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RESEARCH ARTICLE

THE EFFECT OF REAL EXCHANGE RATE ON ECONOMIC GROWTH IN GHANA

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ABSTRACT

Interest rate is the closely watched variable in the economy, their movements are reported almost daily by news media because they directly affect our everyday lives and have important consequence for the health of the economy and it is important macroeconomic variables for economic growth, they affect personal decisions such as whether to consume or to save, whether to buy a house and whether to purchase bonds or put funds into a saving account. This paper investigates the effects of real exchange rate on economic growth in Ghana over the period 1975 to 2015 using quarterly time series data. Specifically, it examines the extent to which real exchange rate has on the growth rates of the country reflecting real GDP, inflation rate and interest. The study, therefore, employs the co-integration analysis within the framework of Vector Autoregressive (VAR) to empirically investigate the effects of real exchange rate on real GDP growth in the country. The study found long-run relationships among the variables. The results also indicated that within the past one year and two years, inflation rate and interest rate had negative impacts on the growth of real GDP in Ghana respectively while within the past one year, real exchange rate had a positive effect on the real GDP in Ghana. Further, the study found feedback effects among the variables. Further, the study found feedback effects among the variables. The Granger Causality test also showed unidirectional causality running from inflation rate and interest rate to real GDP and bi-directional causality from both real exchange and money supply and real GDP. This study, therefore, recommends that the Bank of Ghana and government of Ghana put in measures which are geared towards stabilising these policy variables especially real exchange rates as they are capable of influencing the country's economic performance both in the short and long run.

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INTRODUCTION

Economic growth is a delicate occurrence. In conventional economic literature, factors of production such as capital, labour and land are the main determinants of economic growth. The new growth theories add further variables including technological advancement, human capital (the skills and knowledge of workers) and social capital as sources of economic growth. Interest rate and investment are among the central variables influencing economic growth rate. Most investments are of governmental origin and decisions about their realisation are primarily affected by the real interest rate. Usually, a reduction in the real interest rate increases economic growth through capital accumulation. Furthermore, if the interest rate is fixed in an economy by banking authorities, effects of economic growth on interest rate will not be recognisable.

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So under this study, the researchers examined the impact of interest rate as one of the central variables that affect economic growth in Ghana. Interest rate is one of the important macroeconomic variables, which is directly related to economic growth. Interest rate is considered as the cost of capital, meaning the price paid for the use of money for a period. From the point of view of a borrower, an interest rate is a cost of borrowing money. From a lender's point of view, an interest rate is a fee charged for lending money. An increase in interest rates means that consumers have to pay more to finance their Consumption. Then higher required payments discourage the consumers from buying durable goods, which reduces consumption. The same goes for investments, which can be seen as consumption by firms. Higher interest rates for the financing of equipment and machinery discourage firms to do investments. In other words, when interest rates increase, investments go down, since it gets more expensive to borrow money and more tempting to save money. Thus, consumption decreases and it leads to decreased demand (Suntum, 2008). So the decrease in saving leads to the decrease in investment

hence it lowers the economic growth of a country. Interest rate is the closely watched variable in the economy, their movements are reported almost daily by news media because they directly affect our everyday lives and have important consequence for the health of the economy and it is important macroeconomic variables for economic growth, they affect personal decisions such as whether to consume or to save, whether to buy a house and whether to purchase bonds or put funds into a saving account. Economic growth of any country reflects its capacity to increase production of goods and services. The simplest definition of economic growth can be stated as the increase in the Gross Domestic Product (GDP) of that country. Economic growth is the increase in the market value of the goods and services produced by an economy over time. It is conventionally measured as the percent rate of increase in real gross domestic product, or real GDP. Another measure of equal importance is the growth of the ratio of GDP to population (always referred as the GDP per capita). Nominal GDP is mostly adjusted for inflation factor to reflect real GDP. Interest rate is one of the macroeconomic growth factors; it's up and down volatility is closely related to inflation rates.

The high or low rates also impact GDP and hence it influences economic growth rate. In business fields, it is very important to accurately predict interest rate trends. Many previous studies have assumed that the time series data is stationary and they ignored that non-stationary could exist in the variables. The idea that a stable and competitive real exchange rate (RER) is favourable for economic development now has a respectable status in policy and academic circles (Rapitti, 2012). Current empirical research documenting a strong relationship between the level and volatility of the RER and economic growth has contributed a great deal to consolidate this view. Research has mostly relied on a variety of econometric techniques applied to large cross-country data sets. Although the documented positive effects of both RER competitiveness and stability of growth appear to be robust empirical findings, it is still unclear what mechanisms driving these associations are (Rapitti, 2012). The current study, therefore, fills this gap by examining the impact of interest rate on the economic growth in Ghana.The GDP per capita in Ghana was last recorded at 1696.08 US dollars in 2015. This is equivalent to thirteen (13) percent of the world's average. GDP per capita in Ghana averaged 1026.76 USD from 1960 until 2015, reaching an all-time high of 1696.08 USD in 2015 and a record low of 701.53 USD in 1983.The performance of the Ghana economy has a long history, as per brief review of economic activity.

Moreover, it is more fascinating that after a few years of a floating or flexible exchange rate regime in Ghana, there is little disagreement with the view that exchange rates should be market determined (Osei-Assibey, 2013). This could be partly because substantial fluctuations in the prices of commodities traded by Ghana are major sources of external shocks to the economy, thereby cushioning the terms of trade shocks. The facility to operate an independent monetary policy is another important and related property of floating that is believed to have been of value to Ghana. Despite the Ghanaian economy witnessing economic performance over the years, it continues to be bedevilled by a host of constraints. Among these constraints are low levels of savings and investment, depreciation of the cedi, high inflation rate, high-interest rate, etc. which have raised serious concerns among economists and policy makers on the sustainability of the achievements attained so far (Bekoe & Adom, 2013). This study contributes to the literature on real growth applied to Ghana's economy; it will examine the effect of interest rate, inflation, and Real GDP on the real growth rate of Ghana's economic. The study is concerned to analyse the relationship between Interest rate and GDP.

Literature Review

The Concept and Definition of Interest Rate

Interest rate is the mechanism by which supply and demand for loans interact. Businesses need loans to invest in the economy. It is the capital charged, either expressed as a unity or percentage of the principal. Interest rates are usually noted annually, also termed as the Annual Percentage Rate (APR). Assets to be borrowed may comprise of consumer goods, cash or fixed assets such as buildings. Interest is a charge to the one borrowing the asset. For fixed assets such as building, the rate of interest is termed as the "lease rate". In situations where the individual or firm is considered a low-risked, the interest rate charged is usually low and vice versa. The higher the interest rate (i.e. cost of borrowing), the lower the quantity of loans demanded. So interest rate involves the cost of borrowing, of which its movement affects the movement of credit in the economy. There is, therefore, a direct link existing between the growth of an economy and interest rate which implies that lower the interest rates result in a higher growth of the economy. Interest rate measures how much money costs. If the banks increase their interest rate, more money will flow into a deposit. Debtors will, therefore, have more money to borrow. If the banks lower the interest rate, people become unwilling to deposit their money in the bank. The bank will have less money to lend to potential borrowers. If the government wants to stimulate investment, it will increase the interest rate to collect more money for banks; if the government wants to stimulate consumption instead, it will lower the interest rate, so people will save less and spend more.

Factors that affect Interest Rate

Supply and Demand

Interest rate constitutes the level between demand and supply of loan. When there is a change in demand and supply, interest rates changes to effect the loan market. The levels of Interest rate factors include supply and demand of loan: where there is a rise in the demand for loan increases, while a decline in the demand for a loan will result in decreasing interest rate. Invariably, an increase in the supply of loan will result in reduced interest rates. Hence, as supply and demand forces interplay to effect change, so do interest rates to effect the loan markets. If we want to understand what changes rates, there is the need to fully comprehend the demand and supply equation. There is at each side of the equation motivation and risk factors for performing transactions at each rate. Within the demand side of the equation, the motivation drivers emanate from the risks which are involved in getting the asset. As peoples and individuals perceptions concerning the risks evolves so the asset valuation changes by itself. For an individual owning a debt, a prime risk is an absence and lack of savings to repay the loan when the loan payment time matures. When there are availability and increase in money to loan individuals, then the supply of loan rises. For instance, you end up lending money to a bank when you open an

account with the bank. Based on the type and nature of Bank account, the bank can utilise that money to transact its business and investment purposes. Thus, the bank stands a chance to lend out that money to other customers. The greater banks can give, the greater loan is made available to the public. And as the supply of loan rises, the amount to be paid on borrowing decline. There is a decline of a loan made available to the economy as lenders decide to postpone the period of paying or settling the amount owed. At the long run, this goes on to appreciate the rate of interest in the society. The total amount demanded to be borrowed must balance the supply of lending funds. Usually, the savings of individuals, firms, organisations and the government constitute the bases of supplying funds to Banks. In totality, this is termed the savings level of that society. The saving rate is the income saved by the individual expressed as a percentage.

Inflation

When the rate of inflation rises, there is the likelihood of a rise in interest rates. This is because Banks and Financial institutions will demand a higher rate of interest to compensate for the decline in the value of the money to be repaid later. As the economy grow; the production level of organisations increase to cater for the increasing demand. Thus when there is an increase in production, there is a corresponding increase in the utilisation of capacity, which further results in increases in the demands for wage since labour becomes scarce. The increase in wages results in an increase in the prices of goods and services, which as a result brings about a further increase in wages, producing a chain reaction. As a result of this reaction, people expect increases in prices, which results in an increased expectations of inflation at the long run. The growth of the economy nowadays which might lead to inflation is dependent on an idea called the economy expected growth rate. This economic growth rate is a vague concept comprising of all levels of education, technology, and productivity. Usually, as the economic grows to its peak, firms raises their production so as to offset realises. When there is an increase in production, the utilisation of existing capacity rises, resulting in an increase in wage demand since labour becomes scarce. Increases in wages result in corresponding increases in goods, which finally result in further increases in wage, causing a chain reaction. With this chain reaction, there is an expectation of a rise in prices for consumers and workers, which results in increasing expectations of inflation.

Inflation is assumed to fluctuate about the business cycle in the short run. If there is a low demand for goods, unemployment rate rises and a contraction in the economy, because producers tend to reduce production when they can't sell enough products. There is a decrease in prices for goods as well as wages since demand decreases. When there is an expansion in the economy with a rise in the gross domestic product (GDP), the reverse takes place. There is a demand increase for goods and services, increasing wages, hence a corresponding increase in the price of products and services. Sometimes, if there is a more serious contraction in the economy, the central bank will step in and stimulate the economy to promote growth. The process involves increasing the money supply by buying bonds from the Treasury, which adds to some funds banks have to lend. When the central bank acquires government bonds, the price of the bonds increases and interest rates decline, since interest rates are inversely correlated with bonds prices. With lower interest rates, businesses and consumers are likely to buy more on credit, increasing demand in the economy. When the money supply gets too large, there is a danger of inflation. The central bank will then decrease the money supply by reversing the process.

Government

The government play a major role in determining the effect of interest rates. When more securities are acquired by the government, Banks are pumped with plenty money more than what they need for lending, decreasing the rate of interest. When the government sells securities, money from the banks are used up for the transaction, rendering fewer funds at the banks' disposal for lending, forcing a rise in interest rate. The central bank acts as the independent authority to control the money supply in most modern economies; in Ghana, this central bank is known as the Federal Reserve. The interplay between growth and inflation among consumers, producers, and the government is a driving factor behind interest rates. In most advanced economies, the presence of a central bank adds another entity in the interplay of economic growth and inflation. The central bank is meant to prevent rampant printing of money to fund government expenditures, which can lead to unchecked inflation. Beyond controlling money supply, the Federal Reserve acts as an external force to curtail volatility in the economic cycle and act as a lender of last resort in times of crisis. Although market economies allocate resources efficiently most of the time, at times they can encounter crises and periods of instability that can turn into vicious cycles.

Future Expectations

Future expectations of economic growth and economic stability are also important determinants of the savings rate; economies that undergo severe slowdown or increasing uncertainty about prospects tend to witness increases in the savings rate. The interest rate market can be thought of as an intermediary for savers and borrowers—as the level of savings decreases, the market clearing interest rate needs to rise. This analysis is simplified, though, and numerous conditions can substantially alter the dynamics of the savings rate. One condition is the implicit assumption that the economy is closed—that is, savings from other economies cannot enter the domestic market. If the economy was not closed, an excess of savings from abroad could flow through and help lower rates. As international capital has become more mobile, savings have tended to flow toward assets in demand regardless of national boundaries. Countries offering a higher rate of return, especially adjusted for the safety of capital and property rights, will attract more capital than other countries. A current example of this situation is the United States, where the savings rate declined for over two decades until 2007 and foreign capital substituted for the lack of domestic savings.

Financial Regulatory Framework

The financial regulatory framework of an economy, as well as the structure of its banking system, also affects the level of funds available for borrowing. Regulations that avoid inflow or outflow of capital do have a significant impact on domestic interest rates. If foreign inflows are bared from entering the country, interest rates tend to rise than an open economy; the reverse occurs if capital is held captive domestically

Model Description

The data used in this study is mainly secondary, sourced from reports and other published information on interest rate and GDP in Ghana. Specifically, these sources included the 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. Also, the study employed the use of annual time series data which spanned over a thirty-five year period from 1980 to 2015 inclusive. To examine this relationship between real exchange rate and GDP, the study uses time-series data set covering the years 1980 to 2015. To achieve the main aim of this work, the paper adopted the Autoregressive Distributed Lag (ARDL) approach. A *distributed-lag model* is a dynamic model in which the effect of a regressor*x* on *y* occurs over time rather than all at once. The ARDL model is considered appropriate for determining the short-run and long-run relationships among the variables. For the purpose of this study, real GDP was used as the dependent variable in the empirical model.

Model Specification

Thus the model used in this research isa modification of the work done by Edwards (1989), Montiel (1999), Baffes et al. (1999) and Issa(2004). The real exchange rate is written as a single equation, the reduce form solution of smallsimultaneous equation model:

$RGDP_t = F_T^{\alpha}$ .....(1)

Where F is a vector of the permanent component of macro fundamentals, and α is a vector ofparameters to be estimated. Thus, within this study

$RGDP_t = f(\mu INF_t^{\beta 1}, INT_t^{\beta 2}, e^{\varepsilon t})$ .....(2)

Where $RGDP_t$ is real GDP at time,
$INF_t$is the inflation rate at time t,
$INT_t$is the interest rate at time t;
$\mu$is a constant, and e is the error term.

Equation 1 can be written as:

$RGDPP_t = f(e^{(\mu INF_t^{\beta 1}, INT_t^{\beta 2}, e^{\varepsilon t})})$ .....(3)

From equation 3, the econometric model can be specified as:

$RGDP_t = \beta_0 + \beta_1 INF_t + \beta_2 INT_t + \varepsilon_t$ .....(4)

Where $RGDP_t$ is the of real GDP rate at time t which is measured as the nominal GDP adjusted for inflation,

$INF_t$is the inflation rate at time t which is measured as the annual percentage change in consumer prices,
$INT_t$is the interest rate at time t which is measured using the Bank of Ghana's monetary policy,
$\varepsilon_t$is the error term,
$\mu = \beta_0$, and e =1.
$\beta_1$andβ_2 are the parameters to be determined with$\beta_1 < 0$, $\beta_2 < 0$

By taking the logarithm of equation (3), we arrive at:
$lnRGDP_t = \beta_0 + \beta_1 INF_t + \beta_2 INT_t + \varepsilon_t$ .....(5)

Differencing equation 5, gives equation 6, the economic growth which is stated as:

$ln\Delta RGDP_t = \beta_0 + \beta_1 \Delta INF_t + \beta_2 \Delta INT_t + \varepsilon_t$ .....(6)

The Vector Autoregressive (VAR) representations of the variables of interest are specified below:

$Y_t = \emptyset + \delta_1 Y_{t-1} + \ldots \delta_p Y_{t-p} + v_t$ .....(5)

Where Y_t is a (K*1) vector of endogenous variables, ∅ is a (K*1) vectors of intercepts; δ_p are the (K*K) fixed VAR coefficients matrices and$v_t = (v_{1t}, \ldots, v_{kt})$, is an unobserved error term. It is to be noted that, K is the number of variables. Given the trending properties of the variables, the paper employs the information criteria to select the lag length of the VAR, including an intercept and a deterministic trend. The study selects the lag length based on the Akaike Information Criterion (AIC) and Swartz Bayesian Criterion (SBC). Forecast Error Variance Decomposition was also used to determine the feedback effects among the variables. Granger (1996) causality test was conducted to examine the linear causation among the variables under consideration. Granger causality is useful in determining the direction of the relationships. The testbased on the model isspecifiedbelow.

$$\Delta Y_t = \delta_0 + \sum_{i=1}^{p} \beta_{1i} \Delta Y_{t-i} + \sum_{i=0}^{p} \phi_{1i} \Delta X_{t-i} + v_t \quad (9)$$

$$\Delta X_t = \delta_0 + \sum_{i=1}^{p} \beta_{2i} \Delta X_{t-i} + \sum_{i=0}^{p} \phi_{2i} \Delta Y_{t-i} + u_t \quad (10)$$

If X_t Granger causes Y_t, then the current values of Y_t are determined by past values of X_{t-1}. The test of H_0: $\delta_i = 0$, can be carried out with the F- test.

Estimation Techniques

Unit Root Test

The stationarity properties of all variables are examined to ascertain their respective orders of integration. The presence of unit root in the series indicates that the variable is non-stationary. Hence the degree or order of integration is one or higher. Conversely, the absence of unit root implies that the variables are stationary and the order of integration is zero. This study began by inspecting the stationary properties of the series using the Augmented-Dickey-Fuller (ADF) test procedure. The ADF test is used to determine the order of integration of each series in the model. The order of integration is established by determining whether the series is stationary or non-stationary. If the series is however found to be non-stationary, then the series is differenced, and the resultant differenced series is then tested to determine whether it is stationary or non-stationary. This sequence is repeated until all series are stationary.

All other tests assume asymptotic normality.

H_o: All variables have Unit Root or are non-stationary
H_1: Variables are Stationary

The ADF test tests the null hypothesis that the variables have a unit root or are nonstationary as against the alternative hypothesis that the variables are stationary.

Table 1. Results of the ADF Unit Root Test

Method	Statistic	Prob.**
ADF – Fisher Chi-Square	28.6301	.0001
ADF – Choi Z-stat	-2.76545	.0028

The study then resorts to the VAR framework to estimate the long run and short run relationships between real exchange rate and the associated explanatory variables. From Table 1, the value for the ADF – Chi-square test is 28.6301 and that of the ADF – Choi Z-stat is -2.76545. Their corresponding p-values are 0.0001 and 0.0028 respectively. Since these p-values are less than 0.01, we reject the null hypothesis at the 1% level of statistical significance. This means there are no unit roots in the panel under the given test condition.

RESULTS AND DISCUSSION

Having done the unit root test, the Vector Autoregressive (VAR) was used to determine the optimal lag length for the Johanson cointegration test which is based on the AIC as presented in Table 2. From the results, the optimal lag length based on AIC is 2. Using the selected optimal lag length of 4, the likelihood ratio test which depends on the Maximum Eigen values and Trace test of the stochastic matrix of the Johanson (1991) procedure for exploring the number of cointegrating vectors was used.

Trace statistics show that there isone (1) cointegrating vector at 5 percent level of significance. The null hypothesis of zero cointegrating vectors is rejected against the alternative of one cointegrating vector. Therefore, it can be concluded that there is one cointegrating vector specified in the model and that there exists a long-run relationship between the variables of interest. The VECM associates the changes in growth in real GDP with the other lagged variables and the disturbance term of lagged periods.

The coefficient of the speed of adjustment (i.e. ECM (-1)) is negative and significant at 1 percent.The estimated coefficient of the ECM (–1) is -0.06140 (significant at 1%) indicating that in the absence of changes in the independent variables, deviation of the model from the long-term path is corrected by 6% per quarter. Again, the short-run results indicate that the first and second lags of the first and second differences of LNRGDP exert significantly and positive effect on ΔLNRGDP consistent with the findings of Pitchford (1992), Younger (1992), Osei-Assibey (2013), and Rapitti (2012).From the results in Table 5 above, all the variables under consideration are statistically significant at 1 percent. Thus, the results indicate that the past one year of the inflation rate and interest rate and the past two years of the money supply had negative impacts on the growth of real GDP in Ghana respectively while the past one year of real exchange rate had a positive effect on the real GDP.

Table 2. Selection of Optimal Lag Length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-344.9596	NA	289202.4	21.08846	21.22450*	21.13423*
1	-335.0955	17.33689	275419.6	21.03609	21.58027	21.21919
2	-323.2809	18.61688*	235979.4*	20.86551*	21.18594	21.18594
3	-321.0165	3.156384	369178.1	21.27373	22.63419	21.73148
4	-316.3073	5.708174	516709.2	21.53378	23.30238	22.12886
5	-302.5228	14.20223	441045.6	21.24380	23.42054	21.97621
6	-293.6770	7.505483	552128.4	21.25315	23.83803	22.12289
7	-286.5343	4.761793	873619.5	21.36572	24.35873	22.37278
8	-272.7042	6.705509	1151876.	21.07298	24.47414	22.21737

* indicates lag order selected by the criterion
LR: sequentially modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 3. Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.480079	43.01251	35.19275	0.0059
At most 1	0.318422	17.50342	20.26184	0.1148
At most 2	0.063365	2.553002	9.164546	0.6670

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 4. Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.517485	28.42098	25.82321	0.0222
At most 1	0.357358	17.24455	19.38704	0.0997
At most 2	0.226097	9.996034	12.51798	0.1274

Max-eigenvalue test indicates 1 cointegrating Eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Long run relationship

Tables 3 and 4 below present the results of the cointegrating test. From Tables 3 and 4, both the Maximum Eigenvalue and

These results are consistent with the findings by Younger (1992), Osei-Assibey (2013), and Rapitti (2012).The results indicate that, 0.1 unit increase in the past one year of inflation rate and interest rate and the past two years of money supply

Table 5. The Result of the Short Run Dynamics

Error Correction Model:	D(LNRGDP)		
Variable	Coefficient	Standard Error	T-value
Constant	-0.11264	0.01190	-9.46555***
D(LNGDP(-1))	1.32068	0.13478	9.79914***
D(LNGDP(-2))	0.83500	0.12000	6.43097***
D(INF(-1))	-0.04585	0.00495	-9.26263***
D(INF(-2))	-0.02060	0.00282	-7.30496***
D(INTR(-1))	0.52547	0.04811	10.92226***
D(INTR(-2))	-0.02258	0.00429	-5.26340***
ECM(-1)	-0.06140	0.00653	-9.40276***
R-squared	*0.333052*	*Akaike AIC*	*-1.104910*
Adj. R-squared	*0.634798*	*Schwarz SC*	*-0.909322*
F-statistic	*9.680420****	*Sum sq. resid*	*2.252912*
Mean dependent	*-0.012137*	*Log likelihood*	*82.47651*
S.E. equation	*0.134791*	*Durbin-Watson stat*	*1.937804*
S.D. dependent	0.223046		

Source: Author's Computation

Table 6. Results of Pair-wise Granger Causality Test

Null Hypothesis	F-Statistic	Probability
INFL does not Granger Cause LNGDP	3.71571	0.0347**
LNGDP does not Granger Cause INFL	4.43481	0.0194**
INTR does not Granger Cause LNGDP	4.14356	0.0245**
LNGDP does not Granger Cause INTR	2.54436	0.0934*
INTR does not Granger Cause INFL	1.96222	0.1561
INFL does not Granger Cause INTR	0.77296	0.4696

Note: **, and * denote significance level at 5% and 10% respectively
Source: Estimated by the author using E-views 8.0

will cause growth in real GDP in Ghana to decrease by 0.05 percent, 0.02 percent, and 0.02 percent respectively while 1 percent increase in the past one year of real exchange rate will cause real GDP growth in Ghana to increase by approximately 0.53 percent. This shows how changes in the country's real exchange rate can greatly influence the real GDP growth. Therefore, in the short run, the above variables reflecting inflation rate, interest rate, money supply, and real exchange rates being this paper's focused variable are important in influencing the country's real GDP growth.

Granger Causality Test

After establishing cointegration among the variables, Granger causality test was then conducted to measure the linear causation between economic growth (GDP) and the associated independent variables. The results of the pair-wise Granger causality test are presented in Table 6. The results in Table 6 suggest that the null hypothesis that real exchange rate does not Granger cause real GDP is rejected at 5 percent significance level. This means that real exchange rate Granger causes real GDP. In the same way, real GDP Granger Causes real exchange rate (i.e. they have bi-directional causality). Also, from the Table 7, the results show that there is bilateral directional causality between inflation rate and real GDP Growth.

Conclusion

The paper empirically investigated the real exchange rate and economic performance in Ghana with particular reference to real GDP over the period 1975Q1 to 2015Q1. The main interest is to study how changes in real exchange rate influence Ghana's economic performance. The study uses the Johansen's cointegration and error-correction techniques within the Vector Autoregressive framework (VAR) to identify the variables in explaining the real GDP in Ghana. From the study, it is found that all the variables such as growth in the inflation rate, interest rate, real exchange rate and money supply turned out to be non-stationary at their levels but became stationary at their first differences. Further, from the study, all the variables indicated their correct signs and were statistically significant. The Granger Causality test also indicated unidirectional causality running from inflation rate and interest rate to real GDP and bi-directional causality from both real exchange and money supply and real GDP. The study, therefore, recommends that the government of Ghana and Bank of Ghana intensify their efforts in stabilising these policy variables especially real exchange rate as they are capable of influencing the country's economic performance in both short and long run.

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