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EXCHANGE RATE FLUCTUATIONS AND DOMESTIC INVESTMENT: EVIDENCE FROM GHANA

Michael Opoku Baah[i]
Department of Integrated Development Studies,
University of Cape Coast,
Cape Coast, Ghana

Abstract:
Exchange rate fluctuation is one of the critical determinants of domestic investment in Ghana. Though exchange rate fluctuations can have an asymmetric effect on domestic investment, other studies assumed a symmetric relationship between these variables. Using annual data from the period of 1980-2017, the Linear Autoregressive Distributed Lag Model (ARDL) and Non-linear Autoregressive Distributed Lag model (NARDL) was used to investigate the symmetric and asymmetric effect of exchange rate fluctuation on domestic investment by creating two new variables to substitute exchange rate fluctuations (appreciation and depreciation variables). From the first objective, fluctuation in the rate exchange was found to harm domestic investment. The second objective confirmed the asymmetric effect of exchange rate fluctuations on domestic investment. Income had a positive effect on domestic investment which affirms the assertion of the accelerator theory of investment. The other explanatory variables included in the study, foreign direct investment and interest rate differential were found to be detrimental to domestic investment while domestic credit to the private sector had a positive effect on domestic investment. The study recommends that the Bank of Ghana should put in place long-lasting, effective, and efficient measures to stabilise the exchange rate.

JEL: F31, F41, E22, E44, E51, E52, E58

Keywords: exchange rate, domestic investment, fluctuation

1. Introduction

Exchange rate fluctuations significantly impact various macroeconomic variables, including domestic investment (Bahmani-Osokooee, 2016). According to Iyke and Ho (2018), domestic investment is significantly impacted by exchange rate fluctuations; therefore, uncertainty in the exchange rate movement can affect the economic well-being

[i] Correspondence: email michael.baah1@stu.ucc.edu.gh

of a country. Caballero and Vittorio (1989), in their study on how uncertainty about the real exchange rate affect exports assert that fluctuations in the real exchange rate can lead to undesirable consequences for domestic investment. Fluctuations and uncertainty in exchange rate movements impact investor confidence, leading risk-averse investors to more likely reduce their investments.

A country's level of economic development is a reflection of the volume of investment it attracts locally and internationally. Nevertheless, the level of investment in Ghana especially domestic investment is woefully inadequate to even trigger a noticeable rise in Gross Domestic Product (GDP) (Acquah, 2017). Changes in exchange rate fluctuations can have two contrasting effects on domestic investment (Nonejad and Mohammadi, 2016). When the rate of exchange falls (domestic currency depreciates), domestic investment is likely to increase because of the rise in revenue generated from the sales of products at the local and international markets (Goldberg, 1993).

Nevertheless, this encouraging outcome is neutralized by the opposing effect of increasing the cost of variable inputs especially imported raw materials, thereby, decreasing domestic investment (Harchoui, Tarkhani, and Yuen, 2005). Although efforts have been made to improve our understanding and extend the frontiers of knowledge, the impact of exchange rate fluctuations on domestic investment remains an empirical question. This is because theoretical models have struggled to clarify as to which of the effect is more presiding. For example, the theory of optimal inertia was used by Dixit and Pindick (1994) in their work "Investment under uncertainty" to explain how reluctant investors are to embark on an investment venture when the risk is too high. The frequent fluctuation of the exchange rate (phenomenally, depreciation in the case of Ghana) poses a challenge to the growth of domestic investment. This is due to the high costs associated with investing in a volatile environment, ultimately impeding economic development.

Although the investment literature acknowledges that investors respond differently to exchange rate movements, this divergence can be attributed to variations in their investment philosophy and orientation despite the fact that fluctuating exchange rates can hurt investment. Iyke and Ho, 2018, Diallo, 2008, Bahmani-Oskooee, and Hajilee, 2013, Campa and Goldberg, 1999, Canbalonglu and Gurgun, 2017 in their study presume a linear relation between exchange rate fluctuation and domestic investment neglecting the asymmetric effect.

Nevertheless, delving into the asymmetric effect provides insights into the directional impact of exchange rate fluctuations, specifically the depreciation and appreciation effect. In light of this premise, the study seeks to investigate the effect of exchange rate fluctuations on domestic investment in Ghana by closely examining the asymmetric effects of exchange rates on domestic investment.

2. Objectives of the Study

1) Estimate the linear effect of exchange rate fluctuation on domestic investment.
2) Determine the asymmetric effect of exchange rate fluctuations on domestic investment.

2.1 Hypotheses

H_0: Exchange rate fluctuations have a symmetric effect on domestic investment.
H_1: Exchange rate fluctuations have an asymmetric effect on domestic investment.

3. Materials and Methods

3.1 Theoretical Model Specification

To address the objectives, the study uses a behavioural model of investment called the accelerator theory of investment. The theory simply states, "*Investment is directly proportional to the increase in output*" (output is proxied by income and consumption) therefore, changes in income and consumption will affect investment in the same direction and magnitude.

$$K^* = \alpha Y^* \quad (1)$$

K^* is the stock of capital (investment), α is a constant capital-output ratio $(\frac{K}{Y})$,Y^* is the level of output or income. Since output (income) affects capital stock (investment) in the same direction, changes in output will also induce a change in the stock of capital (induced investment).

$$\Delta K^* = \alpha \Delta Y^* \quad (2)$$

Changes (increase or decrease) in output (income) is the difference between the previous output and current output in time (t) thus $\Delta Y^* = Y_t - Y_{t-1}$, capital stock (investment) will also respond to the changes in output(income) in the same manner $\Delta K^* = K_t - K_{t-1}$

$$K_t - K_{t-1} = \alpha(Y_t - Y_{t-1}) \quad (3)$$

Expanding the bracket in equation (3)

$$K_t - K_{t-1} = \alpha Y_t - \alpha Y_{t-1} \quad (4)$$

Therefore, it is clear in equation (4) that changes in income will affect investment as claimed by the accelerator theory of investment.

3.2 Empirical Model Specification

To determine the effect of exchange rate fluctuation and other control variables on domestic investment, the study expresses domestic investment (Gross Fixed Capital Formation) as a function of these listed macroeconomic variables. Equation 5 is the specification of the functional model below:

$$DI = f(DCPS\ , REER\ , IRD\ , FDI\ , INC) \quad (5)$$

To clearly distinguish the dependent variable from the independent variables, equation 5 is transformed into a structural model in equation 6:

$$DI_t = f(.) = DCPS_t^{\beta 1} REER_t^{\beta 2} IRD_t^{\beta 3} FDI_t^{\beta 4} INC_t^{\beta 5} e^{\varepsilon} \quad (6)$$

The study applied a logarithmic transformation to some variables in equation (6) to normalise the equation, the empirical specification of the model above was written as seen in equation (7) below:

$$lnDI_t = \beta_0 + \beta_1 InDCPS_t + \beta_2 REER_t + \beta_3 IRD_t + \beta_4 InFDI_t + \beta_5 InINC_t + \varepsilon_t \quad (7)$$

Where DI indicates domestic investment (a proxy for Gross Fixed Capital Formation as a percentage of GDP), $DCPS$ measures Domestic Credit to Private Sector, $REER$ measures Exchange rate fluctuations, IRD measures Interest Rate Differential, FDI measures Foreign direct investment, INC measures Income (a proxy for GDP per capita), In represents natural logarithm, t denotes time and ε_t random disturbance term. The slope coefficient $\beta_1, \beta_2, \beta_3, \beta_4$ and β_5 measures the elasticities and β_0 , is the intercept parameter.

3.3 Measurement and Justification of Variables

3.3.1 Gross Fixed Capital Formation (DI)

Gross fixed capital formation is used as a proxy for domestic investment and it includes land improvement (fences, ditches, drains), plants, machinery, equipment purchases, construction of roads, railway, school, offices, hospitals, private residential dwellings, commercial and industrial buildings (Fiagboh, 2014).

3.3.2 Domestic Credit to the Private Sector (DCPS)

Domestic Credit to the Private Sector demonstrates the degree to which the financial sector (banks, credit unions etc.) channels assets to the private sector to encourage investment. Making credit access easier and available to the private sector is a reflection of financial fairness and proficient asset distribution in the economy since the private sector can use its assets in a progressively effective and profitable way when compared to the public sector (Kargbo and Adamu, 2012).

3.3.3 Real Interest Rate Differential (IRD)

Interest rate differential is a difference in the interest rate between two currencies of two distinct economic regions (Ndikumana, 2008). The real interest rate differential for this study was calculated by subtracting the Bank of Ghana's real interest rate from the U.S real interest rate. The intuition behind this is to ascertain whether a citizen of Ghana will rather choose to invest in their local economy or invest outside due to the differences in the real interest rate (returns on investment).

3.3.4 Real Effective Exchange Rate (REER)

For this study, the real effective exchange rate was used to represent exchange rate fluctuations. A real effective exchange rate takes into consideration the weighted mean of a national currency compared to an index or basket of major currencies in the world. The exchange rate can be used to ascertain the value of a country's currency against other major currencies.

3.3.5 Foreign Direct Investment (FDI)

According to Shim and Siegel (1995), FDI "*is the long-term participation of source countries' management, joint venture, transfer of technology and expertise into host countries*". This includes investments of foreign funds into businesses and companies abroad instead of the investor's domestic country.

3.3.6 GDP Per Capita (Income)

GDP per capita is an economic measure of income denoting the value of goods and services produced in a given year by the citizens of the country. The GDP is calculated by dividing the country's gross domestic product by its total population. It explains how prosperous a country's citizens are or their standard of living.

3.3.7 Data Sources

The data for this study were secondary data from the World Development Indicators and International Financial Statistics (IFS). Annual Times Series on these selected macroeconomic variables: Gross Fixed Capital Formation (domestic investment), GDP per capita(income), Foreign Direct Investment, Interest Rate Differential, and Domestic Credit to the Private Sector are included in the model to examine its effect on Gross Fixed Capital Formation (domestic investment). The study period selected for this study spans from 1980 to 2017.

3.4 Estimation Technique

3.4.1 Linear Autoregressive Distributed Lag (LARDL) and Non-linear Autoregressive Distributed lag (NARDL)

Following Pesaran et al (2001), the relationship among the variables using the LARDL approach was expressed in equation 8, thus the short and long-run result was obtained by estimating the LARDL model in equation 8.

$$\Delta lnDI = \alpha_0 + \alpha_1 lnDI_{t-1} + \alpha_2 DCPS_{t-1} + \alpha_3 REER_{t-1} + \alpha_4 IRD_{t-1} + \alpha_5 FDI_{t-1} + \alpha_6 INC_{t-1} + \sum_{i=1}^{\rho} \beta_1 \Delta DI_{t-1} + \sum_{i=1}^{\rho} \beta_2 \Delta DCPS_{t-1} + \sum_{i=1}^{\rho} \beta_3 \Delta REER_{t-1} + \sum_{i=1}^{\rho} \beta_4 \Delta IRD_{t-1} \sum_{i=1}^{\rho} \beta_5 FDI_{t-1} + \sum_{i=1}^{\rho} \beta_6 INC_{t-1} + \varepsilon_t \quad (8)$$

Where α and β represent the short long run and short-run elasticities respectively. To investigate the asymmetric effect of real effective exchange rate fluctuations on domestic investment in Ghana, the study followed the methodology used by Bahmani-Oskooee and Fariditavana (2015) and Kwesi Obeng (2018) in their respective studies.

Exchange rate fluctuation was decomposed into positive changes (appreciation) and negative changes (depreciation). Two variables, ExPos and ExNeg, were therefore created using the partial sum process suggested by Shin, Yu, and Greenwood-Nimmo (2014) as follows:

$$EX_t = EX_0 + EX_t^+ + EX_t^- \quad (9)$$

Where EX_t^+ and EX_t^- are the partial sum process of positive changes and negative changes in Exchange rate fluctuations (EX_t). ExPos and ExNeg were then obtained in the equation in (10) and (11)

$$ExPos = EX_t^+ = \sum_{t=1}^{\rho} \Delta ExPos_t^+ = \sum_{t=1}^{\rho} \max(\Delta EX_t, 0) \quad (10)$$

$$ExNeg = EX_t^- = \sum_{t=1}^{\rho} \Delta ExNeg_t^- = \sum_{t=1}^{\rho} \max(\Delta EX_t, 0) \quad (11)$$

EX in equation (9) was replaced with $ExPos$ and $ExNeg$ to obtain the nonlinear ARDL model in equation (12):

$$\Delta lnDI = \alpha_0 + \alpha_1 lnDI_{t-1} + \alpha_2 DCPS_{t-1} + \alpha_3 ExPos_{t-1} + \alpha_4 ExNeg_{t-1} + \alpha_5 IRD_{t-1} + \alpha_6 FDI_{t-1} + \alpha_7 INC_{t-1} + \sum_{i=1}^{\rho} \beta_1 \Delta DI_{t-1} + \sum_{i=1}^{\rho} \beta_2 \Delta DCPS_{t-1} + \sum_{i=1}^{\rho} \beta_3 \Delta ExPos_{t-1} + \sum_{i=1}^{\rho} \beta_4 \Delta ExNeg_{t-1} + \sum_{i=1}^{\rho} \beta_5 \Delta IRD_{t-1} \sum_{i=1}^{\rho} \beta_6 FDI_{t-1} + \sum_{i=1}^{\rho} \beta_7 INC_{t-1} + \varepsilon_t \quad (12)$$

Equation (12) was estimated following a similar procedure Pesaran et al. (2001) proposed for the estimation of linear ARDL models. The coefficients and signs of $ExPos$ and $ExNeg$ give us clues to ascertain whether real effective exchange rate fluctuations, EX have a symmetric or asymmetric effect on domestic investment, DI. Thus exchange rate fluctuations have an asymmetric effect on domestic investment only when the signs and coefficients of the two newly created variables are different that is negative and positive. On the other hand, exchange rate fluctuation has a symmetric effect on domestic investment when the signs of the newly created variable are the same.

3.5 Cointegration Test

The ARDL bounds test technique is commonly used to test for cointegration among the variables and whether there exists a long-run relationship when the variables in the model are mixtures of the I (0) and I(1) series (Dapaah, 2016).

After the cointegration has been established, the long-run model for DI_t (domestic investment) was estimated as:

$$\Delta DI_t = \sum_{i=1}^{\rho} \beta_1 \Delta DI_{t-1} + \sum_{i=1}^{\rho} \beta_2 \Delta DCPS_{t-1} + \sum_{i=1}^{\rho} \beta_3 \Delta REER_{t-1} + \sum_{i=1}^{\rho} \beta_4 \Delta IRD_{t-1} \sum_{i=1}^{\rho} \beta_5 FDI_{t-1} + \sum_{i=1}^{\rho} \beta_6 INC_{t-1} + \varepsilon_t \quad (13)$$

The Akaike Information Criterion (Akaike, 1973) was used to select the lag of the ARDL model. The final step is to estimate the Error Correction Model (ECM), which captures the short run adjustment of the system, due to the shocks and disequilibrium.

4. Results and Discussion

Table 1: Summary Statistics

	REER	GPC	IRD	GFCF	FDI	DCPS
Mean	341.9188	22.15291	27.48005	18.07676	9.12E+08	9.156950
Median	114.8346	19.95000	18.64108	15.65112	1.31E.+08	10.22622
Maximum	3549.286	42.76000	122.8745	29.00214	3.49E+09	15.88200
Minimum	64.66527	9.500000	7.126350	3.531480	2000000.	1.542268
Std.Dev	684.6902	9.461067	25.28557	6.784972	1.34E+09	5.301333
Skew	3.521101	0.733288	2.648732	0.010650	1.056741	0.088509
Kurtosis	15.19704	2.778149	10.06216	2.260643	2.264610	1.338776
Jarque- Bera	314.0706	3.483429	123.4005	0.866245	7.928705	4.419083
Prob	0.000000	0.175220	0.000000	0.648481	0.018980	0.109751
Sum	12992.91	841.8105	1044.242	610.9171	3.47E+10	347.9641
SS. Dev.	17345626	3311.936	23656.32	1703.326	6.64E+19	1039.853
Ob	38	38	38	38	38	38

It can be observed from Table 1 that all the variables have positive average values and median. This is normal considering the series involved. For instance, the mean of gross fixed capital formation which is the proxy for domestic investment is approximately 16 per cent while the average for inflation is also 27 per cent. The average GDP per capita income of Ghanaians is also GHC 22. Also, the minimal deviation of the variables from their mean as shown by the standard deviation indicates the slow growth rate (fluctuation) of these variables over the period considered. Again most of the variables show signs of positive skewness implying that the majority of the variables' mean is greater than their median except for gross fixed capital formation which is 0.010650 negatively skewed.

Moreover, the Jarque-Bera statistic which shows the null hypothesis that all the series are drawn from a normally distributed random process cannot be rejected for the variables. The standard deviation of the variables from their means is quite low except for the real exchange rate, which is highly deviated.

4.1 Unit Root Test

The cointegration technique used in this study does not require the pre-testing of the variables for unit roots. However, the use of the Autoregressive Distributed Lag (ARDL) and Non-Linear Autoregressive Distributed Lag (NARDL) requires that none of the variables used should be integrated of an order higher than one.

Table 2: Results of Unit Root Test with Trend and Constant: ADF Test Level First Difference

Variables	ADF-Statistics	Lag	Variables	ADF-Statistics	Lag
LDCPS	-2.956360[0.1577]	0	ΔLDCPS	-8.123588[0.0000]***	0
LFDI	-2.842795[0.1920]	0	ΔLFDI	-6.113104[0.0001]***	0
LGFCF	-1.551344[0.7928]	1	ΔLGFCF	-6.494254[0.0000]***	1
LGPC	-4.339717[0.0075]**	0	ΔLGPC	-10.44962[0.0000]***	0
LINR	-6.253874[0.0000]***	1	ΔLNR	-7.392264[0.0000]***	1
LREER	-6.545429[0.0000]*	0	ΔLREER	-10.23295[0.0000]***	0

Note: ***. **. * indicates the rejection of the null hypothesis of non-stationary at 1%,5%, and 10% level of significance respectively, Δ denotes the first difference, BW is the Band Width. The p-values are in parenthesis while I (0) is the lag order of integration.

From the ADF test results in Table 2, it can be observed that at levels of the null hypothesis of the presence of unit root for some of the variables specifically the log of domestic credit to the private sector (LDCPS), the log of foreign direct investment (LFDI) and the log gross fixed capital formation (LGFCF) cannot be rejected since their P-values of the ADF statistics were not significant statistically at all the three conventional levels. However, the log of the variable of GDP per capita (LGPC), interest rate differential (IRD) and real effective exchange rate (REER) are statistically significant at 5%, 1% and 10% respectively. At first difference all the variables are stationary and statistically significant at 1% hence we reject the null hypothesis of the presence of a unit.

4.2 Cointegration Analysis

This section presents the long-run relationship between domestic investment, exchange rate fluctuations and other control variables.

Table 3: Bounds Tests Results for Cointegration

Linear ARDL model	Non-Linear ARDL model
F-value = 6.452505	F-value = 5.723257
At 10% (2.26–3.35)	At 10% (2.12–3.23)
At 5% (2.62–3.79)	At 5% (2.45–3.61)
At 1% (3.41–4.68**)**	At 1% (3.15–4.43)

From Table 3, F-statistics for FGFCF (.) = 6.452505 and 5.723257 for the Linear ARDL model and Nonlinear ARDL Model respectively exceed the lower and upper bound's critical value, at all significance levels, therefore, the null hypothesis of no cointegration between domestic investment, exchange rate fluctuations and the other variables was rejected at all level of significance.

The long-run results show that exchange rate fluctuations (REER) are detrimental to domestic investment in Ghana. The coefficient of exchange rate fluctuations is negative and statistically significant at a 1 per cent level of significance. This means that, with the coefficient of -0.2480, a 1 per cent increase in exchange rate fluctuations will to lead a 0.25 percentage decrease in domestic investment. In this study specifically, exchange rate fluctuations affect domestic investment through the imports of raw materials and inputs, therefore, fluctuations in the exchange rate affect the cost of imported raw materials and

inputs which will, in turn, discourage domestic investment. The results have theoretical backing in the sense that when the real exchange rate fluctuates, investment becomes riskier and uncertain for a developing economy like Ghana, and its repercussions are felt on domestic investment.

Table 4: Linear ARDL Results (Domestic investment is the Dependent Variable)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REER	-0.248016	0.063108	-3.929994	0.0005
IRD	-0.093362	0.047981	-1.945841	0.0611
INDCPS	0.097347	0.097123	1.002310	0.3242
INGDP	0.142034	0.047473	2.991915	0.0055
INFDI	-0.060313	0.025909	-2.327876	0.0269
C	3.449771	0.742686	4.644994	0.0001
ΔREER	-0.235786	0.068441	-3.445120	0.0018
ΔIRD	-0.083020	0.030547	-2.717792	0.0111
ΔINDCPS	0.251160	0.114743	2.188893	0.0371
ΔINGDP	0.091295	0.033640	2.713873	0.0113
ΔINFDI	-0.109755	0.045320	-2.421778	0.0222
ECM(-1)	-0.837713	0.224667	-3.728688	0.0009
C	0.013459	0.028014	0.480441	0.6346

The results concur with the findings of Diallo (2008), Oluwaseyi et al., (2015) and Oniore, Gyang and Nnadi (2016) in their study where they found exchange rate volatility and fluctuation to hurt domestic investment. The results point out that exchange rate fluctuations are a significant factor in explaining domestic investment and subsequently can't be ignored. However, these results do not coincide with the findings of Iyke and Ho (2018) who asserts that exchange rate volatility and fluctuation have a positive impact on domestic investment in the long run.

From the results in Table 4, the coefficient of interest rate differential (IRD) of -0.093362 depicts that a 1 per cent increase or change in interest rate differential will result in a 0.1 approximate decrease in domestic investment, in the long run, all other things being equal. The result is statically significant at the 10 per cent level of significance. The negative impact of interest rate differential on domestic investment explains the reality that investment conditions outside Ghana are more favourable and therefore nationals prefer to invest abroad rather than in Ghana.

Moreover, foreign direct investment (INFDI) has a significant negative effect on domestic investment in this study. The long-run result shows that an increase in foreign direct investment will reduce domestic investment by 0.06 per cent and it is significant at 10 per cent. In this study, FDI was found to crowd out domestic investment in Ghana.

This result is in line with the findings of Adams (2009), Agosin and Machado (2005), and Yahia, Haiyun et al. (2018). For example, Yahia et al. (2018) pointed out that though FDI inflows are intended to accelerate economic growth in the host country, when it is not well regulated by the government it turns out to stunt the growth of domestic investment, local business and firms. Most of the FDI the Ghanaian economy attracts is

domestic market seeking, thus taking over the local market. Due to the superior technology of these foreign firms as compared to local firms and businesses, they can out-compete our local firms and this gives them a competitive advantage.

They eventually end up crumpling local firms and businesses because products from these foreign companies are more price competitive, and a step up ahead in quality when compared to our local products.

Expectedly, the coefficient of GDP (INGPC) per capita (a proxy for income) carried a positive sign and is statistically significant at a 5 per cent significance level which is also consistent with the findings of Alshamsi et al., (2017), Hakizimana, J. (2015) and Guechheang and Moolio (2013). With a coefficient of 0.14, it implies that a one per cent increase in GDP per capita (a proxy for income) will cause domestic investment to increase by approximately 0.14 per cent, ceteris paribus. The finding supports the accelerator theory of investment which states that investment expenditure increases when there is salary (income) increment. This is because when there increase in demand which is strongly influenced by income, local firms, businesses and investors increase their investments to meet the new level of demand.

The presence of a long-run relationship between domestic investment and its independent variables allows for the estimation of short-run estimates. All the independent variables in the short run are statistically significant including the variable "domestic credit to the private sector" which was not statistically significant in the long run. The coefficient of domestic credit to the private sector (INDCPS) in the short run is 0.251160 and it is statistically significant at 10 per cent.

This implies that a 1 per cent increase in domestic credit to the private sector will cause domestic investment to increase by approximately 0.25 per cent. The private sector contributes immensely to economic growth, but for them to continually invest in the local economy they must have access to credit facilities, therefore making credit access and services available to the private sector encourages and promote domestic investment. The Banking industry is one of the major avenues for accessing credits and their ability to offer these services is directly critical to domestic investment in a country (Malilinguh and Zoltan, 2018).

The short-run dynamics reveal that exchange rate fluctuation (REER) is still hostile to domestic investment in Ghana. The coefficient of exchange rate fluctuation is negative and statistically significant at a 5 per cent level of significance. The coefficient of -0.235786 implies that an increase in fluctuations of the real effective exchange rate of Ghana by 1 per cent leads to approximately a 0.23 per cent decrease in domestic investment.

Failure to manage and stabilize the rate of exchange of a country can cause some economic distortions in domestic investment, consumption and production patterns. The long-term and short-term exchange rate fluctuations showed a negative effect on domestic investment. This result reveals that exchange rate fluctuation is a key factor in explaining domestic investment and cannot be overlooked.

Now moving on to the second objective, following Bahmani-Oskooee and Fariditavana (2015), Bahmani-Oskooee and Mohammadian (2016), Halicioglu et al (2017) and Kwesi Obeng (2018), the nonlinear equation (using the NARDL estimation

technique) in equation (13) was estimated, using the same estimation technique used for the linear ARDL, the long run and short run asymmetric effect results is presented in Table 5.

Table 5: Non-Linear (NARDL) Results (Domestic Investment is the Dependent Variable)

Variable	Coefficient	Std.Error	t-Statistic	Prob.
REERNEG	0.243235	0.067115	3.624145	0.0011
REERPOS	-0.242810	0.072894	-3.331008	0.0024
IRD	-0.083202	0.050519	-1.646950	0.1107
INDCPS	0.117819	0.099465	1.184534	0.2462
INGDP	0.120527	0.051673	2.332486	0.0271
INFDI	-0.066881	0.026566	-2.517590	0.0178
C	3.524350	0.824759	4.273186	0.0002
ΔREERNEG	-0.224063	0.114812	-1.951567	0.0618
ΔREERPOS	0.238173	0.109967	2.165862	0.0397
ΔIRD	-0.078159	0.032243	-2.424031	0.0226
ΔINDCPS	0.265024	0.118942	2.228181	0.0347
ΔINGDP	0.072477	0.034443	2.104263	0.0452
ΔINFDI	-0.137448	0.049550	-2.773924	0.0101
ECM(-1)	-0.884784	0.221288	-3.998339	0.0005
C	0.011356	0.031873	0.356294	0.7245

From Table 5, the main variables of interest, REER (POS) which represents appreciation and REER (NEG), which represents depreciation, confirm the asymmetry effect of exchange rate fluctuations on domestic investment in Ghana. This assertion is true because the variables REER(POS) and REER(NEG) have different coefficients. This result accepts the alternate hypothesis of the study that exchange rate fluctuations have an asymmetric effect on domestic investment. Specifically, REER(POS) has a negative coefficient whiles REER(NEG) has a positive coefficient in Table 5 with the same level of statistical significance. That is a 5 per cent level of significance in Table 5 in the long run and a 10 per cent statistical level of significance in the short run.

In Table 5, in the long run, a 5 per cent appreciation of the local currency will lead to a 0.24 decrease in domestic investment. Though it is established in this study that exchange rate fluctuations affect domestic investment through the cost of imported inputs and export sales (Goldberg, 1993). However, when the effect of export sales is more pronounced, it can augment the cost of imported inputs. All things being equal, appreciation of the local currency, should have a positive effect on domestic investment, because it reduces the cost of imported inputs (Kandil, 2015), on the contrary appreciation of the currency can also reduce export sales because export becomes more expensive on the international market (Kwasi Obeng, 2018). With these two contrasting effects, the more dominant of the two effects will prevail and its effect will be felt on the domestic investment.

From Tables 5 depreciation has a positive effect on domestic investment both in the short and long run. This is because, counter-intuitively, depreciation increases the

cost of imported inputs but improves exports sale. When the revenue generated from export sales, far exceeds the cost of imported inputs depreciation may promote domestic investment. This result confirms the claim that the relationship between exchange rate movement and some macroeconomic variables can be asymmetric (Bahmani-Oskooee and Fariditavana, 2014, 2015; Bahmani-Oskooee and Mohammadian, 2016; Halicioglu et al., 2017, Obeng, 2018).

All the other drivers (domestic credit to the private, income, foreign direct investment, interest rate differential) of domestic investment has the same directional impact both in the long run and the short run from the nonlinear ARDL model. All the independent variables in the short-run nonlinear ARDL model are statistically significant at 10 per cent. Except for the variable domestic credit to the private sector and interest rate differential, all the independent variables in the long-run nonlinear ARDL are statistically significant. The Error Correction Model (ECT) for the nonlinear ARDL model is negative as anticipated and it is statistically significant at 1 per cent. The coefficient is of the Error Correction Model is (-0.884784) shows approximately 89 per cent of shocks that occur in the short run will be corrected in the long run.

5. Conlusion and Recommendations

The empirical evidence revealed the following findings:

First, the exchange rate fluctuation exerts negative linear effects on domestic investment both in the long run and short run. This implies that fluctuations in the exchange rate is harmful to domestic investment. Secondly, exchange rate fluctuations have an asymmetric effect on domestic investment in the long and short run. This implies that appreciation and depreciation of the local currency have a differential impact on domestic investment which assertions of Kwasi Obeng (2018) and Bahmani-Oskooee et al., (2015).

Based on the findings of this study, the following recommendations are proposed. The volatility and uncertainty inherent in exchange rate fluctuations often generate apprehension among domestic investors, deterring investment in the local economy. Addressing this issue necessitates the Bank of Ghana's commitment to implementing enduring and robust measures rather than short-term fixes. Recognizing the significant impact of exchange rate fluctuations on domestic investment, particularly concerning the procurement of imported raw materials and inputs, the Bank of Ghana should intensify efforts to promote stability in the exchange rate. One effective strategy entails advocating for the adoption of hedging instruments and forward contracts among domestic investors, particularly those engaged in import and export activities. By encouraging the utilization of these risk management tools, domestic investors can better mitigate the potential adverse effects of exchange rate fluctuations on their investment decisions. This proactive approach not only enhances investor confidence but also contributes to fostering a more resilient and stable investment environment conducive to sustained economic growth.

6. Limitation of Study

The peculiar setback of this study was the unavailability of data which is common in Sub-Saharan African countries. A large sample size could not be used because of some missing values for some of the variables in the 1970s.

Conflict of Interest Statement
The authors declare no conflicts of interest.

About the Author
Michael Opoku Baah is currently pursuing his PhD in Development Studies at the University of Cape Coast, Ghana. He obtained his Bachelor of Education (Economics and Geography) and MPhil in Economics from the University of Coast in 2016 and 2020 respectively. His research interests are in international trade, climate change economics, environmental economics and sustainable development.

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Appendix: Diagnostic Tests

Test	**Linear ARDL model**		**Non-Linear ARDL model**	
	F-statistic	**p-value**	**F-statistic**	**p-value**
Serial Correlation	0.276339	0.6034	1.209869	0.2818
Functional Form	0.792439	0.3812	2.338901	0.1387
Normality	1.500919	0.472149	2.204050	0.332198
Heteroscedasticity	0.641164	0.7182	0.474028	0.8632
CUSUM	-	stable	-	stable
CUMSUMSQ	-	stable	-	stable