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INFLATION, EXCHANGE RATES AND INTEREST RATES IN GHANA: AN AUTOREGRESSIVE DISTRIBUTED LAG MODEL

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Abstract

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This paper investigates the impact of exchange rate movement and the nominal interest rate on inflation in Ghana. It also looks at the presence of the Fisher Effect and the International Fisher Effect scenarios. It makes use of an autoregressive distributed lag model and an unrestricted error correction model. Ordinary Least Squares regression methods were also employed to determine the presence of the Fischer Effect and the International Fisher Effect. The results from the study show that in the short run a percentage point increase in the level of depreciation of the Ghana cedi leads to an increase in the rate of inflation by 0.20%. A percentage point increase in the level of nominal interest rates however results in a decrease in inflation by 0.98%. Inflation increases by 1.33% for every percentage point increase in the nominal interest rate in the long run. An increase in inflation on the other hand increases the nominal interest rate by 0.51% which demonstrates the partial Fisher effect. A 1% increase in the interest rate differential leads to a depreciation of the Ghana cedi by approximately 1% which indicates the full International Fisher effect.

Keywords: inflation, exchange rate movement, nominal interest rates, autoregressive distributed lag model, error correction model

INTRODUCTION

Ghana formally adopted inflation targeting in 2007 making it one of the first group of emerging market economies and as at the time one of the first low income countries to do so. A 5 percent inflation rate was set as the medium target by the Bank of Ghana. This objective was however affected by negative shocks which made it difficult to achieve the target. Problems of this nature are common in the inflation reduction phase of inflation targeting countries and do not necessarily imply policy failure. It however means that there is the need for flexibility in the implementation of inflation targeting. Challenges in the implementation of inflation targeting policies are expected in the economy since it is vulnerable to shocks and has a history of high and variable inflation. Inflation rates dropped significantly to as low as 10.7% in 2010, 8.7% in 2011 and 9.2% in 2012. It has however returned to double digits, 13.5% as at the end of 2013.

In several instances, monetary policy authorities have reacted vigorously to short-run deviations from targets, in an attempt to maintain credibility. This had a destabilizing impact on the economy. Attempting to hit inflation targets for every year is not desirable and might not be feasible. The challenge should rather be to maintain the credibility of the ultimate target, in the face of variations in the path of inflation. This can be done by not just focusing on annual inflation targets but also being mindful of short-run trade-offs against output and employment (Ekholm, 2010).

The objective of the study is in twofold: to assess the impact of exchange rate movement (EXR) and the nominal interest rate (INTR) on inflation (INFL) in Ghana and to investigate the Fisher Effect (FE) and the International Fisher Effect (IFE) scenarios. The study admits that several factors cause inflation in Ghana besides exchange rate movement and the nominal interest rates but the study will focus on these two factors in addition to the assessment of the FE and IFE.

The FE theory postulates that nominal interest rates and the inflation rate move together in the long-run. Thus implying that, real interest rates are stable in the long-run. The IFE also postulates that the appreciation or depreciation of currencies is proportionally related to the differences in the nominal interest rates. This theory attributes changes in exchange rates to interest rate differentials, rather than inflation rate differentials.

Inflation is one macroeconomic variable that remains elusive to the policy makers in the country. Though the much desired single digit level was attained in 2010, 2011 and 2012, it could not be sustained and has as expected returned to double digits and currently stands at about 13.5% at the end of the 2013 fiscal year. This trend is predicted to prevail for a while as policy makers struggle to discover the mix of policies that will control both inflation and its causal factors.

Literature on the relationship between inflation and the level of exchange rate is sub divided into two groups. The first group considers the responsiveness of the prices of tradable goods to changes in the exchange rate. In other words, it considers the validity of the Purchasing Power Parity. Dunn (1970) and Magee (1973, 1974) supported this assertion in their study. More recent contributions have attempted to use modern techniques and different aspects to establish PPP conditions, particularly since the work by Granger (1981), and Engle and Granger (1987) on co-integration relationships. MacDonald (1995) in his study supported the idea of a long run Purchasing Power Parity. The PPP theory was however not supported by Krugman (1978) and Frenkel (1981). Studies based on the macroeconomics of the Ghanaian economy have employed co-integration based models e.g. Bawumia and Abradu-Otoo (2003).

Bawumia and Abradu-Otoo (2003) examined the relationship between monetary growth, exchange rate and inflation in Ghana from 1983 to 1999. An error correction model (ECM) was applied in their analysis and the study showed the existence of a long run equilibrium relationship between inflation, money supply, the exchange rate, and real income.

This study adopts a similar approach however due to the fact that the variables were integrated of different orders, an autoregressive distributed lag model (ARDL) was applied for the analysis on the impact of exchange rate movement and the nominal interest rate on inflation in Ghana. Ordinary Least Squares regression models were used to investigate the FE and IFE.

MATERIALS AND METHODS

Time series data from 1991to 2013 was used and the data was obtained from the Bank of Ghana and the World Bank country indicators. The main variables for the study included: inflation, exchange rate movement and the nominal interest rates. The average yearly inflation was used as a proxy for inflation in the study. The interest rate differential and the inflation differential were also computed between Ghana (the domestic economy) and United States of America (the foreign economy). The autoregressive distributed lag model approach was chosen due to the fact that the variables had a mixture of I(0) and I(1) properties. This method also made it possible to assign different variables with different lag-lengths as they enter the model.

The generation of the models and all diagnostic tests were done in GRETL software. The least squares regression method was used to estimate the model due to the fact that it minimizes the sum of squares of the prediction errors. The variables were first tested for non-stationarity properties using the Augmented Dickey Fuller method. Series with unit roots were stationarized by applying at least one round of non-seasonal differencing to eliminate the unit root. The basic autoregressive distributed lag model is given in Equation. 1.

Equation 1

$$y_t = \beta_0 + \beta_1 y_{t-1} + \dots + \beta_k y_{t-p} + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + \dots$$
$$\dots + \alpha_q x_{t-q} + \varepsilon_t,$$

where ε_t is a random disturbance term which is serially independent. The ARDL model for the variables will be estimated as in Equation 2 where, Δ represents first order difference.

Equation 2

$$\Delta y_t = \beta_0 + \Sigma\beta_i \Delta y_{t-1} + \Sigma\gamma_j \Delta x_{1t-j} + \Sigma\delta_k \Delta x_{2t-k} +$$
$$+ \theta_0 y_{t-1} + \theta_1 \Delta x_{1t-1} + \theta_2 \Delta x_{2t-1} + \mu_t.$$

From estimating the model in Equation 2, an F test on the null hypothesis $H_0 : \theta_0 = \theta_1 = \theta_2 = 0$ is performed to determine if the variables $y_{t-1,}$ x_{1t-1} and x_{2t-1} which have long run coefficients are statistically significant. If the variables are statistically significant and co-integrated then a normal error correction model is used to estimate the given long run relationships among them. This is given in Equation 3.

Equation 3

$$\Delta y_t = \beta_0 + \Sigma\beta_i \Delta y_{t-1} + \Sigma\gamma_j \Delta x_{1t-j} + \Sigma\delta_k \Delta x_{2t-k} + \varphi z_{t-1} + \mu_t.$$

Z_{t-1} is the error-correction term and it is the OLS (Ordinary Least Squares) residual from estimating the model with the level variables. The short-run effects can therefore be extracted from the unrestricted ECM as in Equation 3.

Equation 3 shows that in the long-run equilibrium $\Delta y_t = 0$, $\Delta x_{1t} = \Delta x_{2t} = 0$. Therefore the long run coefficients of x_1 and x_2 are given by $-(\theta_0/\theta_1)$ and $-(\theta_0/\theta_2)$ respectively.

The Fisher Effect

The Fisher hypothesis (Fisher, 1930) postulates that that in the long run, inflation and nominal interest rates move together which implies that real interest rates are stable in the long term. Thus,

$$I_t = \delta_0 + \delta_1\psi + \varepsilon_t,$$

where I_t represents the nominal interest rate, represents the rate of inflation. δ_0 is a constant and δ_1 represents the slope coefficient of inflation. If δ_1 is statistically equal to one then the strong form of FE is implied or the full FE. The weak form or partial FE implies that δ_1 is positive and less than one. The hypothesized values of δ_0 and δ_1 are 0 and 1, respectively, implying an equal percentage change in the interest rate for a given change in inflation. According to Modigliani and Cohn, (1979) Tanzi, (1980) and Summers, (1983), the full Fisher Effect is often not attained and is explained by the money illusion phenomenon. Mundell (1963) and Tobin (1965) also argued that the true relationship is less than one to-one. Darby (1975) and Feldstein (1976) argue that the relationship is greater than one-to-one.

The International Fisher Effect

The appreciation or depreciation of currency prices is proportionally related to differences in nominal rates of interest. This is expressed mathematically as:

$$e_t = \phi_0 + \phi_1 I_t^d + \varepsilon_t,$$

where e_t is the exchange rate movement, I_t^d, the nominal interest rate differential. ϕ_0 and ϕ_1 are regression coefficients; constant and slope coefficient respectively. ε_t is the error term. The expected values of ϕ_0 and ϕ_1 are 0 and 1 respectively. If ϕ_1 is statistically equal to one then the strong form of the IFE is implied or the full IFE. The weak form of the IFE or the partial IFE implies that, ϕ_1 is positive and less than one. Positive and negative ϕ_1 mean appreciation and depreciation respectively. The idea of currency movements being associated with the relative movement of the interest rate differential was also supported by Dornbusch (1976) and Frankel (1979).

General Trend in Inflation

Generally inflation in Ghana has been declining since its historic high levels in last two decades. It reached as high as 122% in 1983 and 59% in 1995. Currently the rate stands at about 13.5%. Single digit levels were recorded in the years 2010, 2011 and 2012. The rate has however returned to double digits and also assuming an upward trend since 2013. Fig. 1 illustrates the general trend in inflation in Ghana.

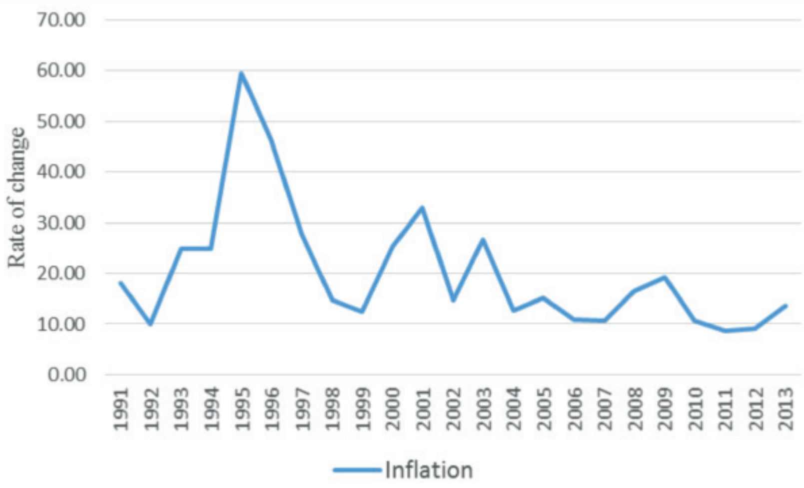
Inflation, Exchange Rate Movement and Interest Rates

The level of interest rates in an economy plays a significant role in influencing the level of inflation. Rising nominal interest rates lead to rising inflation rates and vice versa all things being equal. The relationship is however opposite in the case of real interest rates. Rising real interest rates lead to declining inflation rates ceteris paribus. The relationship is explained in the simple Fisher equation (Fisher, 1930), where

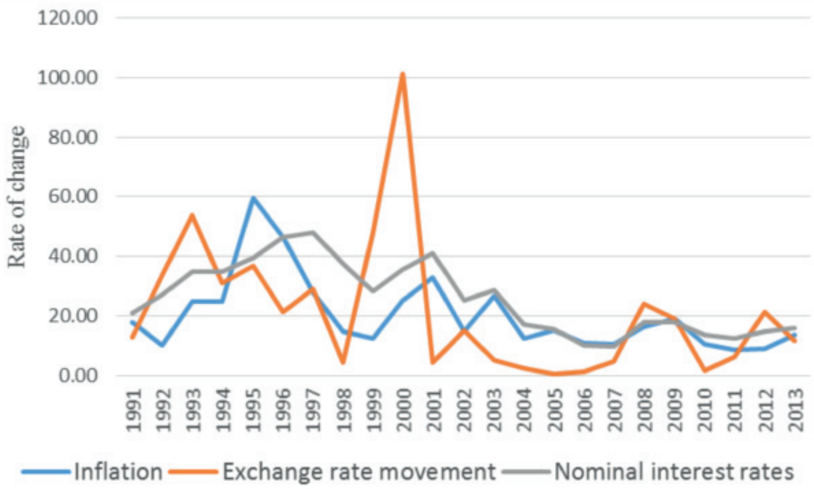
$$I = r + \psi^e,$$

I..... nominal interest rates,
r..... real interest rates and,
ψ^e... expected inflation.

The nominal exchange rate is basically an asset price that affects the real exchange rate in the short run. Exchange rates that are determined freely by



1: *Trend in inflation*
Source: Bank of Ghana



2: *Inflation, interest rates and exchange rate movement*
Source: Bank of Ghana

the market are volatile and that is not different in the case of Ghana. The major trading partners of Ghana such as UK, USA and other European countries have monetary policies that differ from Ghana hence the inflation differential is very high. Thus fluctuations in real exchange rate in the short run are caused by both the inflation differential and the nominal exchange rate. Depreciation of the real exchange rate has a huge impact on the rate of inflation. Declining rate of depreciation is accompanied by declining rate of inflation and vice versa ceteris paribus. An increase in the rate of depreciation means higher cost of imports (imported inflation) which is generally transmitted into domestic prices. Fig. 2 shows the relationship among the three modeled variables: inflation, exchange rate movement and interest rates. The relationship between inflation, interest rate and exchange rates was further highlighted by Dornbusch, Fisher and Startz (1998), Walsh (1998), Krugman and Obstfeld (2003).

RESULTS

Unit Root Test for Level Variables

Since the study employed time series data which are often non stationarity and lead to spurious regression estimates, Granger and Newbold (1974), the Augmented Dickey Fuller (ADF) method was employed to test the data for unit roots. Based on the test results an appropriate econometric technique was used in estimating the model. The results show that, inflation and nominal interest rates were non-stationary at level but stationary after first difference i.e. I(1). Exchange rate movement was however stationary at level i.e. I(0). Giving the fact that the variables were integrated of different orders, the study employed the autoregressive distributed lag model which was appropriate in this case. An error correction model was used to estimate the short run relationship between the variables if it was established that the variables were co-integrated. The results are shown in Tab. I. The study employed an error correction model to estimate the short run relationships among the variables as proposed by Engle and Granger (1987). The results for the unit root test are displayed in Tab. I.

Constructing the Autoregressive Distributed Lag Model (ARDL)

Since the unit roots test shows different orders of integration for all three variables. It became necessary to employ the ARDL model. The study first estimated an Ordinary Least Squares (OLS) model using the level variables. The residual term from this model is saved and used in the estimation of the long run relationship among the variables in the Error Correction Model. Tab. II shows the level model results. Inflation is the dependent variable

I: *Unit root test*

Variable		Test Statistic	1% critical	5% critical	10% critical	MacKinnon approx. p-value for Z(t)	Decision
INFL	Z(t)	−2.45	−3.75	−3	−2.63	0.13	Unit roots
ΔINF	Z(t)	−5.70	−3.75	−3	−2.63	0.00	No unit roots
INTR	Z(t)	−1.21	−3.75	−3	−2.63	0.67	Unit roots
ΔINTR	Z(t)	−4.51	−3.75	−3	−2.63	0.01	No unit roots
EXR	Z(t)	−3.48	−3.75	−3	−2.63	0.01	No unit roots

II: *OLS Level model: dependent variable – INFL*

Variable	Coefficient	Std. Error	t-ratio	P-value
Constant	0.20	4.50	0.04	0.97
EXR_t	–0.03	0.09	–0.34	0.74
INTRt	0.80	0.18	4.55	0.00

$R^2 = 0.55$, $F(2, 20) = 12.00$, $P(F) = 0.00038$, $n = 22$

III: *ARDL*

	Coefficient	Std. Error	t-ratio	P-value
$INFL_{t-1}$	–1.24	0.41	–3.03	0.01
$INTR_{t-1}$	0.93	0.33	2.82	0.01
ΔEXR_{t-1}	0.17	0.08	2.16	0.04
$\Delta INTR_{t-1}$	–0.97	0.42	–2.34	0.03
$\Delta INFL_{t-1}$	0.80	0.32	2.55	0.02
$\Delta INFL_{t-2}$	0.63	0.23	2.70	0.02

$R^2 = 0.57$, $F(6, 14) = 3.15$ and P-value(F) = 0.04, $n = 20$

IV: *Test for serial correlation*

Test	Test statistic	P-value	Decision
LMF	0.005	0.95	No serial correlation
TR^2	0.007	0.93	No serial correlation
Ljung-Box Q'	0.018	0.89	No serial correlation

P-values are greater than 5% indicating the null hypothesis of no serial correlation is not rejected

while exchange rate movement and the nominal interest rates serve as the independent variables.

The study then proceeds to estimate the ARDL model given the assumption that, all three variables were integrated of the same order i.e. I(1). Tab. III shows the results of the estimated model. The first order differenced inflation was regressed on the first order differenced independent variables including a maximum of two lags. Two lags of the first order differenced dependent variable are included in the system. Insignificant variables are dropped from the model. The results are displayed in Tab. III.

The study then proceeded to test for the stability of parameters in this ARDL model using the CUSUM test. The results show that the model parameters are stable. The model was also tested for serial correlation using the Breusch-Godfrey test. The results show that the model had no serial correlation issues.

Parameter Stability Test

The CUSUM method tests the null hypothesis that the parameters do not change or the model is stable. This hypothesis is rejected if the given P-value obtained from the test is less than the 5% significance level. The test statistic from the test (Harvey-Collier t(13)) is –0.52 and the $P(t[13] > -0.52)$ is 0.60. The null hypothesis of parameter stability is therefore not rejected and it is concluded that the model is stable.

Test for Serial Correlation

The results for the Breusch-Godfrey test for serial correlation are displayed in Tab. IV. P-values less than 5% indicate the presence of serial correlation.

Testing for Long Run Relationship

To establish whether the model variables have a long run relationship or not, the study tests for the statistical significance of the coefficients of inflation and interest rates in the lagged form (lag one). Given their coefficients as β_1 and β_2, the null hypothesis of the test is given as: H_0: $\beta_1 = \beta_2 = 0$.

Using coefficient restriction test, the P-value (0.01) obtained is less than the 5% significance level therefore indicating a rejection of the null hypothesis. It thus means that the nominal interest rate has a long run relationship with the rate of inflation.

Constructing the Error Correction Model (ECM)

The long run relationships can therefore be estimated using an unrestricted error correction model if the variables are co-integrated using the ADF test on the lagged residual term from the level model, EC_t. If the coefficient of EC_{t-1} is negative and significant in the ECM then it validates the long run relationship.

In both cases of testing the unit roots in EC_t as shown in Tab. V, the P-values are less than 5% indicating it is stationary and thus the variables are co-integrated. An unrestricted error correction

V: *ADF test for stationarity in EC*

	With constant	With constant and trend
Test statistic: tau_c(1)	–3.72	–3.59
Asymptotic p-value	0.00	0.03
Sample size (n)	21	21

P-values less than 5% indicate a rejection of the null hypothesis of non-stationarity

model can therefore be used to estimate their short run relationships. The Error Correction model results are displayed in Tab. VI. The first order differenced inflation is regressed on the lagged terms of the first order differenced inflation, nominal interest rates and exchange rate movement. The model also includes the lagged terms of inflation, exchange rate movement and nominal interest rates and the lagged term of the residual term (EC_t) from the level model.

Statistical Significance of the Short-run Coefficients

After estimating the error correction model, it is necessary to test whether exchange rate movement and interest rates affect inflation in the short run. This can be done by restricting the coefficients of the short run variables, ΔEXR_{t-1} and $\Delta INTR_{t-1}$ to zero. Given their coefficients as α_1 and α_2, the null hypothesis is given by H_0: $\alpha_1 = \alpha_2 = 0$.

The P-value (0.01) obtained from the test is less than the 5% significance level used. The null hypothesis is therefore rejected implying that exchange rate movement and the nominal interest rate affect inflation in the short run.

The long run relationship among the variables is validated if the coefficient of the lagged residual from the level model (EC_{t-1}) is negative and statistically significant in the estimated ECM. The test of parameter restriction of EC_t shows a P-value of (0.01) which is lower than 5%. The coefficient of EC_{t-1} is therefore significant and negative thus validating the long run relationship. This thus implies that nominal interest rates affect the level of inflation in Ghana in the long run. This is explained by the coefficients of $INTR_{t-1.}$ The negative sign of the EC_t indicates that previous year's deviation from equilibrium is restored by 133% in the current year. This indicates an overshooting adjustment.

Parameter Stability

The CUSUM method is once again used to test for the stability of parameters in the ECM. The test statistic from the test (Harvey-Collier t(14)) is –0.77 and the P(t[14] > –0.77) is 0.45. The null hypothesis of parameter stability is therefore not rejected and it is concluded that the model is stable. The long run relationship between the nominal interest rates and inflation is then calculated using the coefficients from ARDL. The results are displayed in Tab. VIII.

VI: *ECM model: dependent variable – ΔINFL*

	Coefficient	Std. Error	t-ratio	P-value
ΔEXR_{t-1}	0.20	0.08	2.60	0.02
$\Delta INTR_{t-1}$	–0.98	0.40	–2.42	0.03
$\Delta INFL_{t-1}$	0.87	0.32	2.70	0.02
$\Delta INFL_{t-2}$	0.67	0.23	2.87	0.01
EC_{t-1}	–1.33	0.42	–3.15	0.01

$R^2 = 0.57$, $F(5, 15) = 3.96$ and $P(F) = 0.02$, $n = 20$

VII: *Test for serial correlation in the ECM*

Test	Test statistic	P-value	Decision
LMF	0.006	0.94	No serial correlation
TR^2	0.009	0.93	No serial correlation
Ljung-Box Q'	0.004	0.93	No serial correlation

P-values are greater than 5% indicating the null hypothesis of no serial correlation is not rejected

VIII: *Long run coefficients*

Variable	Long run coefficient		Formula	Long run effect
$INTR_t$	0.93	θ_2	$-\left(\frac{\theta_0}{\theta_2}\right)$	1.33
$INFL_t$	–1.24	θ_0		

θ_0, θ_2 are the estimated coefficients from ARDL

IX: *The Fisher Effect*

	Dependent variable	(Nominal interest rate)		
Variable	**Coefficient**	**Std. Err**	**t-ratio**	**P-value**
Constant	0.09	0.04	2.521	0.02
Inflation	0.51	0.10	5.27	< 0.001

$R^2 = 0.40$, $F(1, 21) = 27.76$ and $P(F) = < 0.001$, $n = 23$

X: *The International Fisher Effect*

	Dependent variable	Exchange rate changes (%)		
Variable	**Coefficient**	**Std. Error**	**t-ratio**	**P-value**
Constant	0.32	0.07	4.65	< 0.001
Interest rate differential	–1.06	0.25	–4.22	< 0.001

$R^2 = 0.46$, $F(1, 21) = 17.77$ and $P(F) = < 0.001$, $n = 23$

Interpretation

In the short run, a percentage point increase in the rate of depreciation of the Ghana cedi leads to an increase in inflation by 0.20% ceteris paribus. Inflation rate however decreases by 0.98% for every percentage point increase in the level of nominal interest rates. In the long run, exchange rate movement has no impact on inflation. A percentage point increase in the nominal interest rate leads to an increase in inflation by 1.33%. 133% of the disequilibrium in inflation is corrected in the subsequent year. This shows a quick or an overshooting rate of adjustment.

The Fisher Effect

To test for FE, the nominal interest rate is regressed on the rate of inflation. The results (see Tab. IX) show that there is partial FE but the relationship is positive. A 1% rise in inflation causes the nominal interest rate to increase by 0.51%. The model fulfilled all classical requirements.

The International Fischer Effect

To test for international Fisher effect, exchange rate movement (%) is regressed on the nominal interest rate differential. The results (see Tab. X) show the presence of IFE. The Ghanaian cedi depreciates by approximately 1% for every percentage increase in the nominal interest rates. The model fulfilled all classical requirements.

DISCUSSION

Exchange rate and nominal interest rate play vital roles in determining the level of inflation in Ghana. The results from the study show that inflation is affected by both factors in the short run and in the long run. The short run relationships were estimated using an unrestricted error correction model. The results show that a depreciation in the Ghana cedi by a percentage point leads to an increase in the rate of inflation by 0.20%. It however decreases by 0.98% for every percentage point increase in the nominal interest rate. The results from this study confirm the study by Bawumia and Abradu-Otoo (2003) which also proved a long run relationship between inflation and interest rate using co-integration and error correction analysis. Their study also concluded that the level of exchange rate movement affects inflation positively. The impact is however transmitted with a one-month delay.

The findings support the existence of the Fisher Effect and the International Fisher Effect in Ghana. Interest rates and inflation move along in the long-run but not one for one. In order words, the relationship is positive but not a perfect one. The full International Fisher Effect is approximately obtained with regards to the relationship between exchange rate and the nominal interest rate differential. Exchange rate depreciates by 1% for every 1% increase in the nominal interest rate. It is also consistent with the findings by Fama and Gibson (1982), Huizing and Mishkin (1986), Kandel *et al.* (1996), and Lee (2007) that interest rates and inflation do not move with one-for-one. The impact of the exchange rate on inflation is transmitted with a one month lag. The impact of the nominal interest rates on the exchange rate is transmitted with a one month delay. The impact of the interest rate on inflation is transmitted with a twelve months lag. Some inflation targeting central banks have adopt a value between twelve and twenty-four months as their monetary policy horizon (see, for example, Bank of England, 1999; European Central Bank, 2010). Theoretical models usually imply transmission lags of similar length (Taylor and Wieland, 2012), but the results of empirical studies vary widely.

With exchange rate volatility and an inflation targeting mechanism, the Bank of Ghana is tempted to focus its efforts unduly on the exchange rate fluctuations. This case implies that the Bank of Ghana will be reacting to almost every or several of the fluctuations in the exchange rate. Monetary policy will therefore also be volatile. This is obviously undesirable as it means that the central bank itself becomes a source of unnecessary disruptions in the economy. Volatile exchange rate such as seen in Ghana for the past few years will be problematic if the Bank of Ghana allows the exchange rate to take a very prominent position in its analysis. Higher interest rates need to only be temporary. Once the exchange rate is stabilized, interest rate should be allowed to decline given the cost of persistently high interest rates.

Temporary tight policies may signal the determination of the monetary authority to pursue exchange rate stability and low inflation. Even when the tight policies are withdrawn, the exchange rate would stabilize at a higher level.

Drazen and Masson (1994) have shown that if the costs of implementing the tight policies are too high, the temporary policy would actually reduce credibility because investors know that the policy could not be sustained. In such a situation the relationship between the interest rate and the exchange rate could be negative. When there are important structural issues aside the reputation of the monetary authorities, raising interest rates may not necessarily solve exchange rate crises. Even if interest rates as a monetary policy tool can stabilize exchange rates, the costs of raising interest rates may be too high.

CONCLUSION

The objective of the paper was to assess the impact of exchange rate movement and the nominal interest rate on inflation in Ghana and to investigate the Fisher Effect and the International Fisher Effect scenarios. The study employed an autoregressive distributed lag model and an unrestricted error correction model to estimate the long run and short run relationships between inflation, exchange rate movement and interest rates. The error correction model was applied due to the fact that the variables were co-integrated. The long run relationships were estimated using the coefficients from the autoregressive distributed lag model. The ARDL model was also applied because variables were found to be integrated of different orders. The Fisher Effect and International Fisher Effect were explained using regression models.

The results from the study show significant effects of interest rate and exchange rate on inflation in both the short run and the long run. However in carrying out monetary policy which aims at price stability, there is the need to reconcile the traditional interest rate-exchange rate trade-off, Goldfajn and Gupta (1999). This should be done being mindful of the inflation-output trade-off and the inflation-unemployment trade-off. The cost incurred in raising interest rates to stabilize the currency could be overwhelming if the banking sector is fragile such as the case in Ghana. This policy is only appropriate if the corporate sector is heavily exposed to foreign debt.

The Bank of Ghana needs to outline a credible view of the transmission mechanism, from policy instruments to objectives. This can be done using a model which will inform the decision making process so as to provide clear and consistent explanations for policy actions. Inflation expectation should be incorporated in this model of disinflation. The Bank of Ghana builds its credibility as it makes progress in the bid to achieve low inflation.

It is however worth admitting that modeling inflation in the Ghanaian economy will be challenging given the fact that, the economy is highly vulnerable to shocks and inflation expectations are unstable.

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