Regression (VAR) model, examined the major determinants of manufacturing investment in India for the period 1973 – 2002. The results indicated that the estimated coefficient for the level of output was positive and significant in all the specifications. The coefficient of profit was also positive and statistically significant in all models indicating that even after the introduction of the financial sector liberalization policy, firms still depended on profit for investment. The financial liberalization coefficient however had a negative impact on corporate investment. Nair attributed this to the fact that liquidity constraints existed and this prevented the efficient mobilization and channelization of resources even after the financial sector liberalization.

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. Credit to the private sector, and the terms of trade negatively and significantly imparted on private investment. The negative impact of credit availability was attributed to the lack of strong business and professional organizations and lack of personnel with experience and expertise in credit analysis.

Bakare (2011) analyzed the determinants of private investment in Nigeria using a time series data between 1978 and 2008 with modeling investment behaviour as an error correcting process. The empirical investigations showed that changes in real private investment in Nigeria were best explained by changes in the political trend (political instability), macroeconomic instability, poor infrastructure, and corruption which were all represented by a dummy. Thus these four major factors created a hostile investment climate which hindered private investment in Nigeria. The study also found a significant and negative relationship between private investment and public investment, nominal exchange rate, the corruption perception index, and

poor infrastructure. Savings and inflation were however found to be significant and positively related to private investment. Overall, the study brought out in clear terms the reason for the low levels of private investment in Nigeria.

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 public investment, and lagged private investment to GDP ratio had a positive and statistically significant effect on private investment, with public investment confirming a possible complementary effect. Macroeconomic instability however had a negative effect on private investment. 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.

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 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 autoregressive distributed lag modeling approach to examine the determinants of private sector investment in Ghana from 1970 to 2002 using a time series analysis. 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. Finally, constitutional regime (political instability) represented by a dummy variable came out with a positive sign albeit not significant at any of the conventional statistical levels. Overall, the results confirmed a significant accelerator theory effect on private sector investment in Ghana at the aggregate level over the period under study.

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.

In another comprehensive study, Jenkins (1998) using a two-step Engle-Granger approach to deal with non-stationary variables, constructed a model of private investment for Zimbabwe over the period 1969 to 1990. The macroeconomic model of private investment behaviour in Zimbabwe showed that private investment was related, in the long run, positively to gross profits and negatively to the external debt to GDP ratio which increased uncertainty in the Zimbabwean economy. In the short-run dynamic model of private investment, changes in the availability of foreign exchange (measured as export earnings plus reserves) lagged one period, were significantly and positively related to changes in private investment. In the short run,

private investment also responded negatively to changes in the relative cost of capital and positively to changes in the relative price of industrial output (measured by the ratio of the industrial price deflator to the GDP deflator).

Stimulating private investment in Ghana continues to be a significant concern of policy makers in Ghana and developing countries at large. Following the implementation of various financial sector reforms vis-à-vis the adoption of different monetary policy regimes, it was envisaged by policymakers that the ensuing development of Ghana's financial system will expand the quantity and availability of investible funds and efficiently facilitate the channeling of these funds from various surplus units to the investment activities with the highest return, and thus assuage the liquidity constraints confronting most investors and entrepreneurs in the country. It was also expected that these will go a long way to dampen the overall costs and risks of investment, and boost capital accumulation. Despite this remarkable attention devoted by policymakers to creating an enabling and congenial environment for private sector investment, available empirical literature on investment behavior in Ghana, to the researcher's best knowledge, has not yet exclusively been focused on investigating the role of financial factors in determining domestic private investment in Ghana. The results of this study will have important implications for policymakers. Whilst controlling for the effect of non-financial factors, the findings would provide empirical information on how effectively the financial sector deregulation and its accompanying reforms have influenced private investment in Ghana.

Model and Estimation Strategy

This section, in analyzing the financial determinants of private investment, specifies an appropriate model of private investment for Ghana. Among the various approaches considered in modeling the determinants of private investment, the flexible accelerator model appears to be the most popular and has often been applied in most empirical research in developing countries (Blejer and Khan, 1984; Ouattara, 2004). This model is most appropriate to developing countries as a result of institutional and structural factors present in most developing countries, such as the absence of well functioning financial markets, the extensive role of the government in the provision of investment, foreign exchange constraints, and other market imperfections (Blejer and Khan, 1984). Thus this section derives a theoretically consistent model of private investment within the flexible accelerator framework that will allow for such resource constraints and, at the same time, incorporate other variables accounting for private investment behaviour in Ghana.

In a representation of the accelerator model, the desired stock of capital at any time period is assumed to be proportional to expected output. Mathematically, this can be expressed as:

$$K_t^* = \alpha Y_t^e \quad (1)$$

Where K_t^* is the desired capital stock the private sector wishes to have in place in future periods, Y_t^e is the expected level of output in period *t*, and α is a constant denoting the capital output ratio. It is necessary to accentuate the desired change in the capital stock and to highlight the component of the replacement of worn out capital known as depreciation, by decomposing the desired capital stock into two forms, presented as:

$$I_t^* = (K_t^* - K_{t-1}) + \delta K_{t-1} \quad (2)$$

Equation (2) can be simplified as:

$$I_t^* = K_t^* - (1 - \delta) K_{t-1} \quad (3)$$

On introducing a lag operator (L), equation (3) can conveniently be written as:

$$I_t^* = [1 - (1 - \delta)L]K_t^* \quad (4)$$

From equation (1), if K_t^* is substituted into equation (4), the desired level of investment yields;

$$I_t^* = [1 - (1 - \delta)L]\ \alpha\ Y_t^e \quad (5)$$

Where I_t^* = the desired level of investment in period t
δ = depreciation rate of the capital stock,
L = the lag operator,

In order for the model to fit the flexible accelerator mode, the desired capital stock must be affected by changing economic conditions. Lags in the adjustment of actual investment that arise because of the time it takes to plan, build, and install new capital can be introduced through a partial adjustment mechanism for the capital stock based on Nerlove's Partial Adjustment Model (PAM), whereby the actual stock of capital is assumed to adjust to the difference between the desired stock in period t and the actual stock in the previous period. The adjustment process of such investment models can be represented as:

$$(I_t - I_{t-1}) = \gamma\ (I_t^* - I_{t-1}) \quad (6)$$

Where $(I_t - I_{t-1})$ = the level of actual investment in period *t* and *t-1* respectively
$(I_t^* - I_{t-1})$ = the desired change in the capital stock
γ = the partial adjustment coefficient (speed of adjustment, $0 \leq \gamma \leq 1$)

Since the flexible accelerator model allows economic conditions to influence the adjustment coefficient, empirical works by Blejer and Khan (1984) and Chhibber and Van Wijnbergen (1988) identified such factors as expectation of profitability, credit availability, government expenditure policies, and real interest rate as having significant impact by way of influencing the ability and initiatives of private investors to implement their investment projects. These factors were thought of as affecting the speed of adjustment. Thus attempts were made to model the speed of adjustment by incorporating the above factors in a mathematical formulation presented as:

$$\gamma = \gamma_0 + \frac{1}{(I_t^* - I_{t-1})}\ [\gamma_1\pi_t + \gamma_2 R_t + \gamma_3 C_t + \gamma_4 G_t] \quad (7)$$

Where π represents profits, R is the real interest rate, C is real credit availability, and G is government real capital expenditure. From equation (7), if the value of γ is substituted into equation (6) the resultant becomes:

$$I_t - I_{t-1} = [\gamma_0 + \frac{1}{(I_t^* - I_{t-1})}\ [\gamma_1\pi_t + \gamma_2 R_t + \gamma_3 C_t + \gamma_4 G_t](I_t^* - I_{t-1}) \quad (8)$$

Further simplification yields:

$$I_t - I_{t-1} = \gamma_0(I_t^* - I_{t-1}) + \gamma_1\pi_t + \gamma_2 R_t + \gamma_3 C_t + \gamma_4 G_t$$

$$I_t = \gamma_0 I_t^* + \gamma_1\pi_t + \gamma_2 R_t + \gamma_3 C_t + \gamma_4 G_t + (1 - \gamma_0)I_{t-1} \quad (9)$$

Substituting equation (5) into equation (9) yields;

$$I_t = \gamma_0[1 - (1 - \delta)L]\ \alpha\ Y_t^e + \gamma_1\pi_t + \gamma_2 R_t + \gamma_3 C_t + \gamma_4 G_t + (1 - \gamma_0)I_{t-1} \quad (10)$$

The model in equation (10) incorporates variables that best capture the behavior of private investment decision-making. Thus guided by theory on the basis of the above derivations, the following empirical model for private investment is specified for estimation purposes;

$$I^P = f\ (INTR, CRPV, RER, M2, INFL, GDP)$$

Where I^P = Private investment, INTR = Real interest rate, CRPV = Ratio of private sector credit to GDP, RER = Real exchange rate, M2 = Ratio of broad money supply to GDP, INFL = Inflation rate, and GDP = real GDP growth rate.

The estimable econometric model in log-linear form can be formulated as;

$$ln\, I_t^P = \gamma_0 + \gamma_1 INTR_t + \gamma_2\, lnCRPV_t + \gamma_3 ln\, RER_t + \gamma_4 ln\, M2_t + \gamma_5\, ln\, INFL_t + \gamma_6 ln\, GDP_t + \varepsilon_t \quad (11)$$

Equation (11) above represents the long run equilibrium relationship. γ_i (where i = 2 to 6) represents the elasticity coefficients, ε_t is the error term, t is time and ln denotes natural logarithm. All the variables to be examined are in natural logarithm except the real interest rate since negative values were recorded for some years. The choice of the log-linear model was based on the premise that log transformation allows the regression model to estimate the percentage change in the dependent variable resulting from the percentage changes in the independent variables (Stock and Watson, 2007). The log-linear model also helps reduce the problem of heteroskedasticity because it reduces the scale in which the variables are measured from a tenfold to a twofold (Gujarati, 1995).

The model was estimated using the autoregressive distributed lag (ARDL) model also known as the Bounds test. The testing procedure of the ARDL bounds test is performed in three steps. First, OLS is applied to an error correction model to test for the existence of a long-run relationship among the variables by conducting an F-test for the joint significance of the coefficients lagged levels of the variables. Once cointegration is established, the second step involves estimating the coefficients of the long run relations and making inferences about their values (Pesaran and Pesaran, 1997). The final step involves estimating an error correction model (ECM) to obtain the short run dynamic parameters. The ECM generally provides the means of reconciling the short-run behaviour of an economic variable with its long-run behaviour.

The data for this paper is drawn from World Bank's World Development Indicators, African Development Indicators, official documents of the Ghana Statistical Service, annual reports of the Bank of Ghana, and various issues of the State of the Ghanaian economy. Annual time series data which spanned over a forty one year period from 1970 to 2010 inclusive are used in this paper.

Definition and A priori Expectation of Variables

According to the Fisher equation, the real interest rate is the nominal interest rate less the expected rate of inflation. The effect of the real interest rate on private investment is ambiguous. 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. 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 ($\gamma_1 < 0$) while a positive coefficient ($\gamma_1 > 0$) would support the complementarity hypothesis.

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. 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 ($\gamma_2 > 0$).

In terms of the Purchasing Power Parity, the real exchange rate is the nominal exchange rate (e) that is adjusted by the ratio of the foreign price level (P_f) to the domestic price level (P). The impact of the real exchange rate on private investment is ambiguous. More specifically, devaluation increases the cost of importing capital goods, and since the chunk of capital investment in developing countries is constituted of imported goods and machineries, this increases the cost of investment and reduces the profitability of private firms leading to a reduction in investment activities. Conversely, a depreciated real exchange rate tends to shift aggregate demand away from traded to non traded goods, resulting from an increase in the real rate of interest to maintain internal balance. The increase in the interest rate increases the saving rate which stimulates growth by increasing the rate of capital accumulation. Thus the effect of the real exchange rate on private investment is ambiguous ($\gamma_3 > 0$ or $\gamma_3 < 0$).

The ratio of broad money supply to GDP is conventionally used as a measure of financial sector deepening (Nnanna, 2006). It gauges the increased provision of financial services to the financial sector based on how liquid money is. An increase in the money supply will ease the financing conditions of households and firms, which is reflected in lower lending rates and ultimately enhanced availability of credit to private investors which spurs investment. Thus a priori, the coefficient of broad money supply and investment are positively related ($\gamma_4 > 0$).

The coefficient of the term representing the rate of inflation (γ_5) is expected to be negative. High inflation rates are an indicator of macroeconomic imbalances, which can impact on private investment negatively. High and unpredictable inflation rates tend to be volatile and create uncertainty about future prices and interest rates which increases the risk associated with long term investment activities (Oshikoya, 1994). Its volatility results in unpredictable real interest rates which discourages domestic savings, and investment. In addition, inflation also erodes the purchasing power of money, so there is little incentive for people to save money in the banking system. This leads to a reduction of funds available for investment purposes through the banking system (Hassan and Salim, 2011). The coefficient of inflation is therefore expected to be negative ($\gamma_5 < 0$).

Real GDP growth rate is a measure of how fast the economy is growing. If output is growing, businesses will invest in new capital, more jobs would be created and personal incomes would expand. If it is slowing down, then businesses will hold off investing in new purchases and employing, to see if the economic conditions will improve. This can further depress the economy and consumers will have less money to spend on purchases. If the GDP growth rate turns

negative, then the economy is heading towards or is already in a recession. Thus the study expects the coefficient of GDP growth rate to be positive ($\gamma_6 > 0$).

Analysis and Discussion of Results

This section of the paper presents and discusses the results of our econometric analysis. Prior to testing for existence of long-run level relationship (cointegration) and estimating the corresponding cointegration vector and the dynamic error correction models, the order of integration of the individual series were examined using both the augmented Dickey-Fuller (ADF) and Phillips-Perron tests for unit roots. The results of the unit root tests are presented in Table 2.

Table 2: Results of the Unit Root Tests

Variables	ADF Test		Phillips-Perron Test	
	Constant	**Constant + Trend**	**Constant**	**Constant + Trend**
Panel A: Level				
lnI^P	-0.2901	-3.9198**	-2.1495	-3.8135**
INTR	-1.16814	-4.84015***	-3.5095**	-4.7895***
lnCRPV	-0.74808	-1.950926	-0.79515	-1.9085
lnRER	-1.160192	-3.573474**	-1.87823	-2.5029
lnM2	-1.50267	-1.500305	-1.6968	-1.7157
lnINFL	-3.9922***	-4.507914***	3.9984***	-4.5305***
lnGDP	1.997872	-4.090464***	2.47449	-0.88432
Panel B: First Difference				
$\Delta\ lnI^P$	-6.5027***	-	-9.6519***	-
$\Delta INTR$	-7.29341***	-	-	-
$\Delta lnCRPV$	-5.76219***	-6.26816***	-5.7670***	-6.26178***
$\Delta lnRER$	-5.23251***	-	-4.90196***	-4.8329***
$\Delta lnM2$	-6.17263***	-6.08422***	-6.2158***	-6.1396***
$\Delta lnINFL$	-	-	-	-
$\Delta lnGDP$	-4.02535***	-	-4.32018***	-6.00017***

*Note: *,**,***, denotes the rejection of the null hypothesis of unit root at the 10%, 5% and 1% significance levels respectively. The critical values for the ADF tests statistics are -3.159, -3.46 and -4.076 at the 10%, 5% and 1% significance levels respectively. Δ is the first difference operator. The lag length selection for the Phillips-Perron test is based on Newey-West. Results were obtained from Eviews 7.0 econometric software.*

From the ADF unit root test result, using a constant and a trend all variables attained stationarity apart from the credit to the private sector (CRPV) and the broad money supply (M2). The Phillips-Perron test result also showed that when both a trend and constant was added only private investment (I^P), the real interest rate (INTR) and inflation rate (INFL) attained stationarity. First differencing was done because the series were not stationary, thus the need for the series to be differenced once to attain stationarity. As shown from panel B of Table 2, all the variables become stationary after the first difference. The stationarity of all the variables in their

first difference implies the series is integrated of order zero, I(0) indicating that they are stationary. Given that the underlying series are a mixture of I(0) and I(1) processes, we proceed to test for the existence of cointegration based on the ARDL framework. The results of the cointegration test are presented in Table 3.

Table 3: Results of the Bounds Test for Cointegration

Critical Bounds Value of the F-statistic				
Number of Regressors	**90% Level**		**95% Level**	
6	**Lower Bound** 2.3666	**Upper Bound** 3.6214	**Lower Bound** 2.8194	**Upper Bound** 4.2202
Calculated F-statistic: 5.5326 F_{I^P} ($I^P \mid INTR,\ CRPV, RER, M2, INFL, GDP$)				

Note: Results obtained from Microfit 5.0

From Table 3, the calculated F-statistic F_{I^P} ($I^P \mid INTR,\ CRPV, RER, M2, INFL, GDP$) = 5.5326 is greater than the upper bound values of 4.2202 and 3.6214 at the 5% and 10% significance levels respectively. Since the computed F-statistic exceeds the critical upper bound values, then the null hypothesis of no cointegration is rejected at both the 5 percent and 10 percent significance levels. This therefore implies the existence of a long run relationship among the variables when private investment is normalized on the regressors.

Once the existence of cointegration has been established, the long run coefficients of the ARDL model are estimated. The Schwarz Bayesian Criterion (SBC) was employed in selecting the order of the lag length with the model specification of ARDL (2, 2, 0, 2, 2, 1, 2). Table 4 presents the results of the long run coefficient estimates of the ARDL model.

Table 4: Results of the Estimated Long Run Coefficients Using the ARDL Approach

ARDL (2,2,0,2,2,1,2) Selected Based on SBC			**(Dependent Variable $ln\ I_t^P$)**	
Regressor	**Coefficient**	**Standard Error**	**T-Ratio**	**Probability**
Constant	-31.4001	17.0216	-1.8447	0.085*
$INTR_t$	-5.2316	2.0125	-2.5995	0.031**
$ln\ CRPV_t$	0.08123	0.03427	2.3702	0.029**
$ln\ RER_t$	7.8804	2.2852	3.4484	0.004***
$ln\ M2_t$	0.08005	0.0828	0.9668	0.349
$ln\ INFL_t$	-0.0519	0.01775	-2.9236	0.010**
$ln\ GDP_t$	4.2890	2.2249	1.9278	0.073*

*Note: ***,**,* denotes the rejection of the null hypothesis at the 1%,5%, and 10% significance levels respectively. Results were obtained from Microfit 5.0*

As shown in Table 4 above, all the estimated coefficients have their expected signs and are significant; with the exception of the money supply which was found to be insignificant. The sign of the coefficient of real interest rate was negative and significant at the 5 percent

significance level. Its negative sign confirms the neoclassical theory of the user cost of capital which treated the real interest rate as a key component of the user cost of capital and therefore affects private investment negatively. With a coefficient of -5.2316, a unit increase in the real interest rate will reduce private investment by 5.2316 percent. This means that in the long run, a rise in the real interest rate has the potential of deterring private investment in Ghana. The results concur with empirical studies by Michaelides et al (2005), Gnansounou (2010), among other studies.

As evident from the results, credit to the private sector has a positive and statistically significant effect on private investment in Ghana. The positive elasticity coefficient means that a percentage increase in the credit to the private sector will lead to a 0.08123 percent rise in private investment. The finding is consistent with theoretical expectation that as financial resources in the form of credit are available it becomes more viable to invest. This is evident with the Ghanaian case where credit availability to the private sector has been more pronounced although marginally after the financial liberalization. The results therefore suggest that increase in the availability of credit to the private sector stimulates private investment in the long run. It also corresponds with results obtained by Asante (2000), Ucan and Ozturk (2011), etc.

The elasticity of the real exchange rate has a positive sign of 7.8804 and significant at the 1 percent level of significance. This indicates that all other things being equal a percentage depreciation or devaluation of the domestic currency has the tendency of boosting private investment by 7.8804 percent. A persistent depreciation of the real exchange rate can increase the domestic saving rate with a consequent rise in the rate of capital accumulation. Similarly, a depreciated real exchange rate tends to increase the volume of exports, boosting investment in the export oriented sectors. Empirical works done by Frimpong and Marbuah (2010), Acosta and Loza (2005), Jenkins (1998), Asante (2000), inter alia, corresponds with the results of the study in line with the real exchange rate.

Consistent with theoretical expectation, the elasticity coefficient of the money supply was positive although not significant. This suggests that in the long run a 1 percent increase in the money supply causes private investment to increase by 0.08123 percent. The insignificant coefficient can be explained along the line that over the years the Bank of Ghana has operated a tight monetary policy stance, with a possible increase on the rate of interest. For instance, the Bank of Ghana in line with attaining its objective of price stability and arresting the depreciation of the cedi between 2000 and 2009 maintained a tight monetary policy stance, with the intensification of open market operations to mop up excess liquidity while the minimum primary reserve requirement for deposit money banks was raised from 8 per cent to 9 per cent in July, 2000 (Bank of Ghana Annual Report, 2000). During the period, the real interest rate rose consistently from 9.2 percent in 2001 to 18 percent in 2009 which was a possible deterrent to stimulating private investment.

The long run results also reveal a negative and statistically significant coefficient of inflation at the 5 percent significance level. The elasticity coefficient of -0.0519 indicates that inflation exerts a negative influence on private investment in Ghana in the long run, hence a 1 percent rise in the rate of inflation results in a 0.0159 percentage fall in the level of private investment. The result contradicts some empirical findings like that of Bakare (2011) and Frimpong and Marbuah (2010), but consistent with the work of Ndikumana (2000), and that of Ucan and Ozturk (2011) for Turkey, where a higher inflation rate was found to discourage private investment. The result indicates that inflation exerts a negative influence on private investment in Ghana in the long run. This explains why prior to 1983 (prior to the

implementation of the ERP and SAP) during the period of massive economic decline characterized by high inflationary rates, private sector investment was discouraged with the latter declining from 8.65 percent of GDP in 1970 to 2.27 percent of GDP by 1982. It was however evident that after the introduction of the reforms with the consistent fall in the rate of inflation, private investment increased gradually although marginally.

The anticipated positive relationship between real output growth and private investment was confirmed empirically at the 10 percent significance level. This means that in the long run an increase in GDP growth rate by 1 percent would trigger a 4.2890 percent increase in private investment. The finding is consistent with works by Fowowe (2011), Nair (2004), Ouattara (2004), Frimpong and Marbuah (2010), Michaelides et al (2005), among other works. The positive and statistically significant elasticity coefficient is an indication that as output is growing, businesses will invest in new capital, more jobs would be created and personal incomes would expand.

The third step of the bounds testing procedure is to estimate the short run dynamic parameters of within the ARDL framework. The error correction model measures the speed of adjustment to restore equilibrium in the dynamic model following a disturbance, and provides the mechanism of reconciling the short run behaviour with its long run behaviour. Table 5 presents the result of the error correction model.

Table 5: Estimated Short Run Error Correction Model

ARDL (2,2,0,2,2,1,2) Selected Based on SBC (Dependent Variable $ln\, I_t^P$)

Regressor	Coefficient	Standard Error	T-Ratio	Probability
$\Delta INTR_t$	-0.01434	0.040571	-0.35343	0.727
$\Delta lnCRPV_t$	0.14539	0.31387	0.46321	0.648
$\Delta lnRER_t$	-10.9253	3.9348	-2.7766	0.012**
$\Delta lnM2_t$	-0.35456	0.22749	-1.5586	0.135
$\Delta lnINFL_t$	-0.062458	0.02727	-2.2905	0.033**
$\Delta lnGDP_t$	27.3600	12.0148	-2.2772	0.034**
ecm (-1)	-0.6392	0.09184	-6.9599	0.000***

ecm = PIV + 5.2316*INTR -.08123*CRPV -7.8804*RER -.080050*M2 + .051915* INFL -4.2890*LNGDP1 + 31.4001*C

R-Squared	0.86868	R-Bar Squared	.67608
S.E. of Regression	1.8503	F-Stat. F(17,20)	5.8369[.000]
Mean of Dependent Variable	0.38553	S.D. of Dependent Variable	3.2511
Residual Sum of Squares	51.3545	Equation Log-likelihood	-59.6418
Akaike Info. Criterion	-82.6418	Schwarz Bayesian Criterion	-101.4741
DW-statistic	2.1642		

*Note: ***,**,* denotes the rejection of the null hypothesis at the 1%, 5% and 10% significance levels respectively. Results were obtained from Microfit 5.0*

In the short run, deviations from the long run equilibrium can occur due to shocks in any of the variables in the model. Thus all the short run coefficients show the dynamic adjustments of all the variables to their long run equilibrium (Dritsakis, 2011). With a negative elasticity coefficient of -0.01434, the real interest rate was found to be statistically insignificant. The negative sign implies that an increase in the real interest rate raises the user cost of capital, thereby making private investment less profitable. Therefore the level of private investment is expected to decline as the real interest rate increases.

Credit to the private sector with its maintained positive sign, was however not significant in the short-run, contrary to what was obtained in the long-run. The availability of credit in the short-run can be a key constraint facing private firms in Ghana, undoubtedly accounting for its insignificance. This empirical finding could be due to the scarce and rationed nature of credit available to private investors prior to the financial liberalization in the late 1980s.

Contrary to the long run finding, the real exchange rate was found to exert a negative influence on private investment, although significant at the 5 percent level. This is an indication that a 1 percent depreciation or devaluation of the domestic currency has the impetus of reducing private investment by approximately 10.9 percent in the short-run. This implies that a depreciation of the domestic currency increases the cost imported capital assets hence resulting in a decline in the demand for imported inputs.

From the results, the ratio of broad money supply with an elasticity coefficient of -0.35456 was not significant. The sign was however contrary to what was obtained in the long run case. The result implies that in the short-run, a percentage increase in the ratio of broad money supply will elicit a 3.54 percent fall in private investment.

Consistent with the long-run finding, the elasticity coefficient of inflation was found to be negative and significant at the 5 percent level in the short-run. Inflation, which is a sign of macroeconomic instability, has the potential of driving down private investment by 0.0625 percent following a percentage rise in its rate. Thus in both the short-run and long-run, inflation has the potential of deterring private sector investment.

The results show that a 1 percent increase in GDP in the short run will lead to a 27.36 percent increase in private investment, significant at the 5 percent level. Since it is highly elastic, then it is expected that private investment would respond more to changes in GDP in the short run. Thus a unit change in the level of aggregate output or income in the economy would stimulate a more than proportionate change (27.36 percent change) in the same direction in the level of investment undertaken by firms in Ghana. This result contradicts empirical work by Hassan and Salim (2011) whose finding concluded GDP to exert an inelastic influence on private investment in the short run. The finding however concurs with work by Ribeiro and Teixeira (2001).

The ECM represents the speed of adjustment to restore equilibrium in the dynamic model following a disturbance. The estimated coefficient of the ECM which equals -0.6392 suggests a relatively quick speed of adjustment back to the long-run equilibrium. The coefficient is highly significant at the 1 percent significance level and appropriately signed. According to Verma (2007), a highly significant error correction term is further proof of the existence of a stable long-term relationship. The result suggests that about 63.92 percent of the deviation between the actual and the long-run equilibrium value of private investment is corrected each year. That is approximately more than 63.92 percent of the disequilibria from the previous year's shock converge back to the long-run equilibrium in the current year.

Conclusion

This paper investigated the financial determinants of private investment in Ghana by specifying a private investment model. The objective of the paper was to determine whether the financial factors have contributed to boosting private investment in Ghana as per the objectives spelt out in the ERP, SAP and the financial reform policies of the 1980's. Using annual time series data from 1970 to 2010, the model was estimated using the autoregressive distributed lag (ARDL) model where the short run and long run effects were established.

The findings of the study provide evidence that private investment in Ghana, like in other developing countries is affected by important financial and macroeconomic variables. The empirical evidence however has certain important policy implications, and in view of that recommendations have also been provided, in an attempt to help boost and stimulate private investment in Ghana.

The empirical evidence from the study on the real interest rate implies that in both periods, further increases in the real interest rate will increase the user cost of capital so much so that net profits of investors become negative. It is therefore recommended that the central bank introduce policies that would increase competition among the financial institutions so as to induce them to reduce their lending rates. Periodically, the Bank of Ghana has been publishing the interest rates, however the way in which the information is disseminated is not well known, hence there is the need for increased awareness of these interest rates to enable investors identify which financial institutions are giving lower rates, so as to induce them to go in for such cheaper loans, in so doing, the competition among the financial institutions would also be enhanced.

The empirical results also implied that private investment would decline in both the short run and long run if investors face severe financing constraints when credit is made scarce to the sector. Financial institutions lack data on private investors' characteristics and performance perpetuating the general perception that they might be risky ventures to invest in, thus making it difficult for the financial institutions to grant them credit. Since this is a significant barrier to investors in acquiring financial aid, periodic auditing of financial statements of the private businesses is key for financial institutions to be conscious of the financial potential of the investors. Also vital is building a database of private investors to track their performance and make data on them readily accessible to the creditors to reduce asymmetric information and to obscure the perception that private businesses are risky ventures to invest in. Since access to collateral and financing requirements are some of the major barriers private investors face in acquiring funds in Ghana, institutions interested in facilitating capital access for investors could provide guarantees to commercial banks to cover any losses on private investments. Reducing their credit risk would encourage the banks to make capital available to the private firms.

Exchange rate stabilization policies are pertinent in addressing and remedying the possible volatilities and effects of the depreciation of the exchange rate on private investment. Exchange rate policies such as expenditure changing policies could be introduced via expansionary monetary policies which would increase the interest rate and subsequently lead to a depreciation of the domestic currency, to boost investment. Occasionally, the central bank of Ghana has been embarking on managed (dirty) floats in order to achieve a certain reserve target. These managed floats could be intensified by the bank occasionally intervening in the foreign exchange market to influence the value of the currency. This measure would act as a buffer against any external economic shock before its rippling effect on the economy.

Contrary to a priori expectations, the broad money supply to GDP ratio negatively influences private investment in the short run, while in the long run its effect on private

investment is positive. This presupposes that in the long run, an increase in the money supply which would be reflected in lower lending rates will reduce the financing constraints of private firms by enhancing the availability of credit, and consequently increasing investment. The short run result implied that the resultant fall in the real interest rate proceeding from an increase in the money supply is expected to reduce private investment via reduced savings, confirming McKinnon's complementarity hypothesis. Due to the opposing effects of the money supply on private investment in the long run and short run, it is recommended that monetary policy makers should establish the threshold interest rate at which increases in the money supply would not lead to a further fall in the real interest rate to prevent private investment from falling per the dictate of the complementarity hypothesis.

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