*Annals of Management Science*
*Vol. 1, No. 1, December 2012, 107-122*

# Real Exchange Rate and Economic Growth: Determining the Direction of Impact in Ghana

**Abel Fumey***
*Department of Economics, University of Ghana, Accra, Ghana*

## Abstract

*The study examines the relationship between the real exchange rate and economic growth in Ghana with emphasis on the channel through which the impact is transmitted by using an annualized data from 1980 to 2010. The long run and short run dynamics of the variables of interest are captured by estimating an error correction model using Johansen cointegration approach. Empirical results obtained suggest that there is a significant long run relationship between real exchange rate and economic growth and that real exchange rate impacts positively on gross domestic product. This implies that an appreciation of real exchange rate improves economic growth. Therefore, adopting a suitable exchange rate policy may help improve output capacity and achieve a higher economic growth. Importantly, the study also reveals that real exchange rate in Ghana operates through aggregate supply channel to impact economic growth. Based on the results obtained from the study, we recommend against allowing real exchange rate appreciation to exceed the equilibrium rate. Our recommendation is aimed at protecting domestic industries from massive importation of goods. Additionally, we recommend that fiscal, monetary and exchange rate policies be designed to ensure sustainable and suitable macroeconomic stability which would stimulate real appreciation of the exchange rate in order to enhance economic growth.*

***Keywords:*** *direction of influence, economic performance, aggregate supply, Ghana cedi, cointegration, error correction.*

## 1. Introduction

According to researchers, the direction of influence between exchange rate and economic growth has been blurred. Macdonald (2000) pointed out that the role of the exchange rate in the economic growth process is not immediately made clear in literature. This statement underscores the motivation for our study. In other words, a major objective of this study is to examine the relationship between the real exchange rate (RER) changes and economic growth in Ghana. Ghana has experienced various exchange rate regimes - from fixed to floating exchange rate regimes and the current practice of managed floating which started since 1990. In this current practice of managed floating, the Bank of Ghana occasionally shores up the system by supplying foreign currency to the market. Therefore, it is imperative to ascertain the impact of real exchange rate in the various regimes on the economic development of the country.

Despite the seemingly blurred indication of the linkages that exist between the exchange rate and economic growth, there are pieces of evidence that point to some relationships between them. One of these evidences is that, when the exchange rate is flexible, it exhibits a very close correlation between nominal and real exchange rates, although there are disagreements among researchers as to whether or not the real exchange rate is driven by the nominal exchange rate

* E-mail: afumey@ug.edu.gh or fumabel@hotmail.com

when prices are sticky. Also, once there is a change in real exchange rate, it tends to be persistent. Another evidence is that flexible exchange rate regimes has the tendency of becoming excessively volatile. This volatility can be unmatched by corresponding volatility in other variables like prices and relative money supply that determine the direction of movement of the exchange rates.

The exchange rate is a major economic performance measuring tool because of its influence on the relative prices of local and foreign goods as well as demand for such goods. This fact is supported by Bautista (1987) who defines the real exchange rate as "the real worth of foreign exchange in terms of a given domestic currency".

A number of countries, including Ghana are experiencing real exchange rate instabilities which affect their economic performance. Economic theory has it that for standard of living to be improved or for an economy to grow and develop, such economy needs to be linked up with other economies. The presence of external factors in the economy generates an influence which is hard to manage and control. In an external economy, real exchange rate emerges as an important variable that requires prudent management in order to improve the standard of living of the citizens.

There is abundant evidence in literature that supports the fact that inappropriate exchange rate policy is harmful to the overall well being of an economy. For instance, an undervalued exchange rate results in Balance of Payment deficit which leads to a decline in standard of living while an overvalued exchange rate leads to artificial rise in the standard of living beyond a nation's productive capacity. Overvalued exchange rate also creates a deficit in the current account balance and this is often financed by depleting foreign exchange reserve or incurring external debt (Obadan, 1994). This means that the deviation between the actual exchange rate and the targeted real exchange rate is due to lack of adjustment to changes in economic fundamentals. So, how are these fundamentals changing with respect to Ghana and to what extent are exchange rate policies formulated in order to avert the problem of reserve depletion?

The effects of wrong exchange rate policies are quite complex in that changes in the real exchange rate will mostly depend on other prevailing policies in the economy, such as fiscal and monetary policies. While this may seem to suggest that the adverse effect of undervalued or overvalued real exchange rate does not come by itself, an understanding of the extent to which either of these can be done is nonetheless important due to their effect on the economy.

Thus, the study examines the extent to which movements in the real exchange rate of the Ghanaian currency affects the competitiveness of trade flows and the likely consequences of such competitiveness on economic growth.

The implementation of liberalization policies in many developing countries has exposed the behaviour of real exchange rate in these countries with some experiencing persistent overvaluation while some are experiencing persistent undervaluation, all of have have resulted in worsening economic outcomes (Dollar, 1992; Akinlo, 2003; Aguirre and Calderon, 2005). Therefore, this study will also investigate whether Ghana's real exchange rate operates through aggregate demand or aggregate supply channel to affect economic outcomes.

Changes in real would affect inter-sectoral profitability, leading to resource shifts among the various sectors in the economy. The real exchange rate is, therefore, crucial in determining the profitability of both traded goods and non-traded goods. Real exchange rate depreciation increases the relative profitability of tradeables and causes it to expand at the expense of the non-tradeables and acts as an incentive for growth, since tradeables are special in developing

countries (Rodrick 2007). This study examines the relationship that exists between real exchange rate and economic growth in Ghana with a focus on finding the channel through which real exchange rate influences economic growth.

From theoretical point of view, an appreciation of the real exchange rate has an ambiguous impact on real output. However, the traditional view has it that a real appreciation lowers international competiveness, which in turn causes net export to fall and, as a consequence, lowers the aggregate demand (Thapa, 2002). Therefore from the stand point of this theoretical view, quantitative answers as to the question of how real exchange rates affect economic growth in Ghana is essential for implementing the appropriate exchange rate policy as well as for forecasting the possible consequence of such policies. Knowing the relationships that exist between economic growth and real exchange rate is particularly important for Ghana. It will be very helpful in formulating real exchange rate policy that can be used as a strategy in Ghana's bid to reduce poverty within the context of export-led growth. The real exchange rate which acts as a key relative price in the economy may not only change the country's external balance but also other socially sensitive variables such as income distribution, poverty, and employment.

The rest of the paper is organized as follows: section 2 presents some exploration of relevant literature, section 3 covers methodology and data while the results of the study are dealt with in Section 4. Section 5 gives the conclusions and recommendations from the study.

## 2. Literature Survey

The literature survey looks at some theoretical concepts and issues relating to the concept of real exchange rate and the link between exchange rate and economic growth. It also looks at related studies in other developing countries.

### *2.1. The Real Exchange Rate Concept*

There is no single generally accepted definition for real exchange rate by researchers. Montiel (2003) defines it in broad terms as the relative price of foreign goods in terms of domestic goods. Hinkle and Nsengiyuma (1999) had two definitions for the real exchange rate. The first definition is in external terms and is stated as nominal exchange rate adjusted for differences in price level between economies and these are measured in a common currency. The second definition is in internal terms. It is stated as the ratio of local price of tradables to non-tradables within a country. The first definition is based on purchasing power parity (PPP) theory, which compares the relative value of currencies by measuring the relative prices of foreign and domestic consumption baskets. The second definition captures the internal relative price incentives of an economy for the production or consumption of tradable goods as against non-tradable goods.

Edwards (1988) also defined the real exchange rate as the ratio of the prices of tradables to non-tradables. So, the real exchange rate determines the rate at which countries trade among themselves. The real exchange rate is sometimes referred to as terms of trade and it can be defined as the nominal exchange rate that takes the inflation differentials among countries into account.

RER is calculated as: $RER = \frac{eP^*}{P}$

Where *P, P** represent domestic and international prices respectively and *e* denotes Nominal Exchange Rate which is the rate at which a person can trade the currency of one country for the currency of another.

Therefore, the real exchange rate is a function of nominal exchange rate and prices of goods in the two countries measured in their local currencies. Thus, if the real exchange rate is high, foreign goods become relatively cheaper compared to domestic goods. Conversely, if the real exchange rate is low, foreign goods become relatively expensive compared to domestic goods. An increase in RER is termed appreciation and a decrease is termed depreciation.

### *2.2. The Link between Real Exchange Rate and Economic Growth*

The relationship between real exchange rate and economic growth has been seen through aggregate demand or aggregate supply side of the economy (Thapa, 2002). One school of thought believes that the RER operates through the aggregate demand channel and they contend that devaluation or depreciation of the RER enhances international competitiveness of locally produced goods (tradable) which tends to improve the balance of payment. With the improvement in international competitiveness, net exports increase and boost aggregate demand in the economy. But, with devaluation or appreciation, it adversely affects the performance of locally produced goods which tends to decrease net export, thereby contracting the economy through low aggregate demand (Rodrick, 2007). Another school of thought maintains the view that real devaluation or depreciation can cause a reduction in aggregate supply through an increase in the cost of imported raw materials which tends to reduce importation of productive raw materials and, consequently, affects production (Cottanni, et al 1990; Papazoglou, 1999).

Changes in RER as a result of relative price changes would affect inter-sectorial profitability and cause resource shifts among the various sectors in the economy. The RER is, therefore, crucial in determining the profitability of both traded goods and non-traded goods. The RER measures the price of domestic goods relative to foreign ones and is an indicator of international competitiveness of a country. The most traditional argument in favour of the negative effect of real appreciation on economic growth is based on the assumption that RER appreciation decreases the competitiveness of enterprises *vis-à-vis* their foreign competitors and therefore decreases exports. Thus, it diminishes the profits of the exports sector in favour of services and agriculture, which are largely protected from foreign competition (Guillaumont Jeanneney and Hua, 2002).

Perhaps the major way by which exchange rate can influence economic growth is through the effect of exchange rate volatility on the profitability of international trade and investment. Indeed, the unattractive implications of exchange rate volatility for trade and investment are considered to be one of the major weaknesses of floating exchange rate regimes. Hence the relationship between exchange rate volatility and economic growth becomes less definitive （Aghion et al., 2009).

### *2.3. An Overview of Some Previous Empirical Studies*

Some of the empirical works that seek to investigate the RER in relation to economic growth includes Chen (2012), who investigated the role of real exchange rate on economic growth in the Chinese provincial level from 1992 to 2000 by using dynamic panel data estimation. Among other things, the results confirmed the positive effect of real exchange rate appreciation on economic growth in the provinces. Kumar (2010) analyzed the determinants of RER in India by using the autoregressive distributed lag (ARDL) approach. His findings revealed that an appreciation in RER should not always be seen as a decline in international competitiveness of the traded sector as some of the factors contributing to the RER appreciation are attributed to higher growth that results from improvement in competitiveness.

Akinbobola and Oyetayo (2010) assessed the relationship between real exchange rate and domestic output growth in Nigeria using the Engel-Granger cointegration approach for the period 1986 to 2004. The study found that real exchange rate in Nigeria operates through the aggregate supply channel to enhance output and economic expansion. They concluded, among other things that real exchange rate needs to be used as one of the macroeconomic policy instruments and as a diversification of exports to boost foreign exchange.

Adjasi et al (2008) used the exponential generalised autoregressive conditional heteroskedascity (EGARCH) model to establish the relationship between exchange rate volatility and stock market volatility. They found a negative relationship between exchange rate volatility and stock market returns and contended that depreciation of the local currency led to an increased stock market returns in the long run and reduced stock market returns in the short run.

In his paper entitled Real Exchange Rate and Economic Growth, Rodrik (2007) pointed out that undervaluation of a currency (a high real exchange rate) stimulates economic growth, particularly for developing countries, and this can be achieved through the tradable sector (especially industry). His study covered 188 countries from 1950 to 2004.

Vinh and Fujita (2006) examined the impact of the real exchange rate depreciation on economic performance in Vietnam using vector autoregression (VAR) approach. They found that the main sources of variance in output and price level are “own shocks”. They also found that real devaluation has positive impact on both output and inflation. Faria and Ledesma (2003) investigated Balassa-Samuelson effects on growth. Their results indicated that Real Exchange Rate has a strong impact on relative growth. They used bounds test for quarterly data from first quarter of 1960 to fourth quarter of 1996.

Berument and Pasaogullari (2003) studied the effects of real exchange rate depreciation on the economic performance of Turkey by using quarterly data from 1987 to 2001. They found that the real depreciations are contractionary, even when external factors like world interest rates, international trade, and capital flows were controlled. Their findings also suggest that real exchange rate depreciations are inflationary.

Thapa (2002) assessed the Impact of Real Effective Exchange Rate (REER) on economic activities in Nepal. His results show the REER operates through the aggregate demand channel, confirming the traditional view for Nepal. He suggested that Nepal should at least keep the REER constant. Bleaney and Greenaway (2001) investigated the effects of terms of trade and RER volatility on growth and investment in fourteen sub-Saharan African countries using generalized

autoregressive conditional heteroskedascity (GARCH) models. They used annual data for 1980-1995. They found that volatility of Real Exchange Rate has a negative impact on growth and investment.

McPherson and Rakovski (2000) examined the possible direct and indirect relationship between real and nominal exchange rates and gross domestic product (GDP) growth in Kenya for the period 1970 to 1996. The study used a single equation instrumental variable estimation model and found no strong evidence of direct relationship between changes in the exchange rate and GDP growth. They however concluded that improvements in exchange rate management alone are not enough to revive economic growth in Kenya but should be part of a broader economic reform programme.

Gyimah-Brempong and Gyapong (1993) investigated the effects of exchange rate distortion on economic growth in Ghana. Using simultaneous equation model, they found that exchange rate distortion has a harmful effect on economic growth rate. The negative effect, according to them, is imparted through reduced investment and a constriction of international trade. So they suggested a liberalized exchange rate policy to enhance the growth prospects.

In summary, it is clear from the empirical works above that issues relating to on real exchange rate and economic performance has attracted the interest of many researchers across the globe. However related studies on Ghana are scanty. Even, the few available ones tend to focus on exchange rate misalignment and volatility in relation to economic growth.

Our study contributes to the existing literature, particularly as it relates to Ghan, by determining the route through which RER impact economic growth - whether through aggregate demand channel or through aggregate Supply channel.

## 3. Methodology

### *3.1. Model specification*

The specification of the model used in this study – the study to investigate the channel (i.e. whether aggregate demand or aggregate supply) through which the real exchange rate impact growth in Ghana – is based on the model specification by Akinbobola and Oyetayo (2010).

Following Keynesian income model, the standard framework for the demand side of economic growth in an open economy is given by:

$$GDP = C+I+G+(X - M) \quad (1)$$

Where GDP = economic growth, C = private consumption, I = investment, G = government consumption or expenditure, X = export, M = imports and (X – M) = net export.

Private consumption is a positive function of GDP and negative function of real interest rate. Investment is a negative function of real interest rate. Government consumption is the exogenous factor which is a stock. Net export is a negative function of Real Exchange Rate.

In determining the real GDP, equation (1) can be manipulated in the following equation:

$$GDP = \alpha \pm \beta_1(R - \pi^e) - \beta_2 RER + \beta_3 G + \mu_t \quad (2)$$

or

$$GDP = \alpha - \beta_1(R - \pi^e) - \beta_2 RER + \beta_3 G + \mu_t \quad (3)$$

where:
R = nominal interest rate.
RER = real exchange rate.
$\pi^e$ = expected inflation rate.
G = government consumption.
$\mu_t$ = error term.

Since nominal interest rate is a function of money supply, by substituting ($R - \pi^e$) in equation (3) with the money supply (M), the new equation becomes:

$$GDP = \alpha + \beta_1 M - \beta_2 RER + \beta_3 G + \mu_t \quad (4)$$

So money supply has positive impact on real GDP in that with an increase in nominal money supply, nominal interest rate falls and this leads to an increase in investment - all other things remaining constant – and this consequently leads to increase in GDP.

Therefore, it can be seen from equation (4) above that the estimation model for this study takes the form given below in equation (5), which is a modified version of the model used by Thapa (2002) and Akinbobola and Oyetayo (2010). The model is expressed in log-linear form so that data will be smoothened and the coefficients can be interpreted as elasticities that give the response of the dependent variable (lnGDP) to a unit change in any of the explanatory variables when others are held constant.

$$\ln GDP = \beta_0 + \beta_1 \ln M + \beta_2 \ln G + \beta_3 \ln RER + \beta_4 \ln INF + \beta_5 \ln OPEN + \varepsilon \quad (5)$$

Where: GDP denotes real GDP, M represents money supply, G is the real government consumption/expenditure, RER is the real exchange rate, INF is the inflation rate, OPEN is the degree of openness in the economy measured as the sum of real export and import and $\varepsilon$ is the error term.

From the estimated model above, $\beta_1$ is expected to be positive and $\beta_4$ to be negative. $B_2$ is indeterminate depending on whether or not government consumption crowds out private consumption. If the government consumption crowds out private consumption, $\beta_2$ will be negative but if it is positive, it means that government consumption compliments private consumption. $B_3$ is indeterminate depending on whether the real exchange rate operates through the aggregate demand or supply channel. If it is positive, it operates through the aggregate supply channel and if it is negative, it operates through the aggregate demand channel. $B_5$ is indeterminate depending on whether real openness is import dependent or export dependent. However, since Ghana is predominantly an importing economy just like many sub-Saharan African countries, the openness is import dependent. So, if it is negative, the economy is import dependent and if it is positive the economy is export dependent and indicates that exports boost the output growth rate.

### *3.2. Explanation of Variables*

The variables used in the estimation model are briefly explained in table 1 below.

**Table 1.** Definition of variables

| Variables | Explanation |
|---|---|
| *Real Broad Money (M2)* | Broad money is a measure of the money supply in an economy and it includes currency and coins, and deposits in current account, savings account and short-term deposits, overnight repos at commercial banks, and non-institutional money market account. |
| *Real Gross Domestic Product (GDP)* | Gross Domestic Product is the monetary value of all finished goods and services produced in a country at a specific time period. The Real Gross Domestic Product of Ghana for the study is used as a measure of the level of economic growth. |
| *Real Exchange Rate (RER)* | Real exchange rate is simply the domestic relative price of traded to non–traded goods. It measures the relative cost of living between two countries. |
| *Government Consumption (G)* | Government consumption is the ratio of government consumption to gross domestic product. Its impact can either be negative or positive, depending on whether the consumption is respectively directed towards the tradable or non-tradable sector. |
| *Openness (OPEN)* | Openness is measured as the total exports plus imports as a ratio of GDP. i.e. OPEN $= \frac{(Exports + \mathrm{Im}\ ports)_t}{RGDP_t}$. |
| *Inflation (INF)* | Inflation is the persistent and appreciable increase in the general level of prices in an economy. Lower rates of inflation exhibits an increasing value of currency as well as high purchasing power relative to other currencies and vice versa. |

### *3.3. Data Source*

An annualized time series data from 1980 to 2010, which is derived from International Financial Statistics Database of the International Monetary Fund and Quarterly bulletin of the Ghana Statistical Services as well as Quarterly Digest of Bank of Ghana, is used for the analysis.

## 4. Results and Discussion

The results of the estimations and the discussions of the findings from the regression analysis are presented below.

### *4.1. Stationarity Result (Unit root test)*

The time series characteristics of the data are explored by testing the data for stationarity using unit root test analysis. The Augmented Dickey-Fuller (ADF) and the Phillip Perron (PP) tests are adopted here and the results are shown in table 2 below.

**Table 2.** Results of Unit Root Test in Level and First Difference

| Variable | Levels (Constant) | | First Difference (Constant) | |
|---|---|---|---|---|
| | ADF | PP | ADF | PP |
| lnGDP | -1.58077 (0.4819) | -1.644647 (0.42921) | -5.00718 (0.0002) | -5.203031 (0.0001) |
| lnM | -1.533333 (0.5056) | -1.927190 (0.29821) | -5.418914 (0.0001) | -6.180485 (0.0000) |
| lnG | -1.373053 (0.5845) | -1.473877 (0.52025) | -6.543950 (0.0000) | -5.096145 (0.0002) |
| lnRER | -1.382022 (0.5802) | -3.381158 (0.10724) | -5.270001 (0.0001) | -10.21294 (0.0000) |
| lnINF | -1.753298 (0.3960) | -1.661408 (0.41124) | -3.913561 (0.0050) | -5.099135 (0.0002) |
| lnOPEN | -1.971180 (0.2976) | -2.352204 (0.21827) | -5.190823 (0.0001) | -8.804653 (0.0000) |

*NB: the critical values at levels are 5% =-2.943427 and 1% = -3.621023; the critical values at first difference are 5% = -2.945842 and 1% = -3.626784. Probability values are in parenthesis.*

The results in Table 2 show that the Augmented Dickey-Fuller (ADF) and Phillip Perron (PP) tests indicate that all the variables are not stationary at levels but they all become stationary in first difference. Therefore, it can be concluded that the variables are integrated of order one (i.e. $X_t \sim I(1)$), where $X_t$ is a vector of all the variables). That is, the variables may have similar long run characteristics indicating the possibility of cointegration. If the variables are cointegrated, then it means linear combinations of the variables in the model are stable in the long run.

### *4.2. The Cointegration Test*

Table 3 shows the result of the cointegration analysis conducted on the data for the study period. The analysis is done to establish the long run relationship between the variables.

Linear deterministic trend is chosen based on our observations from the graphs of some of the variables.

The result indicates a number of cointegration equations among the variables. While the max-Eigen statistics from the result indicates the existence of one cointegration equation at 1% significance level, the trace test on the other hand indicates three cointegration equations. The presence of cointegration shows that there exists a long run equilibrium relationship among the variables. From the result, the maximum eigen statistic is used to select the number of cointegration equation based on the objectives of the study and in line with economic theory. For the purposes of estimation, a normalized model is derived from the cointegration equation by setting the estimated coefficients to -1.

**Table 3.** Cointegration test result

| Hypothesized no. of CE(s) | Eigenvalue | Trace statistic | 5percent critical value | Max Eigen statistic | 5% critical value |
|---|---|---|---|---|---|
| None | 0.858748 | 178.4733** | 124.24 | 68.50245** | 45.28 |
| At most 1 | 0.674304 | 109.9708** | 94.15 | 39.26269 | 39.37 |
| At most 2 | 0.5536684 | 70.70814* | 68.52 | 28.23548 | 33.46 |
| At most 3 | 0.427679 | 42.47265 | 47.21 | 28.23548 | 27.07 |
| At most 4 | 0.363851 | 22.94072 | 29.68 | 15.83130 | 20.97 |
| At most 5 | 0.182116 | 7.109427 | 15.41 | 7.036204 | 14.07 |

*** (*) denotes rejection at 1% (5%) significance level*
*Trend assumption: Linear deterministic trend*
*Series: lnGDP lnM lnG lnRER lnINF lnOPEN*
*Lags interval (in first differences): 1 to 1*

**Table 4.** Normalized model coefficients

| lnGDP | lnM | lnG | lnRER | lnINF | lnOPEN |
|---|---|---|---|---|---|
| *1.000000* | *-0.04347* *(0.02101)* | *-0.41044* *(0.10552)* | *-0.49921* *(0.10310)* | *0.29304* *(0.01263)* | *0.44641* *(0.08575)* |

*(NB: Standard errors are in brackets)*

From the normalized model, the long-run parameter estimates are obtained and shown in table 5.

**Table 5.** Long-run parameter estimates of the model

| Variable | Elasticity coefficient | Standard error | t-value |
|---|---|---|---|
| lnM | 0.04347 | 0.02101 | 2.5507 |
| lnG | 0.41044 | 0.10552 | 3.3309 |
| lnRER | 0.49921 | 0.10310 | 4.6527 |
| lnINF | -0.29304 | 0.01263 | -9.1731 |
| lnOPEN | -0.44641 | 0.08575 | -4.5068 |

*Dependent Variable: lnGDP*

Table 5 shows the long run parameter estimates generated from the normalized cointegration equation. All the variables are significant at conventional levels (1%, 5%, and 10%) and are correctly signed. The most significant determinants of the growth model in the long run are real government consumption, RER, and real openness. A unit change in real government consumption will positively cause about 0.41 unit change in real growth in the long run. This is in line with the theory that an increase in real government consumption complements private consumption. This leads to an increase in aggregate demand, particularly if the consumption is made on productive goods.

This result gives credence to the policy objective of every government in Ghana since 1983, which is to achieve economic growth. It is the responsibility of the government and the private sector to enhance economic growth through increased government expenditure on infrastructure and creation of enabling business environment for the private sector.

The RER has positive effect on real growth rate in the long run. This can be seen from the elasticity coefficient value of 0.4992, which implies that a unit increase in real exchange rate would lead to about 0.5 unit increase in real growth in the long run. Theoretically, this means the RER operates through the aggregate supply channel. This also means that an appreciation of the exchange rate will lead to a relatively reduced cost of imported capital goods and raw materials. This will, in turn, lead to lower cost of production and, consequently, boost output growth.

This result is similar to that of Akinbobola and Oyetayo (2010) for Nigeria but in contrast to that of Thapa (2002) for Nepal. Therefore the present exchange rate regime which started since 1990, where a floating exchange rate system is managed by the Bank of Ghana with occasional smoothing of short-term fluctuations through the supply of foreign exchange to shore up the system, can be seen as good approach for ensuring the appreciation of the real exchange rate and, consequently, for improving productivity.

The degree of trade openness has a negative effect on real economic growth in Ghana in the long run. A unit increase in trade openness leads to a decrease in real growth by about 0.4 of a unit and vice versa. The negative impact implies the structure of the Ghanaian economy is predominantly imports dependent and mainly based on importation of consumer goods which are not growth induced. Therefore, trade openness in Ghana is not promoting economic growth. This contradicts economic theory.

This means Ghana's export promotion policies and supports have not been yielding the desired results since the start of the Economic Recovery Programme (ERP) in 1983. The export producing industries had received the most direct and indirect supports through currency devaluation and higher of producer prices for crucial exports such as cocoa to avert smuggling across borders. Other forms of support like improvement of the proximate infrastructure of the industries and sponsoring of international trade fairs to exhibit made-in-Ghana goods are provided.

The results also show that a unit increase in the index of inflation also leads to 0.29 unit fall in real economic growth of Ghana within the study period. The negative impact of the inflation on real economic growth is expected as it indicates the presence of macroeconomic instability in the economy, which reduces growth. This does not augur well for investment. As a result of the negative impact of inflation in Ghana's growth agenda over the years, the Bank of Ghana adopted the inflation targeting policy in 2002 to combat the increasing rates of inflation. Ever since, inflation has been brought down to an appreciable level. Within the last three years, inflation has been in single digit.

Money supply also had a significant positive impact on real economic growth but the impact was marginal as a unit increase in money supply will lead to 0.043 unit increase in real GDP. The statistical significance of the money supply variable indicates the important role of interest rate transmission channel on economic activities in Ghana.

### *4.3. Error Correction Model (ECM)*

The results obtained for the model are shown in Table 6 below. The results are based on the analysis of a parsimonious model derived from an over-parameterized model with a lag length of 2 based on the Akaike information criteria.

From the result in Table 6, it can be seen that the real economic growth in Ghana is influenced by the previous year's money supply, previous two years government consumption, and then previous year's inflation rate. Other determinants of growth in this study include current level of the degree of openness, real exchange rate and real gross domestic product. All the coefficients of the explanatory variables were significant at either 1% or 5% level. Moreover, all variable coefficients have the right signs. In the short run, the most important determinant of real GDP, real growth in Ghana, is the degree of openness of the Ghanaian economy which has an elasticity coefficient of 1.04.

The results show that, in the short run, there is a positive relationship between the previous year's money supply with a statistically significant coefficient value of 0.191. Furthermore, the results show that government consumption with two years lag period affects the current real growth of the economy while previous year's inflation influences the current real GDP negatively with an elasticity coefficient value of -0.206. This implies that current government consumption as well as current inflation does not influence the current real economic output. The implication of this result is that the present increase in government expenditure through the public sector wage policy implementation, which has doubled government wage bill, would lead to increased productivity in two years time and this will eventually impact the economic growth. Also the government's resolve to fight inflation, which has brought inflation rates down to single digit in Ghana, would go a long way to boost economic growth in the subsequent year.

In the short run, current real exchange rate impacts negatively on the real growth of the Ghanaian economy with a coefficient value of (-0.332). This means the present RER depreciation in Ghana will result in real growth of the economy in the short run.

The real GDP at lag interval 1 is not very important, as its elasticity coefficient 0.0004, which is very negligible. This indicates that real economic growth is very income inelastic in the short run.

An equilibrium error correction model must have the coefficient of the first lag length of the residuals, also known as the error correction term. The error correction term must satisfy two conditions: it must be negative and less than unity in absolute terms. The coefficient of error correction terms which shows the speed of adjustment of real growth to changes in the broad money supply, government consumption, inflation, economy openness and real exchange rate is correctly signed and statistically significant at 1% level. The error correction term of -0.55 means that any deviation in economic growth or real GDP growth from its long run (equilibrium) value that will occur in one period will be partially corrected in the next period. In other words, about 55% of the error in period 1 will be corrected in the following period. The size of the error reduces period after period until there is no error by which time real GDP would have achieved its long run equilibrium. The result suggests that economic growth in Ghana adjust fairly quickly to its long-run equilibrium.

Diagnostic tests based on the Ramsey Reset test indicate that the model specification is good. Also the tests showed that there is no autocorrelation up to three lags, no heteroskedasticity and the errors are normally distributed. Thus, the money supply, government consumption, inflation, openness and real exchange rate are important economic growth variables in Ghana over the period under study. Moreover, the high R-squared value indicates that the variables influenced real GDP in Ghana over the period 1980-2010. The low probability associated with the F-test for the overall regression also lends credence to the short run model.

**Table 6:** Parsimonious real GDP model

| Dependent Variable: DlnGDP<br>Method: Least Squares<br><br>Sample (adjusted): 1982 2010<br>Included observations: 25 after adjustments | | | | |
|---|---|---|---|---|
| | | | | |
| Variable | Coefficient | Std. error | t-statistic | Probability |
| | | | | |
| C | -0.132213 | 0.047355 | -2.580793 | 0.0164 |
| DlnM(-1) | 0.191521 | 0.076038 | 2.537153 | 0.0181 |
| DlnG(-2) | 0.078716 | 0.051534 | 1.721507 | 0.0380 |
| DlnINF(-1) | -0.206801 | 0.088890 | -2.663971 | 0.0136 |
| DlnOPEN | 1.043355 | 0.132367 | 7.655629 | 0.0000 |
| DlnRER | -0.331991 | 0.064185 | -5.483985 | 0.0000 |
| DlnGDP(-1) | 0.000423 | 0.000166 | 2.544355 | 0.0178 |
| ECM1(-1) | -0.553973 | 0.159757 | -4.719513 | 0.0001 |
| | | | | |
| R-squared | 0.920622 | Meandependent var | | 0.040216 |
| Adjusted R-squared | 0.813356 | S.D. dependent var | | 0.269364 |
| S.E. of regression | 0.099572 | Akaikeinfocriterion | | -1.535949 |
| Sum squared resid | 0.237948 | Schwarz criterion | | -1.087020 |
| Log likelihood | 36.11114 | F-statistic | | 24.16699 |
| Durbin-Watson stat | 1.921944 | Prob(F-statistic) | | 0.000000 |

*Diagnostic test summary statistics:*
Jarque – Bera: 1.122033[0.570629]
Breusch – Godfrey Serial Correlation LM Test
F – Statistics 1.097045[0.351437]
$TR^2$ 3.083359[0.214021]
White Heteroscedasticity Test (no cross products)
F – Statistics: 1.352623[0.275284]
$TR^2$: 20.04934[0.271713]
Ramsey Reset Test F – Statistic: 1.168735[0.290867]
Log –likelihood ratio: 1.685231[0.194231]

## 5. Conclusions and Recommendations

### *5.1. Conclusions*

This study investigated the influence of real exchange rate on economic growth in Ghana. The Johansen cointegration method was used to investigate their long run relationship while the error correction model was used to ascertain the short run dynamics of the variables.

The results of the study revealed that RER operates through the aggregate supply channel, not the aggregate demand channel, to impact economic output. This means that the cost of imported goods and raw materials will fall, all other economic variables remaining constant, whenever cedi appreciates. This will lead to lower costs of production and higher productivity and, consequently, increased economic growth and lower inflation.

The results also show that inflation in Ghana needs to be taken seriously since it exerts negative influence on economic growth. Thus, there is need to take measures at curbing the inflationary pressure on the economy in order to ensure a stable macroeconomic environment.

The positive impact of government consumption on real output growth defies a conventional wisdom for a typical developing country, where government consumption normally crowds out nthe private sector by impacting negatively. But, in the case of Ghana, government consumption complements private consumption to ensure economic growth.

Economic openness also has a negative influence on economic growth. This is because the demand for foreign currency to import goods exerts excessive pressure on the local currency, thereby eroding its value. This has devastating economic consequences. The call is therefore to promote exports.

### *5.2. Recommendations*

The major findings of this study are that fiscal, monetary and exchange rate policies need to be reformulated in order to ensure sustainable and good macroeconomic stability that can help stimulate real appreciation of the cedi and enhance economic growth. However, in doing so, care needs be taken to ensure that real appreciation does not exceed the equilibrium exchange rate in order to prevent massive importation of goods which has the tendency of killing domestic industries. Although, according to the findings, government consumption has positive impact on economic growth, we would like to recommend that government should focus on the consumption of productive goods or refocus on areas of the economy that are growth enhancing, rather than undertaking profligate consumption which may lead to debt accumulation.

The import dependency nature of the economy leaves much to be desired. Government must create enabling environment for local industries to increase their production capacities and to target foreign markets in order to tackle the problems of balance of payment. There is also the need to intensify the campaign on "domestication" where consumers are urged to buy made in Ghana goods in order to reduce the importation of consumer goods into the country. The government should try to diversify exports, especially in the area of agriculture and agri-business, as well as allied-oil industries since Ghana now produces oil in commercial quantities. All these would go a long way to improve foreign exchange earnings.

To curb the problem of inflationary pressures on the economy, the government should formulate suitable and sustainable fiscal and monetary policies to ensure growth in domestic output in the economy. Some of these measures may include improved tax administration to rake in more tax revenue, careful and regulated money supply based on the central bank's own data and not on pressure or directives from government, and ensuring appropriate exchange rate policies that will have positive impact on the economy. The government should not allow high rates of depreciation of the currency, which may create opportunities for banks and individuals to engage in businesses that will be detrimental to the economy. Any mismanagement of the real

exchange rate by the government will lead to economic uncertainties and these can discourage investors and lead to slow economic growth.

**References**


Adjasi C., S. K. Harvey and D. Agyapong (2008). Effect of exchange rate volatility on the Ghana stock exchange. *African Journal of Accounting, Economics, Finance and Banking Research* 3 (3), 28-47.

Aguirre, A. and Calderon, C. (2005). *Real Exchange Rate Misalignment and Economic Performance*, Research Paper, Economic Research Division, Central Bank of Chile.

Akinbobola T.O. and Oyetayo O.J. (2010). Econometric Analysis of Real Exchange Rate and Domestic Output Growth in Nigeria. *International Journal of Academic Research*, 2 (5), 339-347.

Akinlo A. E. and Odusola A. F. (2003). Assessing the impact of Nigeria's naira depreciation on output and inflation, *Applied Economics*, Vol. 35(6), pages 691-703.

Bautista R. M. (1987). *Production incentives in Philippine agriculture: Effects of trade and exchange rate policies*. International Food Policy Research Institute, Washington, D.C., USA

Berument H. and Pasaogullari M. (2003), Effects of the Real Exchange Rate on Output and Inflation: Evidence from Turkey. *The Developing Economies*, 41 (4), 401–435.

Bleaney, M. and D. Greenaway (2001), The Impact of Terms of Trade and Real Exchange Rate Volatility on Investment and growth in sub-Saharan Africa. *Journal of Development Economics*, 65, 491-500.

Chen, J. (2012). Real Exchange Rate and Economic Growth: Evidence from Chinese Provincial Data (1992 - 2008). PSE Working Papers No 2012 – 05.

Cottani, J. A., Cavallo, D. F. and Khan M. S. (1990), Real Exchange Rate Behavior and Economic Performance in LDCs. *Economic Development and Cultural Change*, 39, 61-76.

Dollar, D. (1992). Outward-Oriented Developing Economies Really Do Grow More Rapidly: Evidence from 96 LDCs, 1976 – 1986, *Economic Development and Cultural Change*, 39.

Faria, J.R. and Leon-Ledesma, M.A. (2003), "Testing the Balassa-Samuelson Effect: Implications for Growth and the PPP" *Journal of Macroeconomics*, 25 (2). pp. 241-253.

Guillaumont J. S. and Hua P., (2002). The Balassa–Samuelson effect and inflation in the Chinese provinces. *China Economic Review,* 13 (2-3), 134-160.

Gyimah-Brempong K. and A. O. Gyapong (1993) Exchange Rate Distortion and Economic Growth in Ghana. *International Economic Journal*, 7 (4), 59-74.

Hinkle, L. E., Nsengiyumva, F., (1999). *External Real Exchange Rates Purchasing Power Parity, the Mundell-Flemming Model, and Competitiveness in Traded Goods.* In Hinkle, L., E., Montiel, P. J. (eds.), Exchange Rate Misalignment, Concepts and Measurement for Developing Countries", Oxford University Press, New York, 41–104.

MacDonald, R (2000). *The Role of the Exchange Rate in Economic Growth: A Euro- Zone Perspective*. National Bank of Belgium Working Paper Series No.9.

McPherson M. F. and Rakovski T. (2000) *Exchange Rates and Economic Growth in Kenya: An Econometric Analysis*. African Economic Policy Discussion Paper Number 56 July, 2000.

Montiel, P. J. (2003). *Macroeconomics in Emerging Markets*. Cambridge: Cambridge University Press.

Obadan I.O. (1994) *Real Exchange Rates in Nigeria*. National Centre for Economic Management and Administration (NCEMA). Mimeo, Ibadan, Nigeria.

Papazoglou C.E (1999): The Real Exchange Rate and Economic Activity, Economic Bulletin, Bank of Greece.

Rodrick D. (2007) The Real Exchange Rate and Economics Growth. *Brookings papers on Economic Activities*, Fall 2008, pp. 365 – 412.

Thapa, N.B (2002), *An Econometric Analysis Of The Impact Of Real Effective Exchange Rate On* Economic *Activities In Nepal. Economic Review: Occasional* Paper, April 2002.
Vinh N. T. T. and Fujita S. (2006), *The Impact of Real Exchange Rate on Output and Inflation in Vietnam: A VAR Approach*. Graduate School of Economics, Kobe University, Japan.