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POLICY AND INVESTMENT DECISIONS IN GHANA: ASSESSING THE IMPLICATIONS OF INTEREST RATES, INFLATION AND GROSS DOMESTIC PRODUCT

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Abstract

The unstable behavior of investment in Ghana has become a source of concern to government, investment practitioners and all players of the financial sector of the country. Decisions whether to invest or not, are constrained and rest on factors that must be given due consideration in order to stimulate and promote investment. The objective of this research is, therefore, to establish whether interest rates have positive or negative effect on investment in Ghana. The research used investment data from the Bank of Ghana between 2009 and 2016. The data was analyzed using E-view spread sheet to examine the occurrence or non-occurrence of random walk pattern of differencing. This was to help check if the model from the data will not lead to spurious regression. The results of the study indicate that interest rates have positive relationship to investment in Ghana. The results indicate that interest rates, together with other independent variables included in the study have significant effect on investment in Ghana.

Government should, therefore, through the Monitory Policy Committee of the Bank of Ghana, realign its policies on investment and pay more attention on, especially interest rates, inflation, GDP and exchange rate since these are essential ingredients in boosting investment in Ghana, particularly FDIs.

Keywords: Investment; interest rates; inflation; random walk; GDP

INTRODUCTION

Investment constitutes an important element that determines long-term growth of any economy. Since 1960, investment in Ghana has undergone periods of turmoil characterized by cyclical fluctuations of interest rate over time. A cause for concern is the fact that in Ghana, the impacts of incentives introduced since independence to enhance investment has not been adequately translated into high investment and economic growth rates. There has been an argument that due to cyclical fluctuations of interest rate over time investment opportunities in the country are not favorable. This cannot be an adequate explanation, because there could be some other factors inhibiting investment in the country. It is, therefore, necessary that the major effect of interest rates, among other factors on investment in the economy should be examined for economic planning and policy management.

From the economic perspective, investments increase the capital stock of economies, such as railroad, machinery, factory construction, among others. Maintaining a high rate of investment is one of the factors responsible for good economic performance (Meier, 1976). Accordingly, capital increases by investment, and more investment necessitates more savings in the economy, which in turn serves as the source of investment and subsequently economic growth. On the other hand investment from financial asset provides a stream of future income to its owner. Investment expenditure is made not for present wealth creation but for future wealth creation, a view well-agreed by both economic and financial researchers (Muhammad, Lakhan, Zafar, & Norman, 2013). Capital runs out when it is used, that is, one part becomes rusty; another part gets damaged and thrown out when it is no longer useful. All of the flows that reduce the stock of capital are referred to as “depreciation”. From time to time, firms need to make some investments to replace the capital that has depreciated. Any other investment above depreciation increases the stock of capital and creates a greater productive capacity. The flow of investment expenditure in any period of time depends on the comparisons the firms do between the potential benefits and the costs of repairing or buying capital goods. The potential

benefits are measured in terms of the potential yields or rates of return, and the buying costs are measured by the interest rate (Muhammad et al., 2013).

According to (Muhammad et al., 2013) money could be borrowed and invested or could be generated from one's own personal wealth. They note that high interest rate or cost of money on lending might lower investment because it turns out to be extra expensive to finance investments with loans. On the other hand, using personal funds imply that the interest rate is an opportunity cost of an investment expenditure, thus investments tend to lower when the opportunity costs of an investment expenditure is high, but raises when the income levels of the investor rises.

In terms of empirics, majority of the study seem skewed to evidence that suggest that interest rate has a negative relationship with investment (Bader & Malawi, 2010). Explanations offered in support of this assertion are that, high interest rates or cost of borrowing or opportunity cost is a disincentive to investors to invest. On the contrary, (Greene & Villanueva, 1990) suggest that due to the availability of sufficient capital by underdeveloped markets of emerging economies, investors rely mostly on savings to invest when interest rates are high, thus showing positive relationship between interest rate and investments. Also (Schaller, 2007; Tevlin & Whelan, 2003) found a positive relationship between interest rate and investment when they examined the marginal changes in investments as a result of the marginal changes in interest rates. Studies have also explained that the interest rate-investment relationship provide different results largely because of the vast models applied in testing this hypothesis.

The purpose of this study is to test the results of the researchers, for a developing country like Ghana, which is to establish whether interest rates have positive or negative effect on investment in Ghana among control factors such as inflation and Gross domestic product. Therefore, the first stream of research constitutes the null hypothesis while the second stream, championed by (Greene & Villanueva, 1990) constitutes the alternative.

The results of this study contribute to the policy dialogue on improvement of investment regime in Ghana. At the moment, there are proposals on the table to review the whole set up of the country's investment regime, including the review of some legislations and current incentives offered to investors. The results of the study can be used to enhance economic planning and policy management in Ghana

LITERATURE REVIEW

Related literature on investment

Investment is generally classified into four major components: private domestic investment, public domestic investment, foreign direct investment and portfolio investment(Bakare, 2011).

Private domestic investment refer to gross fixed capital formation plus net changes in the level of inventories whereas public investment includes investment by government and public enterprises on social and economic infrastructure, real estate and tangible assets. The combination of private investment and public investment is normally referred to Gross Fixed Capital Formation. The foreign investment, when it is on tangible asset, is referred to as Foreign Direct Investment (FDI). It is called portfolio investment when it is on shares, bonds, securities, etc.

In investigating causal relationship between investment and exchange rate(Sajid & Sarfraz, 2008) used co-integration technique and vector error correction model to examine causality between investment and exchange rate. The result showed that there is long-run as well as short run equilibrium relationship between them. However, the study was silent on the impact of exchange rate on investments. According to(Blonigen, 1997), when a currency depreciates, meaning its value declines relative to the value of another currency, its exchange rate movement has two potential implications for FDI. First, it reduces the country's wages and production cost relative to its foreign counterparts. When a country's currency devalues, it is viewed as an opportunity for foreign investors to purchase assets at a reduced cost; this is especially true when foreign firms have identified specific assets in their target or the host markets.

Investors tend to postpone their investment when the currency in the target markets strengthens, speculating the currency to depreciate in the future, therefore they could maximize profit on their investment at a later stage(Barrel & Pain, 1996).

Volatility exchange rate has a significantly negative impact on FDI inflows and that the appropriate macroeconomic policy can result in over valuing the currency thereby discouraging FDI(Kyereboah-Coleman & Agyire-Tettey, 2008). Their findings were also similar to that of (Barrell & Pain, 1997, 1999). They noted that the lag in FDI is highly significant. However, high exchange rate volatility does not always imply a negative effect on FDI inflow. Exchange rate movements can influence FDI by affecting the home currency cost of acquiring assets abroad.

In most of their compilations(Lipsey & Chystal, 2006), questioned whether FDI can improve the host country's economic growth. They concluded that the effect of FDI on the host country's GDP growth depends much on the host country's economic openness. The more liberalized the economy, the more likely the positive benefits of FDI to be transferred to the host country. On the other hand, the more restricted the economy, the more negative the impact of FDI on growth. Even though they did not draw direct inference to the relationship between FDI and inflation when reporting the effect of high inflation on employment in Bulgaria, (Glaister & Atanasovo, 1998) seem to suggest that high inflation can cause various problems within the

country to reduce its attractiveness to foreign investors. A more stable economy attracts more FDI, thus a low inflationary environment was desired in countries that promote FDI as a source of capital flow(Wint & Williamson, 2002).

Investment is the change in capital stock during a period. Consequently, unlike capital, investment is a flow and not a stock term. This means that capital is measured at a point in time, while investment can only be measured over a period of time. Investment is a net tangible property of human being and of institutional arrangement capable of rendering services to consumers and producers of a nation(A. S. Vaish, 2007).

Examining the linkage between inflation rate and investment using panel co-integration approach and a variance decomposition(Mouawiya, 2005) found a negative relationship between inflation rates and investment. (Elbadawi, 1996) confirmed the effect of inflation on economic growth and government expenditure on investment. He observed in his study that investment stimulates economic growth while government expenditure spurs investment.

In their studies, (Van den Berg, 2001) confirmed the postulation that both growth theorists and development theorists would agree that investment is important for economic growth. In the same vein, (Bowden, 1986) argued that for growth to occur there must be savings, although savings alone is not enough, investment serves to link savings to economic growth. The theory of investment also implies a relationship that determines investment as a decreasing function of the interest rate.(Hansson, 1986) states that in a high interest rate environment, investment tends to be lower and it increases when interest rates fall. The existing literature, however, shows that relatively little empirical work has been done on determinants of private investment in developing countries, despite the importance of investment to their economies, while most available models were developed for developed countries. The reason for this is twofold, namely the scarcity of data as well as the fact that many existing investment theories were developed for industrialized countries and, therefore, do not fit the circumstances of developing countries.

Literature suggests that gross fixed capital formation in developing countries has declined from an average of 26.5 percent of GDP during 1981 to less than 23.5 percent between 1985 and 1988(Agenor & Montiel, 1999). The decline was attributed to a number of factors, which include falling prices of primary commodities, decline in private external financing, large stock of foreign debt and implementation of adjustment programs designed to restore balance of payments viability (Greene & Villanueva, 1991). Although investment has declined in general during the period indicated above, the ratio of gross investment to GDP varied across countries and regions, being close to 26.5 percent in Asian and European countries and significantly less in other regions of the world(Harupara, 1998).However, lack of data in

developing countries is believed to have hampered a successful establishment of an empirical investment function based on the classical theory for those economies. Because of those inherent constraints, recent studies on investment in developing countries were built on the hypothesis that private sector investment in developing countries is positively related to the accumulation of domestic real money balances. Private investment is positively related to public investment and gross domestic product in the short run, but negatively related to inflation, real interest rate and exchange rate(Harupara, 1998).

Further evidence from (Bende-Nabende, 2002) found that market growth, export-oriented policy and FDI are the dominant long-run determinants of foreign direct investment in sub-Saharan Africa. It then follows that one has to study the microeconomics of investment behavior of firms that make decisions regarding investment. Firms forgo profit in the current period when they invest so as to have higher capital stock in the future, which allows them to gain higher profit. Firms' investment decisions are based on three factors namely, lower current capital stock, expected high future productivity and lower interest rate.

Literature on interest rate on investment

Interest rates are defined as the rental payments for the use of credit by borrowers or the return for parting with liquidity by lenders(Onwumere, Okore, & Imo, 2012). An interest rate is a price and like other prices, it performs a rationing function by allocating the limited supply of financial resources among the numerous competing demands for such resources. In recent years, many developing and transition countries have allowed market forces to play a greater role in their economies. In the financial sector, this means liberalizing interest rates so that they are allowed to be set by the market, and developing financial markets so that credit can be allocated more efficiently.

There is a negative relationship between investment and real interest rate (Williamson, 2002). Hence, a key determinant of investment is the real interest rate, as it represents the opportunity cost of investment. Opportunity cost of investment tends to be high when real interest rate is higher, thus leading to a fall in investment. Movements in real interest rate are, therefore, an important channel through which shocks to the economy affect investment. Furthermore, monetary policy, through its influence on the real interest rate, may also affect investment. The basic Solow Model cites volume of domestic savings as the only source of domestic investment. However, as the model is expanded to an open economy, capital flows are brought on board and this becomes the most noticeable feature of globalization (Sorensen & Whitta-Jacobson, 2005). Furthermore, (Sorensen & Whitta-Jacobson, 2005) found that in an open economy with free capital mobility, FDI and international portfolio investment became

more visible forms of international capital flows. In an open economy, investment and saving may deviate from each other, resulting in either capital exports or imports. Explaining this is the fact that an increase in domestic saving tends to reduce real interest rate, thus inducing savers to invest in their domestic economy.

Investment level is determined by the levels of output demand and supply, technology and interest rates(Hansson, 1986) and that the firm's investment decisions are determined by internal liquidity, profitability and the firm's financial strength (Bhattacharyya, 2007). For instance, investment in Namibia is positively related to three determinants namely; GDP, savings and lagged capital stock, while being negatively related to tax and interest rates(Eita & Du Toit, 2007).

The rate of private investment is positively related to real GDP growth, level of per capita GDP, and rate of public sector investment, and negatively related to real interest rate, domestic inflation, the debt service ratio and the ratio of debt to GDP(Greene & Villanueva, 1991). Therefore, they argued that countries with higher per capita incomes could devote more resources to domestic savings, which could be used to finance investment.

In using regression analysis (Zhou, 1996) also studied the relationship between interest rates and stock prices; he found that interest rates have an important impact on stock returns, especially in long-term investment horizons, but the hypothesis that expected stock returns move one-for-one with ex ante interest rates is rejected. In addition, his results showed that long-term interest rate explains a major part of the variation in price dividend ratios. Besides, he suggests that the high volatility of the stock market is related to the high volatility of long-term bond yields and may be accounted for by changing forecasts of discount rates.

Interest rate changes can impact equity by affecting the rate at which the firm's expected future cash flows will be capitalized and expectations about future cash flows (Smirlock & Yawitz, 1985) . They argue that an increase in interest rates causes stock prices to decline and a decline in interest rates causes stock prices to rise, suggesting an inverse relationship.

In applying arbitrage pricing theory to Japanese stock returns and several macroeconomic variables like industrial production, money supply, crude oil price, and short-term interest rates, (Elton & Gruber, 1988) showed that there is a positive relationship between stock prices and short-term interest rates. According to (Patel, 2012) interest rate, inflation, and exchange rate, index of industrial production, money supply, gold price, silver price and oil prices are the key determinants of stock performance. According to (Chen, Mohan, & Steiner, 1999) stock price is a dividend where the discount rate is a function of risk free rate and firm-related risk premium. The influence of interest rate on stock returns is negative because increase of the risk free rate increases the discount rate.Stock price is the value of the part of

the aggregate output for any given time periodwhich takes the form of construction of new structure, installation of new capital equipment and positive changes in business inventories in the economy (M. C. Vaish, 2003).

With his model of non-convex adjustment costs and the potential to learn,(Chetty, 2004) argued

that the investment demand curve is always a backward bending function of interest rate. He stressed that an increase in interest rate is more likely to stimulate investment when the potential to learn is larger and in the short rather than the long-run. Real lending rates have significant effect on economic growth(Obamuyi, 2007). There also exists a unique long-run relationship between economic growth and its determinants, including interest rate. The results imply that the behavior of interest rate is important for economic growth in view of the relationships between interest rates and investment and investment and growth. Thus, the formulation and implementation of financial policies that enhance investment-friendly rate of interest is necessary for promoting economic growth in Nigeria(Jimoh, 2013; Wuhan & Adnan, 2015).

While high interest rates on savings stimulated the supply of savings to the banking system, the high cost of borrowing in the form of high lending rates discouraged borrowers, especially the private sector producers and investors(Ndekwu, 1989). Thus, the high cost of borrowing working capital increased cost of production. He arrived on this conclusion assessing the impact of the damages in interest rates on savings by analyzing the structures and growth of bank deposit since the deregulation of interest rates on savings and loans in 1987.

In using time series analysis and annual data from 1970-2006, (Obamuyi, 2007) investigated the relationship between interest rates and economic growth in Nigeria. The study employed co-integration and error correction modeling techniques and revealed that lending rate has significant effect on economic growth. This re-emphasized the *a priori* expectation. The empirical results indicated that real lending rates have significant effect on economic growth. Also, interest rates can have a substantial influence on the rate and pattern of economic growth by influencing the volume and disposition of saving as well as the volume and productivity of investment(Uchendu, 1993).

In analyzing the relationship between interest rate and economic development by comparing the developments in the industry and capital market in Brazil, Mexico and the United States between 1830 and 1930,(Haber, 1991)discovered that capital market developments affected industrial composition and national economic performance.Furthermore, other studies such (Shiimi & Kadhikwa, 1999) found that public investment, inflation, real income and interest rate were significant determinants of investment.

In their study "How to Boost Investment in the MENA Countries", (Odoko, Adamu, Dina, Golit, & Omanukwue, 2004) used real interest rate, macroeconomic stability, situation reform, external stability, macroeconomic volatility and physical infrastructure as their independent variables. Their study comprised panel of 40 developing countries. They used co-integration techniques to determine the existence of a long-term relationship between investment and its determinants. They found out that almost all the explanatory variables exhibit a significant impact on investment but higher interest rate (s) appears to exert a negative effect on investment. Other studies such as (Anthony & Joe, 2015) corroborated these findings.

(Mahmudul & Gazi-Salah, 2009) in their study in Jordan on stock investment (based on the monthly data from January 1988 to March 2003) found that interest rate exerts significant negative relationship with share price for six countries. They argued on the availability of significant negative relationship between changes of interest rate and changes of share price.

METHODOLOGY

Data source

Secondary data of Bank of Ghana, regarding Gross Domestic Product, Inflation, Investment, Policy Rate(interest rate), from 2009 to 2016 released on quarterly basis was used for the analysis. One of the rationales for the selection of this8-year period is that we wanted to have a comprehensive view and analysis of the effects of the variables. Again, Ghana's economy was rebased in 2009 and the figures indicated that the country had attained the status of lower middle income economy; hence, for the purpose of uniformity we decided not to include figures that preceded the period of rebasing. The statistical package used for data analysis was E-view.

Descriptive and Inferential Statistics

In this study, the descriptive statistics of the dependent and the independent variables was employed to determine the mean, median and test statistics of the data. The p-value of the Jarque-Bera test computed from E-view was used to determine the nature and probability distribution of the dependent and the independent variables in the study.

Dependent variable

This Research considered one dependent variable that measured the economic performance level in Ghana from 2009 to 2016. Economic performance is one of the major goals of less developed nations because they depend on it for investment and capital accumulation. The research used investment data from Bank of Ghana between the periods 2009 to 2016 as dependent variable.

Independent variables

Three independent variables were included in the main model, policy rate (interest rate), inflation and gross domestic product (GDP). The independent variables have either positive or negative effect to the dependent variable investment performance. The research considered the above independent variables from 2009 to 2016 from Bank of Ghana.

Model description

The empirical linear regression model used in examining the relationship between investment, interest rates, inflation and GDP is specified as follows,

$I_{it} = \beta_0 + \beta_1 Dr_t + \beta_2 R_{it} + +\beta_3 INF_t + \beta_4 GDP_t + \mu_{it}$

Where; I_{it} is the investment variable which represents investments in equity for listed firms, proxied by market capitalization for each firm (i) at a time (t). Dr_t is interest rate representing inter-bank deposit rate at a time (t). IN_t is inflation at a time (t),GDP_t is the income levels in the economy at a time (t).

The statistical package used for data analysis was E-view. The model specification used lies on the Ordinary Least Square (OLS) for multiple regression analysis. To ascertain the stationarity of the data, Augmented Dickey Fuller (ADF) Unit root test was conducted.

The model first examines the relationship between dependent variable and independent or explanatory variables. For each independent variable y_i, $for\ i = 1, \dots\dots\dots n,$ for each observation i, there are k explanatory, or independent, variables$\{x_1, x_2, \dots\dots\dots\dots x_n\}$, each potentially exhibiting some relationship withy_i. The main aim is to postulate a model that approximates the relationship between the outcome random variable and the explanatory variables. The linear models, use in estimatingy_i and to reduce the error the study used a set of unknown coefficients $\{\beta_0, \beta_1, \dots\dots\dots\dots\dots\dots\beta_n\}$ and a random error or disturbance termϵ_i. The multiple linear models are defined as;

$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \cdots \beta_k x_{ik} + \epsilon_i$

The error is represented as $\epsilon_i = y_i - (\beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \cdots \beta_k x_{ik})$ for each observation i. The models was tested at 5% significance level, under the assumptions of classical linear regression model (CLRM)

ANALYSIS AND RESULTS

Random walk in the indicator variables

The data was analyzed using E-view spread sheet to examine the occurrence or existence or non-occurrence of random walk pattern by method of differencing that is, checking whether the

data is stationary or non-stationary for model fitting by using unit root test under Augmented Dickey-Fuller test statistics. This helps to check if the model from the data will not lead to spurious regression. This was done by comparing the p-values at 5% significant level. The p-value of the unit root test was less than 5% significant level after applying differencing, and the null hypothesis was rejected and the data was considered stationary for fitting the model.

Parameter estimation and testing

The parameters of the model in the research were estimated by minimizing the sum of squared errors of the multiple regressions.

$$SS(\beta_0, \dots\dots\dots, \beta_k) = \sum_{i=1}^{n} (y_i - (\beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \cdots \beta_k x_{ik}))^2$$

To minimize the sum of squared errors with respects to the $\beta - coefficients$, the researchers took separate or partial derivatives of $SS(\beta_0, \dots\dots\dots, \beta_k)$ with respect to each $\beta - coefficients$ and set each equations equal to zero. These results in a system of $k+1$ equations that determine the estimates of the $\beta - coefficients$, the estimates of the multiple regression coefficients of the model in the research, were estimated using E-view statistical package. If $k = 1$,then we shall have two systems of equation available for coefficient determination. Minimizing the sum of squared errors of the two systems of equations;

$$\epsilon_i^2 = (y_i - (\beta_0 + \beta_1 x_i))^2$$

$$\sum_{i=1}^{n} \epsilon_i^2 = \sum_{i=1}^{n} (y_i - (\beta_0 + \beta_1 x_i))^2$$

Taking partial derivatives of $\sum_{i=1}^{n} {\epsilon_i}^2 = SS(\beta_0, \beta_1)$ with respect to each $\beta - coefficients$ and setting each equal to zero;

$$\frac{\delta SS(\beta_0, \beta_1)}{\delta \beta_0} = -2 \sum_{i=1}^{n} (y_i - (\beta_0 + \beta_1 x_i)) \; and \; \frac{\delta SS(\beta_0, \beta_1)}{\delta \beta_1} = -2 \sum_{i=1}^{n} x_i (y_i - (\beta_0 + \beta_1 x_i))$$

$-2 \sum_{i=1}^{n} (y_i - (\beta_0 + \beta_1 x_i)) = 0$ ……1 Or

$-2 \sum_{i=1}^{n} x_i (y_i - (\beta_0 + \beta_1 x_i)) = 0$……..2

Using equation 1, $\sum_{1=1}^{n} y_i - n\beta_0 - \beta_1 \sum_{i=1}^{n} x_i = 0$

$$\beta_0 = \frac{\beta_1 \sum_{i=1}^{n} x_i - \sum_{i=1}^{n} y_i}{n}$$

$$\sum_{i=1}^{n} x_i y_i - \beta_0 \sum_{i=1}^{n} x_i - \beta_1 \sum_{i=1}^{n} x_i^2 = 0$$

$$\sum_{i=1}^{n} x_i y_i - \left[\frac{\beta_1 \sum_{i=1}^{n} x_i - \sum_{i=1}^{n} y_i}{n}\right]\sum_{i=1}^{n} x_i - \beta_1 \sum_{i=1}^{n} x_i^2 = 0$$

$$\sum_{i=1}^{n} x_i y_i - \frac{\sum_{i=1}^{n} y_i \sum_{i=1}^{n} x_i + \beta_1 \left(\sum_{i=1}^{n} x_i\right)^2}{n} - \beta_1 \sum_{i=1}^{n} {x_i}^2 = 0$$

$$\beta_1 = \frac{n\sum_{i=1}^{n} x_i y_i - \sum_{i=1}^{n} x_i \sum_{i=1}^{n} y_i}{n\sum_{i=1}^{n} {x_i}^2 - \left(\sum_{i=1}^{n} x_i\right)^2}$$

The p-values of the estimated parameters and the F-statistics are less than 5% significance level; the researcher rejected the null hypothesis that both slopes parameters $\beta_1, \beta_2, \ldots\ldots\ldots \beta_k$ are zero in favor of the alternative that the slope parameters are not zero and conclude that there is evidence of a linear regression relationship between the dependent variable and the independent variables. The F-statistics also show that there is evidence of the relationship between the dependent variable and at least one of the independent variables in the full regression equation.

Goodness of model fit

The regression model was checked for goodness of fit; the study examines the coefficient of determination which measures the percentage of variation in the dependent variable explained by independent variables. The study determines the ratio of sum of squares due to regression with degree of freedom k to total sum of squares with degree of freedom $n-1$. This estimates the percentage of variation in the dependent variable explained by independent variables.

$$R^2 = \frac{Explained\ sum\ of\ squares}{Total\ sum\ of\ squares} = \frac{SSR}{SST}$$

Descriptive statistics of dependent and independent variable

Table 1. Summary of statistics of the secondary data of Bank of Ghana from 2009 to 2016

	INFLATION	INTEREST_RATE	INVESTMENT__91DAY_T_BILL	GDP
Mean	12.89228	15.35977	17.95926	59634.87
Median	11.47	15	19.29	51929
Maximum	19.43	22	24.89	114437
Minimum	8.39	12.7	9.15	23154
Std. Dev.	3.736729	2.356147	6.208279	30466.38
Skewness	0.51631	0.273928	-0.077768	0.490537
Kurtosis	2.045613	2.117673	1.277856	1.906266

Table 1...

Jarque-Bera	8.941127	5.361276	10.96371	8.73503
Probability	0.008667	0.058764	0.002625	0.014533
Sum	1218.25	1575.7	1814.48	5653747
Sum Sq. Dev.	1378.373	484.8973	3880.467	8.75E+11
Observations	107	107	107	107

Source: Computed from Bank of Ghana data (2009 -2016)

The result in table 1 shows that the mean and median of the 107 observations (investment) and all the independent variables are close to each other, this shows evidence of normality. The peakness of the variables considered in the study is not too high based on the values of the kurtosis. The p-value for Jarque-Bera test for all the variables is not significant at 5% for normality.

Determining the presence of random walk in indicator variables

As indicated earlier, the secondary data was analyzed using E-view spread sheet to examine the occurrence or existence of random walk pattern in the dependent and independent variables by using unit root test under Augmented Dickey-Fuller test statistics. This was done by comparing the p-values at 5% significant level. This will help the researcher to eliminate the existence of random walk in order to fit the best model. Table 2 shows the Augmented Dickey-Fuller test of t-statistics and p-values.

Table 2. t-statistics and p-values of indicators variables

Indicator variables	**t-Statistics**	**P-values**
Investment (I_{it})	-2.276672	0.2257
GDP_t	11.73621	1.000
Inflation (Inf_t)	-1.327552	0.4707
Policy rate (Interest rate)	-0.551712	0.7525

Source: Computed from Bank of Ghana data (2009-2016)

After obtaining t- statistics and p-values of indicators as shown in table 2, clearly show that at first level unit root test, the Gross Domestic Product(GDP_t), Investment, Policy Rate (interest rate) and Inflation have unit root test, in the sense that we failed to reject their null hypothesis, because their p-values are all greater than 5% significant level, hence there is presence of random walk in their past data and the data is not stationary. The essence of unit root test to the

indicator variables is to eliminate the presence of random walk from the variables, before fitting the model. Table 2 above was drafted from Augmented Dickey-Fuller test statistics. The second and third differencing of GDP(GDP_t), Investment, Policy Rate (interest rate) and inflation unit root test was determined under Augmented Dickey-Fuller test statistics. This was done by comparing the p-values at 5% significant level. This helps the researcher to eliminate the existence of random walk in the differencing values of indicator variables. Table 3 below shows the Augmented Dickey-Fuller test of t-statistics and p-values of the differencing of indicator variables whose p-values are greater than 5% significant.

Table 3. t-statistics and p-values of differencing of indicators variables

Indicator variables	**t-statistics**	**P-value**
D (Investment)	-4.145137	0.0008
DD (GDP_t)	-52.01510	0.0001
D (Interest rate)	-4.45087	0.0004
D (Inflation-Inf_t)	-4.032341	0.0002

Source: Computed from Bank of Ghana data (2009 -2016)

The t-statistics and p-values of differencing as shown in table 4 clearly shows that the differencing of GDP (GDP_t), Investment, Policy Rate (interest rate) and inflation have no unit root test, because their p-values are all less than 5% significant level, hence there is no presence of random walk in the differencing due to the rejection of the null hypothesis.

Fitting the model

The E-view software was used to generate the multiple regression coefficients. The multiple regression coefficients were used to explain the degree of relationship between dependent and independent variables. The dependent variable is the D (investment performance (l_{it}) in GH¢ while the independent variable represent the factors that were presumed to have significant effect on the dependent variable. The D (investment performance) determinants chosen were based on the value of the regression coefficient which is used as a measure of the percentage of the variation in the dependent variable, which is explained or accounted for by the independent variable. The independent indicators or variables are Gross Domestic Product, Inflation, and Policy Rate (interest rate). The result of the multiple regressions is shown in table 4 below.

Table 4. Result of the multiple regressions

Dependent Variable: D_INVESTMENT_
Method: Least Squares
Date: 20/12/16 Time: 07:50
Sample (adjusted):408
Included observations: 107 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.089237	0.127581	0.857946	0.3498
D_INFLATION_	0.343381	0.100265	2.213906	0.0284
D_INTEREST_RATE_	0.462758	0.239816	2.549141	0.0261
DD_GDP_	-2.17E-05	2.25E-05	-0.865946	0.3566

R-squared	0.171128	Mean dependent var	0.151170
Adjusted R-squared	0.123165	S.D. dependent var	1.204853
S.E. of regression	1.221766	Akaike info criterion	3.109306
Sum squared resid	123.2523	Schwarz criterion	3.216532
Log likelihood	-132.1374	Hannan-Quinn criter.	3.253021
F-statistic	4.762299	Durbin-Watson stat	1.037221
Prob(F-statistic)	0.001598		

Source: Computed from Bank of Ghana data (2009-2016)

DISCUSSION AND CONCLUSION

The regression test indicates that the coefficients of the level of inflation and interest rate were positively related to the investment performance showing a direct relationship between those dependent and independent variables, showing that as those indicators increase or decrease per unit, investment will increase or decrease on the average with respect to their coefficients respectively. These coefficients are highly significant due to their p-values being less than 5% significant levels, under the assumption that the true population coefficient is zero. This clearly shows that interest rate has a positive relationship on investments as stated in the literature, Greene and Villanueva (1990). Also, the coefficients of gross domestic product (GDP), is negatively related to the investment performance showing an inverse relationship between the dependent variable and independent variables; showing that as gross domestic product increases or decreases per unit, investment on the average will decrease or increase with respect to the coefficient. This implies that an increase in the magnitude of any one of these

independent variables will on the average increase or decrease the amount of the dependent variable, investment performance in Ghana.

The R^2 value of about 0.171128 means that the index of inflation, interest rate and gross domestic product explains about 17.1128% of the variation in the index of investment. The p-value of F-statistic is 0.001598 less than 5% significant level, hence significant. Though the percentage of variations of index of investments explained by independent variables was low, the independent variables considered in the model are significant due to the p-value of the F-statistics. This means that jointly all indicator independent variables collectively have significant effect on investment in Ghana.

RECOMMENDATION FOR FURTHER RESEARCH

Models used in this study do not include all the variables, because of inherent data problems associated with developing countries like Ghana. In this case, some problems, especially those that are qualitative in nature, such as investors' perception in terms of politics and corruption are excluded from the model. Only quantitative data was used for the study. Further research can incorporate diagnostic tests to establish the assumptions of ordinary least squares regression. Again, testing the reliability of the dependent variable for the model to establish its stability to the occurrence of shocks can also be carried out in future research.

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