Original Research Article

THE LONG AND SHORT RUN DETERMINANTS OF PRIVATE SECTOR INVESTMENT IN GHANA, 1970-2011

ABSTRACT

Private investment is viewed as a powerful tool for maintaining and expanding the capital stock and production capacity of an economy.Many developed and developing countries have for several decades relied greatly on it to solve their macroeconomic problems, particularly those related to growth and development.For this reason the government of Ghana has taken steps to smoothen the way for the private sector through various policies to increase their investment levels. Hence, this study sought to focus on the various macroeconomic factors that either stimulate or hinder private investment in Ghana.Using an annual time series data from 1970 to 2011 the study employed the econometric techniques such as unit root tests, cointegration and error correction techniques within an ARDL framework.It relied mainly on the use of secondary data drawn from the Bank of Ghana (BOG), World Development Indicators (WDI) and the Africa Development Indicators (WDI).The results indicated that gross domestic product affected private investment in the long run and inflation in the short run. Exchange rate affected it both in the long and short run periods. It was however recommended that resources must be efficiently use to provide public development investments infrastructure to complement private investment performance in, more investment credit avenues must be created to increase its access, hence reduce interest rate and to encourage private investment. Finally, growth must be promoted through macroeconomic stability and conducive business environmentat minimal inflation.

INTRODUCTION

Investment is a key macroeconomic variable necessary for economic growth and development of countries (Harrod1939; Domar 1946). Investment has both private and public components, but in recent years, developing countries have placed greater emphasis on the development of the private sector since it has remained the main engine of growth in all modern economies across the globe. In Ghana governments over the years have used measures like the Economic Recovery Programme (ERP), Structural Adjustment Programme (SAP) and other financial reform programmes to improve the private sector (International Monetary Fund, 1998).

However, the existence of heavy government intervention in the economy, as well as the establishment of large number of state enterprises worsened the private investment climate and destroyed their incentives to invest and produce(Asante, 2000).Private investment declined from 8.0% in 1975 to 2.9% in 1983 and 4.4% in 1984 to 2.5% in 1992 (African Development Indicators, 2011) and was considered to be inadequate to promote and sustain economic growth. Although gradual improvements have been made in its level from 2.5% in 1992 to 19.4% in 2011 (African Development Indicators, 2011), private investment has not been able to generate the substantial economic growth to improve living conditions in the country, hence the need to assess how it is determined in Ghana and ways to improve it.

There has been mounting evidence that private investment depends on a number of variables which significantly contributes to its growth(Dehn, 2000).This study therefore attempts to investigate empirically the Long and Short Run Determinants of private sector investment in Ghana.

The study seeks:To identify the long run determinants of private investment in Ghana and to identify the short run determinants of private investment in Ghana.

Literature Review

Investment is generally classified into four main components: private investment, public investment, foreign direct investment and portfolio investment. Investment theories can be broadly categorised into the simple accelerator theory associated with Clark (1917), flexible accelerator model associated with Keynes (1936), the neoclassical model associated with Hall

and Jorgenson (1971) and the Tobin's Q model also associated with Tobin (1969). According to Acosta and Loza (2004), the theory of investment irreversibility also affects private investment. This theory suggests that the cost of investing in machinery and equipment is usually not recovered by a future resale. However, stable prices improve the informative content of the price system, allowing a favorable allocation of resources. Emerging countries are usually characterized by a high degree of uncertainty. Hence, for investment decisions to be made to yield the desired results uncertainty factors of such economies must be taken into consideration, since any sharp decline in aggregate demand would generate an unsustainable excess in installed capacity (Caballero and Pindyck 1996). This accounts for the reason why advanced countries with lower uncertainty rate have high levels of private investment, as compared to developing economies with a higher uncertainty rate. The inflationary rate is normally use as a proxy for measuring uncertainty (Beaudry et al. 2001).

Factors Affecting Private Investment

Rodrik (1991) introduced an element of policy uncertainty as a factor that drives private investment. He stated that when a policy reform is introduced, it is very unlikely that the private sector will see it as one hundred percent sustainable. A number of reasons may be deduced, among them is the expectation that the political-economic configuration that supported the earlier policies may resurface. There is also the fear that unexpected consequences may lead to a reversal. Investors must respond to the signals generated by the reform for it to be successful.

Also, the rational choice theory influence private investment. This is an economic theory that assumes that individuals always make prudent and logical decisions that provide them with the greatest benefit or satisfaction and that are in the best self- interest. It is a framework for understanding and often formally modeling social and economic behavior. Hence, it enables private investors to compare the costs of their activity against benefits to arrive at an action that maximizes their personal advantage.

Again, private investment is hindered by restrictions on investment financing. Loungani and Rush (1995) suggested that small and medium enterprises (SMEs) are usually unable to finance their activities directly through open market debt. Hence, they resort heavily to the bank credit markets, which are also characterized by imperfections due to information asymmetry between lenders and borrowers. Developing countries are normally faced with the challenge of accessing credit due to the absence of futures market and poor access to long term financing.

Data and Model Specification

The research uses a time series annual secondary data over the 1970-2011 periods. The data were issued from the World Development Indicators (WDI), Africa Development Indicators (ADI) and the Bank of Ghana (BOG). Following the model by Marbuah and Frimpong (2010), the model for this study can be stated as:

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

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

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

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

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

Data Analysis and Estimation Procedure

The study first investigates the time series properties of the data by using the Augmented Dickey–Fuller (ADF) and the Phillip-Perron (PP) tests (the unit root test) was used to check the stationarity properties of the datausingEviews 5.0 Package. However, all the variables were integrated of either order zero I(0) or one I(1). Since the test results confirmed the absence of

I(2) variables or above, ARDL methodology is applicable for the estimation.According to Pesaran and Pesaran (1997), the ARDL approach requires the following two steps.

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

Table 1: Results of Bounds Tests for the Existence of Cointegration

	95% Level		90% Level	
K	I(0)	I(1)	I(0)	I(1)
6	3.3458	4.7141	2.8277	4.0178

Dependent Variable	F-Statistic
F_{LNPRI}(LNPRI|LNPVI,LNRIR,LNINF,LNGDP,DM,LNEXR)	4.8833

Note: K is the number of regressors Source: Computed by the author using Microfit 5.0

The calculated F-statistic value of 4.8833(F_{LNPRI}(.)=4.8833) exceeds the upper bound critical value of 4.7141 at 95% and 90% levels. This means the null hypothesis of no cointegration between private investment and its determinants is rejected at both the 5% and 10% significance levels; hence there exist cointegration (a long run relationship) between private investment and its determinants. Therefore, the ARDL cointegration method is then used to estimate long-run parameters of equation.

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

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

Table 2: Estimated Long-Run Coefficients using the ARDL Approach

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

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

Dependent Variable: LNPRI

Source: Computed by the author using Microfit 5

From Table 2, it can be revealed that in the long run, public investment is negatively related to private investment but not significant. This indicates that an increase in public investment will reduce private investment due to crowding-out effect (public and private sectors compete for the same resources in the economy), though not significant. Economic theory suggests that if public investment is financed through borrowing it reduces loanable funds available to the private investor as it leads to an increase in interest rate, credit rationing and tax burden. Hence, it increases the cost of financing private investment. This contrasts the findings by Marbuah and Frimpong (2010) where public investment indicated a positively insignificant effect i.e. public investment crowds-in or increases private investment.

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

contrasts the work done in Ghana by Marbuah and Frimpong (2010) and Akpalu (2002) who argued that real interest rate has a significant positive impact on private investment based on the McKinnon and Shaw (1973) “complementarity” hypothesis which states that repression of the interest rate will result in low lending rate.

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

Furthermore, gross domestic product in the long run confirms the theoretical underpinnings by been positive and significant. Thus the GDP which represents the total value of all goods and services produced in the economy at a specified period of time acts on the accelerator principle to increase businesses sales and profits in general. Since the main motive of investors is to make profit they would be encouraged to expand their operations. Also, it will serve as an incentive to attract other additional investors to invest, thereby stimulating private investment in the economy. The coefficient reveals a 1 percent increase in gross domestic product will increase private investment by 2.3 percent. This confirms the empirical works done in Ghana by Marbuah and Frimpong (2010) and Akpalu (2002).

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

contrasts the work done by Frimpong and Marbuah (2010) for Ghana, where political instability was positively insignificant.

Finally, exchange rate has a positive and significant impact on private investment. The positive coefficient depicts that an appreciation of the exchange rate increases private investment in the economy. The appreciation of the exchange rate simply means the value of the local currency has increased as compared to other foreign currencies. Hence this situation will compel private investors in Ghana to invest more locally to increase their returns as compared to investing outside the economy. Specifically, it signifies that in the long run, a 1% change in depreciation of the Ghana cedi relative to a foreign currency will cause an increase of about 0.35 % in private investments. The result is similar to findings by Marbuah and Frimpong (2010) and Akpalu (2002) for Ghana.

4.7 Short Run Relationship

Once the long-run cointegrating model has been estimated, the next step is to model the short-run dynamic relationship among the variables within the ARDL framework.

$$\Delta \ln PRI_t = \delta_0 + \sum_{i=0}^{q} \mathrm{B}_{1i} \Delta \ln PRI_{t-i} + \sum_{i=1}^{p_1} \beta_{2i} \Delta \ln PUI_{t-i} + \sum_{i=1}^{p_2} \beta_{3i} \Delta \ln RIR_{t-i} + \sum_{i=1}^{p_3} \beta_{4i} \Delta \ln INF_{t-i} +$$

$$+ \sum_{i=1}^{p_4} \beta_{5i} \ln GDP_{t-i} + \sum_{i=1}^{p_5} \beta_{6i} DM_{t-i} + \sum_{i=1}^{p_6} B_{7i} \ln EXR_{t-i} + \lambda ECT_{t-1} + U_t \quad \text{.....(5)}$$

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

Table 3: Estimated Short-Run Error Correction Model using the ARDL Approach

ARDL(2, 1, 1, 0, 1, 0, 0) selected based on AIC 40 observations used for estimation from 1972 to 2011				
Regressor	Coefficient	Standard Error	T-Ratio	P-values

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

R-Squared	.66004	R-Bar-Squared	.50894
S.E. of Regression	.37718	F-stat. FF(9,30)	8.1242 [.000]
Mean of Dependent Variable	.020747	S.D. of Dependent Variable	.53825
Residual Sum of Squares	3.8412	Equation Log-likelihood	-9.8959
Akaike Info. Criterion	-22.8959	Schwarz Bayesian Criterion	-33.8736
DW-statistic	2.0642		

Source: Computed by the author using Microfit 5.0 Dependent Variable: dLNPRI

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

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

Marbuah and Frimpong (2010) and Akpalu (2002) who indicated inflation to be positively significant.

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

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

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

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

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

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

Model Diagnostics and Stability Tests

In order to check for the estimated ARDL model, the significance of the variables and other diagnostic tests such ad serial correlation, functional form,normalityandheteroskedasticity of the model are considered.

Table 4: Model diagnostics

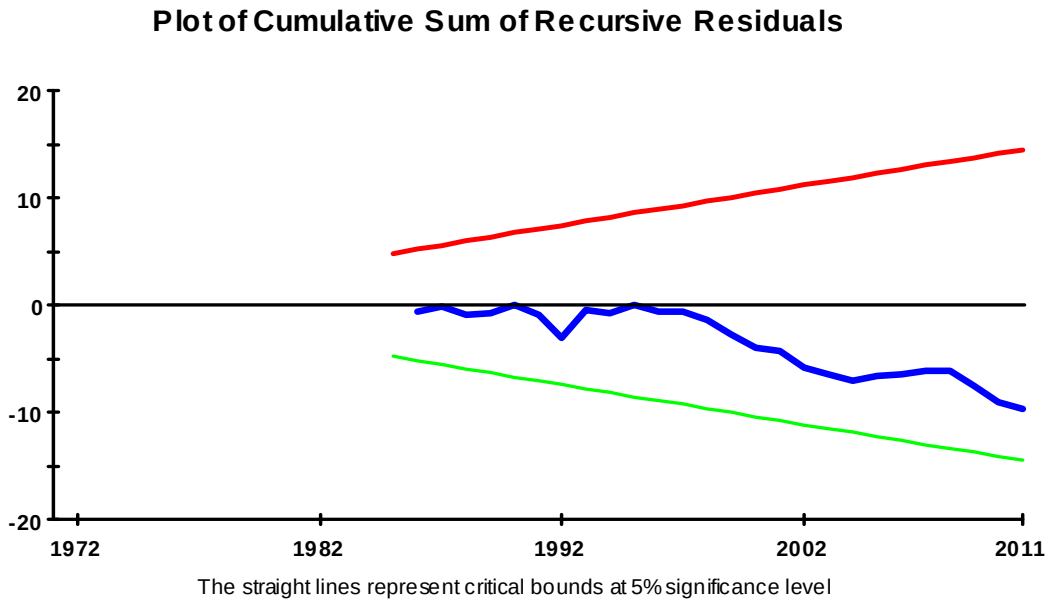
Diagnostics Test Statistic	
X^2_{Auto} (1)	.81110 [0.368]
$X^2_{F.form}$(1)	3.1582 [0.076]
X^2_{Norm} (2)	.20159 [0.904]
X^2_{Hetro}(1)	1.7905 [0.181]

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

Source: Computed by the author using Microfit 5

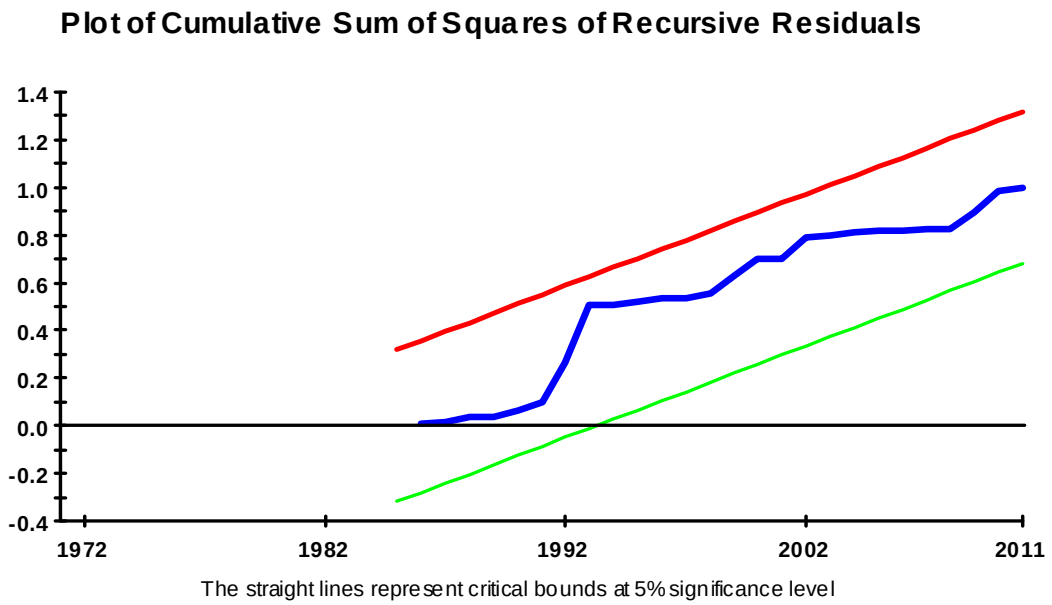
Finally, when analyzing the stability of the coefficients, the Cumulative Sum (*CUSUM*) and Cumulative Sum of Squares (*CUSUMQ*) are applied. Following Pesaran and Pesaran (as cited in Bahmani-Oskooee, 2004), the stability of the regression coefficients is evaluated by stability tests and they can show whether or not the parameter estimates are stable over time. This stability test is appropriate in time series data, especially when one is uncertain about when structural change might have taken place. The result for *CUSUM* and *CUSUMQ* are shown in Figure 1 and 2.The null hypothesis is that the coefficient vector is the same in every period and the alternative is that it is not (Bahmani-Oskooee, 2004). The *CUSUM* and *CUSUMQ* statistics are plotted against the critical bound of 5 percent significance level.According to Bahmani-Oskooee (2004), if the plot of these statistics remains within the critical bound of the 5 percent significance level, the null hypothesis that all coefficients are stable cannot be rejected.

Fig. 1



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

Source: Generated by the author using Microfit 5



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

Source: Generated by the author using Microfit 5

As shown in Figures 1 and 2, the plot of both the CUSUM and CUSUMSQ residuals are within the 5 percent critical bound (boundaries). That is to say that the stability of the parameters has remained within its critical bounds of parameter stability. It is clear from both graphs in Figures 1 and 2 that both the CUSUM and CUSUMQ tests confirm the stability of coefficients of the private investment functions.

Summary of Findings

This study investigates the determinants of private investment in Ghana using a time series data from 1970-2011. The relevance of understanding the determinants of private investment lies in the fact that private investment has been the main engine of growth for countries over the decades. The study examined the trending behaviour of public investment, real interest rate proximate by prime rate, inflation rate, real gross domestic product, dummy of political regime and exchange rate, which are the factors that determine private investment over the study period. It specifically examined the determinants of private investment by employing the Autoregressive Distributed Lag (ARDL) bounds test approach to cointegration and a long run relationship was revealed. Public investment, real interest rate and the dummy of military regime were negatively related to private investment while inflation, gross domestic product and real exchange rate affected private investment positively. However, gross domestic product and the exchange rate were the only significant variables among the other variables. The error correction model showed in the short run indicated that the coefficient of real interest rate, gross domestic product and the dummy of military regime were negatively related to private investment while public investment, inflation and exchange rate had a positive relationship. Unlike the other variables real interest rate and exchange rate were significant. The diagnostic tests results also indicated the model passed the test of serial correlation, functional form specification, normality and heteroscedasticity. The graphs of the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) showed the parameters were stable.

Policy Recommendations

Taking into consideration the findings from the study, the following recommendations are proposed.Firstly, the government must make good use of its limited resources by focusing on the

provision of public development investments infrastructure like airports, roads, railways, ports, communication, electrical, gas and health facilities, water and sewer and education services to promote proper market functioning to serve as complementary to boost private investment performance in Ghana.Also, the interest rate must be maintained at lower levels through the creation of more investment credit avenues by both the government and other credit institutions to be accessed by private individuals to encourage private investment. Again, to ensure development in the private sector to increase its investment levels, the government must first ensure that there is growth in the economy by maintaining macroeconomic stability. Hence, the various sectors of the economy must be improved to achieve a positive gross domestic product to increase growth rate within the Ghanaian economy.Furthermore, there is overwhelming evidence that military regimes (political instability) depressed significantly the levels of private investment in Ghana due to its associated political uncertainty. It therefore suggests that the government must continue to strengthen democracy within the country by the implementation of policies through transparent political institutions to safeguard constitutional rule in order to boost private investment. Moreover, a deteriorating exchange rate is identified as a major hindrance to private investments. This fact demands that the monetary authorities in Ghana should endeavor to ensure the stability of the cedis against major currencies. Such policy direction will engender positive response from the private sector. Lastly, inflation was seen to exert positive effects on private investment the government must make sure its rate is not persistently high to deter private investors but rather maintain lower rates or if high must be within its moderate level (17%-30%) as argued by Tobin to increase private investment.

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