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Exchange Rate Devaluation, Interest Rate Volatility, and Investment Growth: ECOWAS Evidence

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Abstract: There are monetary policies and shocks that emanates from adjustments over identified periods that could sway growth rates of investment. The study aimed at determining effect of exchange rate devaluat[1]ion and interest rate volatility on investment growth in selected ECOWAS nations. We estimated SVAR model in order to identify the influence of policy shocks in exchange rate devaluation and interest rate volatility. The SVAR results revealed that investment growth responds to shocks from exchange rate devaluation negatively at first, but stabilises over time. For interest rate volatility, investment rate continues to grow but at a diminishing rate over the periods. Investment growth was also found to react largely to its internal shocks from its values in lagged periods. The study recommended among others, that devaluation of currency should be implemented as a last resort under sufficient conditions to salvaging ailing ECOWAS economies to sustain current investment growth.

Keywords: SVAR; Investment Growth; Exchange Rate Devaluation; Interest Rate; Volatility

Introduction

Devaluation is said to stimulate production and exports and discourage importation as more local currency will be required to purchase foreign goods. This condition of increased exports and dampened imports is to improve balance of trade, support relative price adjustment and bring the balance of payments closer to equilibrium (Khondker, et al. 2012). However, it has been stated by structuralist economists that these benefits are achieved at a very high cost that could outweigh benefits in the long run impeding economic growth. These costs cut across rise in general price level that results in lower output causing a negative real balance

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effect, furthering inequality in income redistribution that affects aggregate demand. Hence, higher currencies spent on imports if demand for such imported mmodities is inelastic or involve non-substitutable inputs for manufacturing causes decline in aggregate supply (Özcan, 2020).

Interest rates aside being affected by devaluation policies are also monetary instruments used for economic interventions. Volatility in interest rate can be from shocks from inflation, and deregulation. Reason being that investors are swayed by market indicators from performance of stocks together with market factors fluctuations. Over the last four decades, there has been increased levels of domestic and foreign direct investments in developing economics (Ijirshar, et al. 2019). However, the 2018 report, UNCTAD (2018) stated that there has been a recent decline in investment inflows from foreign investors into Africa with continuous decline in FDI from 2017 up to twenty-one percent. This situation has raised the need to examine investment growth and its response to shocks from two monetary variables, interest rate volatility and exchange rate devaluation.

Local currencies of West African countries have over time declined in value relative to the US dollar. Except for the West African CFA Franc used by Francophone countries within the region that rose slightly in the midstream of the periods studied, others have witnessed a continued fall. While a school of thought express that devaluation of the currencies is to create an expansionary economy and cause increased circulation of legal tender, others hold that it creates inflationary trends from weakened purchasing power and higher production costs and worsens standard of living especially for import-dependent economies. This study sought to identify empirically how this fall either determined by market forces or initiated by monetary policy regulators has influenced investment growth in member nations, positively or negatively.

Additionally, the study holds a concurrent empirical examination of interest rate, a major monetary policy indicator, in terms of the rate of change and the effect of economic growth. Interest rates determine rate of savings and consumption and thus might influence the macroeconomic situation of countries in terms of investment growth.

The following research questions emanate from the problems identified:

1. What is the extent to which exchange rate devaluation has influenced investment growth in the ECOWAS nations?
2. Does interest rate volatility have any effect on investment growth among the ECOWAS nations?
3. To what extent has the past values of investment growth in the ECOWAS nations affect the current investment growth?

The study seeks to:

1. Ascertain the influence of exchange rate devaluation on investment growth in ECOWAS nations.
2. Determine the extent to which interest rate volatility affects investment growth among the ECOWAS nations.
3. Ascertain the extent to which past values of investment growth in the ECOWAS nations affect the current investment growth.

In line with study objectives, hypotheses of the study were formulated and stated in their null forms below:

Ho_1: Exchange rate devaluation does not influence investment growth in the ECOWAS nations.
Ho_2: Interest rate volatility has no effect on investment growth among ECOWAS nations.
Ho_3: The past values of investment growth in the ECOWAS nations affect the current investment growth.
The remainder of this study is grouped into four sections. The first section is a review of extant literature relating to study concepts and underlying theoretical perceptions from relevant schools of thoughts. Furthermore, previous empirical works published in relation to study objectives are examined to identify lacuna in existing studies and determine this study's contribution to knowledge. The next section spells out the econometric estimation methodology employed in the study. It contains theoretical framework adopted, data sources, methods of estimation employed and model specification. Data analysis and interpretation make up the third section. Data extracted from requisite sources are analyzed using tools mentioned in the methodology section. Results are interpreted and policy implications of findings explained. The concluding section contains summary of research findings, recommendations and concluding sub-section.

Literature Review

Harchaoui, Tarkhani & Yuen (2005) suggest that devaluation of a country's local currency would stimulate aggregate demand and influence investment price and investment decisions such that it raises the marginal benefit of such investment due to lower fixed cost per output stemming from expanding aggregate demand. In a different direction, they agree with macroeconomic reasoning that devaluation of currency would cause inflation and spell increased cost of production for firms that largely depend on imported inputs. This could dampen investment growth. Blecker & Razmi (2008) support the aforementioned stating that exchange rate devaluation is contractionary in developing countries after using a GMM approach in their study. They however found expansionary effects of devaluation in countries with developed economies. Lederman (2008) is not so categorical. He found that foreign direct investments did not immediately rise with devaluation. Rather, they rose after a two-year growth in exports- exports having direct relationship with exchange rate devaluation.

Bahmani-Oskooee & Hajilee (2010) views the influence of devaluation of currency on investment from the labour-wage perspective. They assert that wages, the reward for labour does not fully adjust to the inflationary impact devaluation exudes. This causes aggregate investment to rise as investors try to make more profit from higher cost of goods and less wages. In their study of 50 countries, they found that the relationship between exchange rate devaluation and investment is majorly in member-countries in ECOWAS using panel data for thirty-eight years till 2019. Study variables were stationary at first differencing and had long run relationship after appropriate unit root and co-integration tests. Positive between exchange rates and the growth of the Nigerian economy. By implication, the economy grows when there is real exchange rate depreciation.

Eregha (2010) ascertained the influence of interest rate variations on investment in Nigeria. The study used monthly data from 1970 to 2002 with interest rate variations measured using variance of interest rates. Findings revealed that interest rate variation negatively affected investment growth. Yinghan (2016) sought to determine the impact of changes in interest rates movements in portfolio investment in China using high frequency data. The study used

the structural VAR model and found that the speed of response of portfolio investments is swift to changes in interest rates in the short and long runs.

The work of Osazevbaru (2021) on the informal sector relates to this study as the informal sector accounts for employment of a larger proportion of the Nigerian population. The sector also involves the employment of factors of production for profit and thus classifies as investment in the macroeconomic sphere. The study centred on the effect of volatility of interest rate on informal sector performance in Nigeria from 1981 to 2018 employing the autoregressive distributive lag (ARDL) bound and ARCH tests. Findings revealed that interest rate volatility was not found to be a significant predictor of performance in that sector. In other words, the informal sector did not respond to shocks arising from volatility of interest rates in the economy.

Adenuga (2020) examined investment growth in Nigeria and the impact of unstable interest rates on recorded growth. The study used the vector error correction model on time series from 1986 to 2018 to achieve study objective. It was found that interest rates positively influenced investment growth in the next period but begins to exert negative pressures on investment growth subsequently. For Xaba (2018) in South Africa, interest rates weakened investment growth as investors would go for less-volatile investments to reduce risks after studying data that spanned 11 years from 2007 to 2017. The study also raised that rather than financial resources being used for investment, investors would rather hold money causing savings to rise in the midst of persistent volatility of interest rate.

Gap in Literature

Review revealed mixed findings on the impact of exchange rate devaluation and interest rate volatility on investment growth in general. This lack of consensus observed has raised the need to conduct empirical research on the variables concerned to provide evidence of what is obtainable within the West African macroeconomic climate. Few works have considered the effect of interest raise volatility and exchange rate devaluation on investment but not on investment growth. Furthermore, previous works did not estimate how past value of investment growth affects current investment growth and the variables where not conducted simultaneously to ascertain their effect on investment growth.

Methods

Investment growth follows a flow modelling which depicts stock of capital changes over a period. Accordingly, growth rate of investment can be measured as:

$$I_t = K_t - K_{t-1} \tag{1}$$

where I_t is net investment in current period, K_t t is current stock of capital, and K_{t-1} is initial capital stock. Here, we review five common theories of investment. These include, accelerator theory, profits theory, financial theory, neoclassical theory, multiplier-accelerator theory of investment, and Tobin's Q theory. According to accelerator theory, net investment is determined by increase in output. This is mathematically deduced as:

$$I_t = \delta(Y_t - Y_{t-1}) \tag{2}$$
$$\Rightarrow I_t = \delta \Delta Y_t$$

where δ is accelerator greater than zero, ΔY_t is change in output at current period. Therefore, whenever there is a rise in output level, a proportionate rise in optimum stock of capital is stimulated. There is the capital stock adjustment theory of investment (flexible accelerator) as developed by Koyck, Chenery, and Junankar (Celik, et al. 2018). This is the version of flexible accelerator theory which relates that capital stock is optimally adjusted with time lag. Accordingly, adjustment process between changes in output and level of optimum capital is characterized with time lags. Hence, when output demand rises, demand for capital stock would rise as well.

There is a time lag for ordering capital goods and raw materials required for investment, there is a time lag to make investment decisions. There, is a time lag for ordering capital goods and raw materials needed for investment, there is a time lag to make investment decisions. Also, we have financial lag, a time needed to raise finance to buy capital especially in developing ECOWAS countries that are endowed with labour abundance but lack capital. The delivery time lag is final in the adjustment course for desired stock of capital goods required to produce a given output.

The Koyck's theory of investment is a stock adjustment theory which explains that "net investment is determined by actual capital stocks is a function of historical values of output with geometrically declining weights. In effect, optimal stock of capital required to meet increase output demand becomes a function initial output levels given as:

$$K_t = K_t(\beta Y_{t-1} + \beta^2 Y_{t-2} + \beta^3 Y_{t-3} + ...), \ |\beta| < 1 \tag{3}$$

Where β is the coefficient of adjustment which measures rapidity of adjustment in the model. If $\beta = 0$, then adjustment speed is excessively rapid. The profits theory states that what determines current investment behavior is basically undistributed profits which serves as a source of internal financing for funding investments. Given that profits are function of output, a rise in output stimulates retained earnings of firms which implies huge profit with lower cost of capital. So, whenever the capital markets are imperfect, retained earnings becomes buffer stock to guarantee optimal investment. This most often necessitates reinvestment of excess profit rather than save in the banks.

Going further we have that optimal stock of capital is a function of expectations of rising profits given that profits expected is a function of actual profits generated and earned in the previous time period. Relating this stock of capital, we have:

$$K_t = K_t(\pi_{t-1}) \tag{4}$$

Where K is the optimal capital stock and πt-1 is actual profits earned in previous years. Due to Shapiro (Guerard & Schwartz, 2007) there is a direct relationship between aggregate profits, income and optimal stock of capital such that for a given profit earned, there is a proportional optimal capital. Similarly, once the rate of interest rises for a given level of

profit, optimal capital stock falls and reverse is the case once interest rate is low. The multiplier -accelerator theory of investment postulates current investment as a function of income (Y) and capital stock (K) of the previous period (t-1).

$$I_t = \phi Y_{t-1} + \beta K_{t-1} \tag{5}$$

where ϕ parameter symbolizes effect of changes in income on investment, while β is a measure of influence of capital stock on investment. Given that same variables of interest rate, income, and profits all influence or determine investment and consumption behaviours, the consumption function can as well be given as:

$$\begin{aligned} C_t &= C_t(Y_{t-1}, r_{t-1}, \pi_{t-1}) \\ \Rightarrow C_t &= \alpha Y_{t-1} + \gamma K_{t-1} \end{aligned} \tag{6}$$

The parameter, α is MPC, while changes in capital stock on consumption is measured by the parameter γ. The capital stock is given by the identity:

$$K_t = K_{t-1}[(1-k) + \mathrm{B}] + \alpha Y_{t-1} \tag{7}$$

Overall, a fall in investment is simultaneously offset by a reduction in aggregate saving. This in turn induces decline in effect of a risen level of income on expenditure since investment gradually decline as capital accumulates, provided income rises no further. This theoretically upholds stability.

The neoclassical theory of investment as articulated by Jorgensen (Girardi, 2021), states that net investment is determined by aggregate investment without replacement investment which is proportional to capital stock. The investment function becomes:

$$\dot{K}(t) = I_{(t)} - \Phi K_t \tag{8}$$

Where $\dot{K}(t)$ denotes time rate of change of capital with respect to time, Φ is the rate of capital depreciation. On its part, the Tobin Q theory upholds that net investment decisions are determined by the ratio of market value of stock of capital to capital replacement cost given by market value of firm's shares. Accordingly, capital replacement cost is actual cost of existing stock of capital if such capital stock was to be purchased at current (today) price, market value of capital stock is capital value determined by stock market. Tobin thus noted that, if q> 1, the market value of shares in stock market exceeds replacement cost of real capital such as the firm's machinery. Under this scenario, net investment rises. Otherwise, that is, q<1, net investment falls.

The study takes it theoretical root on Tobin's q ratio of net investment growth by providing a basis to invest on stock market. Thus, following the footsteps of Jae-Kwang Hwang (2004) who established an opposing causality between exchange rate devaluation and stock prices, we hypothesize same negative link between devaluation and net investment. In general,

currency devaluation enhances investment by raising demands in export market, but shrinks net investment growth due to rising cost of imported capital and intermediate goods as well as user cost of capital as measured by interest rate. Pertaining to interest rate volatility, the Classical theory of Interest credited to Marshall and Pigou respectively uphold the tenet that interest rates fluctuate from the market forces relating to capital. Relatively, Mundell-Fleming model by Marcus Fleming and Robert Mundell further explains the relationship among short run output growth, nominal exchange rate and interest rates which rejects concurrent full capital mobility, fixed exchange rate and monetary independence (Rey, 2015). According to the model, high interest rates attract foreign investment into a country and raise the value of such local currency as demand for the currency increases ceteris paribus.

Model

We specify our investment growth equation as: $IVG = f(EXRD, INTV)$. Investment growth denoted by IVG is a function of exchange rate devaluation (EXRD), and interest rate volatility (INTV). The structural vector auto regressive (SVAR) model was used to gauge influence of policy shocks in exchange rate devaluation and volatility of interest rate. SVAR adjusts VAR estimation innovations into uncorrelated structural shocks by inculcating structural matrices and imposing restrictions on model parameters (E-views, 2019; Sims, 1980). The structural VAR (p) is thus given as:

$$DZ = D_1^w Z_{t-1} + ... + D_p^w Z_{t-p} + Q^w y_t + Ge_t \tag{9}$$

Where *D, D^s and Q^s* are structural coefficients, e_t= orthonormal unobserved structural innovations

$$\begin{aligned} Z_t &= D^{-1}D_1^w Z_{t-1} + ... + D^{-1}D_p^w Z_{t-p} + D^{-1}Q^w y_t + D^{-1}Ge_t \\ Z_t &= D_1 Z_{t-1} + ... + D_p Z_{t-p} + Qy_t + u_t \end{aligned} \tag{10}$$

So, the reduced-form lag matrices- $Di = D^{-1}D_i^w$ and $Q_i = D^{-1}D_i^w$ and the reduced form is:

$$\begin{aligned} u_t &= D^{-1}Ge_t = We_t \\ E(u_t u_t^{'}) &= \sum = D^{-1}GG'D^{-1}' = WW \end{aligned}$$

Where $W = D^{-1}G$, G= (k x k) coefficient matrix containing identification restrictions that indicate linear relationship between structural shocks and reduced forms, Z is a (k x1) vector of variables, *Do* is a (k x 1) vector of intercept, ut is uncorrelated and identical (k x 1) structural noise. Hence,, identifying restrictions are defined by the following matrices:

$$H = \begin{bmatrix} 1 & 0 & 0 \\ Q(1) & 1 & 0 \\ Q(2) & 0 & 1 \end{bmatrix}$$

$$M = \begin{bmatrix} Q(3) & 0 & 0 \\ 0 & Q(4) & 0 \\ 0 & 0 & Q(5) \end{bmatrix}$$

The effects of structural shocks on variables were derived from impulse response functions, which measures the impact of the standard deviation shock of one variable on another.

Estimation Techniques

The study estimates Structural Vector Autoregressive Models. SVAR was employed because it captures simultaneous effects among endogenous variables in the model unlike standard VAR. Variance decomposition together with impulse response function analysis were done as common to SVAR models to determine the change in endogenous variable caused by shocks within the internal dynamics of that variable and structural shocks from other endogenous variables.

Data

Ten countries from the fifteen ECOWAS countries were sampled. They include: Niger, Ghana, Sierra Leone, Burkina Faso, Nigeria, The Gambia, Cote d'Ivoire, Senegal, Guinea, and Mali. The data for each of the countries sampled were extracted from databases of World Bank, the IMF, and the United Nations. Data series spanned thirty-one years from 1991 to 2020 fiscal years. Exchange rate devaluation was measured by calculating the rate of change that occurred in exchange rates from the immediate past period to the current period. Interest rate volatility was calculated by variance of short-term interest rates and utilized in the study. The World Bank database contains investment as a percentage of GDP for each year and each country. These rates were then applied to respective GDP values in US dollars to determine investment value for year for each cross-section. Changes in these values were then calculated from current to immediate past periods to derive investment growth rate for the panel used in estimating the SVAR model.

Findings

This section is devoted to discussion of results beginning with the descriptive analysis.

Descriptive Analysis

Table 1 contains measures of central tendency for study variables. Average growth in investment for the sampled countries in the studied period was 12.53 per cent. Minimum change in investment was a large decline of 69.39 per cent in Nigeria for the 1999 fiscal year; while maximum value stood at over 270 per cent experienced by The Gambia in 2016. Exchange rate devaluation in sampled ECOWAS member-countries was 9.2 percent

worsening of local currency against the US dollar within the 30-year period. Maximum value for exchange rate devaluation represents the worst devaluation, while minimum value represents the least devaluation that occurred. Sierra Leone had the highest investment growth rate, the worst occurrence of devaluation with over 321 per cent decline in 2020 as well as the highest volatility of interest rates. Mali had the least investment growth rate with an average of 5.7% growth in 30 years that marked the study period. The conditional variances of interest rates derived through GARCH analysis with series output revealed an average variance of 246.686. There was an all-time high rate of 24 per cent and a minimum of 4.73 per cent.

Table 1. **Descriptive Statistics**

Countries	Variables	Mean	Minimum	Maximum	Std. Dev.	Kurtosis
Burkina Faso	IVG	0.095263	-0.3677	0.50475	0.194723	0.199864
	EXRD	0.037427	-0.16613	0.960729	0.191002	19.95089
	INTV	12.47798	0.198709	36.66719	10.59537	-0.75057
Cote d'Ivoire	IVG	0.150104	-0.52502	1.574887	0.450239	4.802974
	EXRD	0.037442	-0.16613	0.960728	0.191089	19.90724
	INTV	12.30162	0.148322	34.08785	10.41403	-1.31954
Ghana	IVG	0.119346	-0.68555	1.990915	0.435253	11.86518
	EXRD	0.202269	0.007542	1.043628	0.213626	7.425417
	INTV	126.7176	4.155171	353.9773	94.08488	-0.35584
The Gambia	IVG	0.151046	-0.51246	2.731411	0.59095	12.43201
	EXRD	0.06952	-0.11374	0.432411	0.108177	3.592295
	INTV	758.623	557.5167	1412.379	155.899	10.38974
Guinea	IVG	0.141042	-0.49086	2.366717	0.551704	8.536004
	EXRD	0.101493	-0.1847	0.624084	0.14497	5.534075
	INTV	346.5035	171.2265	591.626	123.21	-0.8806
Mali	IVG	0.057127	-0.23305	0.595218	0.19658	0.47531
	EXRD	0.037425	-0.16613	0.960728	0.190998	19.95279
	INTV	12.22984	0.193695	36.56084	10.45114	-0.71754
Niger	IVG	0.104825	-0.30729	0.805239	0.241511	3.198463
	EXRD	0.037425	-0.16613	0.960728	0.190998	19.95279
	INTV	13.43302	0.255524	42.74517	11.25306	-0.04657
Nigeria	IVG	0.1397	-0.69387	0.796919	0.27657	2.615837
	EXRD	0.198724	-0.05772	3.219049	0.592613	25.3253
	INTV	376.6302	248.2331	882.1726	129.2622	7.220345
Senegal	IVG	0.107109	-0.25878	0.587311	0.193577	0.280184
	EXRD	0.037425	-0.16613	0.960728	0.190998	19.95279
	INTV	12.30162	0.148322	34.08785	10.41403	-1.31954
Sierra Leone	IVG	0.187125	-0.49893	2.26828	0.585763	4.821316
	EXRD	0.164905	-0.05065	0.950164	0.21672	6.222996
	INTV	795.642	264.4456	3485.134	790.1371	5.059183
Sampled ECOWAS	IVG	0.125269	-0.693873	2.731411	0.400045	13.23287
	EXRD	0.092406	-0.184705	3.219049	0.261460	70.28647
	INTV	246.6860	0.148322	3485.134	393.8115	23.61087

Source: Authors' estimations using Eviews

Cross-sectional dependence tests all had null hypothesis rejected at 0.05 level of significance ($p<.05$). This implies that cross-sectional dependence exists at a 5% significance level. The result shows that corresponding relationships among study variables are highly

heterogeneous across cross-sections i.e. countries and thus interpreted responses to shocks could lead to bias in concluding about a cross section.

Table 2. **Test of Panel Heterogeneity**

Residual Cross Section Dependence Test	
Test	**Statistic**
Breusch-Pagan LM	82.6007
Pesaran scaled LM	3.963462
Bias-corrected scaled LM	3.791048
Pesaran CD	4.218741

Source: Authors' estimations using Eviews

Analysis of Unit Root Test

Table 3. **Panel Unit Root Test**

Test	**Investment Growth**		**Int. Rate. Vol**		**Exchange Rate Dev.**	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
LLC*	-0.7364	-8.13444*	-0.75590	-10.8147*	-0.2948	-8.36307*
IPS W.Test	-2.3471	-8.99951*	-0.4356	-9.93252*	-1.5876	-8.9814*
ADF Fisher	1.2085	114.506*	2.3456	127.154*	2.7485	114.113*
PP-Fisher	3.4590	208.177*	1.9847	198.380*	1.3346	162.190*

*Significance at 5% level of significance

Source: Authors' estimations using Eviews

All variables namely, interest rate volatility, investment growth and exchange rate devaluation were stationary at first difference I(1) as indicated by asterisk (*) meaning significance at 5% level. This implied that the dataset is fit for long-term relationship testing- the co-integration test. Furthermore, the highest order of integration of the variables is I(1) and thus, justifies structural modelling of the dynamics of the sampled ECOWAS countries.

Table 4. **VAR Lag Order Selection Results**

Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-1664.499	NA	769.2785	15.15908	15.20536	15.17777
1	-1356.462	604.8740	50.75146	12.44056*	12.62567*	12.51531*
2	-1350.941	10.68943	52.38530	12.47219	12.79613	12.60301
3	-1337.755	25.17395	50.43532	12.43413	12.89690	12.62101
4	-1330.611	13.44331	51.30519	12.45101	13.05261	12.69395
5	-1318.753	21.99114	50.00728	12.42503	13.16546	12.72403
6	-1306.961	21.54719*	48.77945	12.39965	13.27890	12.75471
7	-1297.641	16.77536	48.67285*	12.39674	13.41483	12.80787
8	-1294.568	5.448848	51.41564	12.45062	13.60753	12.91781

*Indicates lag order selected by the criterion

Source: Authors' estimations using Eviews

Lag selection table revealed that 1 lagged period is appropriate for analysis as depicted by AIC, SC and HQ statistics.

Co-Integration Results

All panel tests as shown in table 5 except the Panel v-statistic show no co-integration among panel variables. By implication, it can be stated that long run relationship exists within the panel.

Table 5. **Panel Co-integration Test**

Test	Statistic	Weighted Statistic	Test	Statistic
Panel v-Statistic	-0.261083	-1.877627	Group rho-Statistic	-7.486802*
Panel Rho-Statistic	-8.258032*	-17.404668*	Group PP-Statistic	-15.68959*
Panel PP-Statistic	-13.92464*	-32.19987*	Group ADF-Statistic	-7.362976*
Panel ADF-Statistic	-7.005405*	-6.442457*		

*Significance at 5% level of significance
Source: Authors' estimations using Eviews

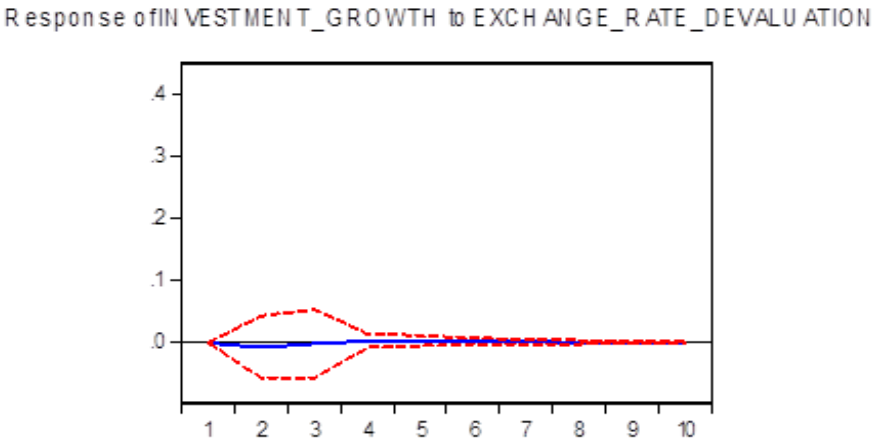
Test of Hypotheses

Table 6. **Variance Decomposition of Investment Growth**

Period	S.E.	Investment Growth	Exchange Rate Devaluation	Interest Rate Volatility
1	0.411314	100.0000	0.000000	0.000000
		(0.00000)	(0.00000)	(0.00000)
2	0.414268	99.95471	0.032695	0.012596
		(0.75088)	(0.69990)	(0.37141)
3	0.414796	99.90152	0.034127	0.064357
		(0.92555)	(0.89063)	(0.38318)
5	0.414959	99.84043	0.042894	0.116673
		(0.94726)	(0.89897)	(0.41208)
6	0.414987	99.82744	0.044914	0.127646
		(0.95148)	(0.89903)	(0.42155)
10	0.415024	99.80957	0.047577	0.142848
		(0.95968)	(0.89888)	(0.43770)

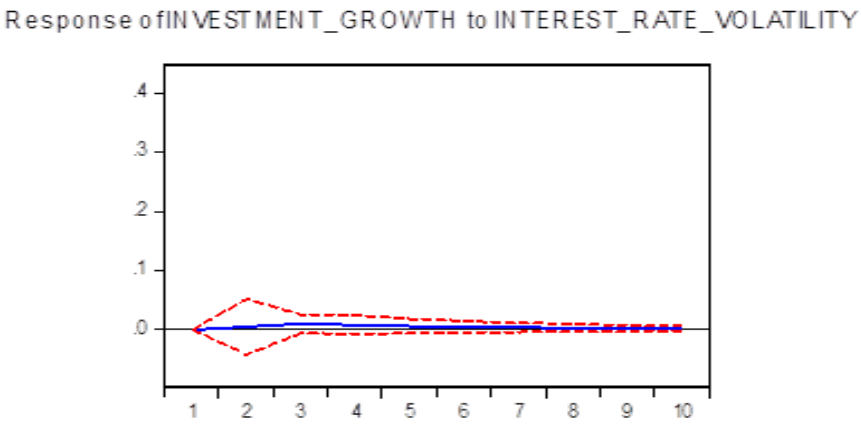
Source: Authors' estimations using Eviews

Ho_1: Exchange rate devaluation does not influence investment growth in the ECOWAS nations.



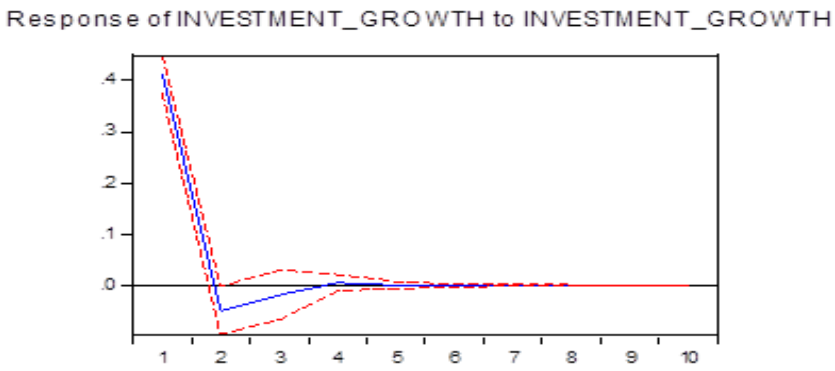
Investment growth responds to exchange rate by going in opposite direction in the short run, it then returns to have a direct relationship with exchange rate in the medium and long runs. Variance decomposition table, table 6 showed that shocks to exchange rate devaluation explained little variations in investment growth with 0.32% determined in the second year from exchange rate shocks in the first year. The contemporaneous effect of exchange rate devaluation on investment growth is also seen to increase in subsequent periods with earlier periods rising at a faster rate than in later periods. Therefore, exchange rate devaluation has an insignificant positive effect on investment growth in Africa.

Ho_2: Interest rate volatility has no effect on investment growth among ECOWAS nations.



Investment growth responded contemporaneously and positively to a one standard deviation innovation in interest rate volatility within the periods of study. There is a short period of positive impact between year 2 and year 3 before investment growth begins to converge to 0. In other words, after the year 3, the response rate of investment growth to interest rate volatility begins to decline. Table 6, the Variance decomposition then shows very little contemporaneous positive response of investment growth to structural shocks in interest rate volatility. Interest rate volatility is thus found to explain 0.012% of the change in investment growth in the year 2. As the periods extend, interest rate volatility begins to rise in its impact on the variations in Investment growth but at a lesser rate- It explains 0.065% variation in investment growth in year 3 from just 0.012% in the previous period. Meanwhile, a 0.1428% explanation of variation in the tenth period was followed by a .0.1412% in the immediate past period. Thus, interest rate volatility is low in predicting variations in investment growth in ECOWAS countries in the short run. However, it would in the long run.

Ho_3: The past values of investment growth in the ECOWAS nations affect the current investment growth.



The impulse response function in as shown in figure 3 showed that there was an initial shock to investment growth in the first year as impact goes below zero in the second year. This shock dies as impact returns to zero in the fourth period and converges back to 0 after the period. From the variance decomposition statistics in table 6, it is found that investment growth shocks in the first period was responsible for about 99.95% variation in the second period. This continues to decline but at a very low rate with all varying measures above 99.8%. Therefore, shocks from past values of investment growth have a near-neutral relationship with current values of the variables. The shocks of investment growth diminish and fade out in the short run.

Policy Implications of Results

Findings depict that there is high volatility present in interest rates in ECOWAS nations with Nigeria leading in volatility. In other words, interest rates are largely unstable as monetary policy tools within these nations. Exchange rate in the nations from data gathered were found to worsen against the US dollar continuously in most of the nations. Rises were only recorded for Francophone countries that used the West African franc slightly before the value began to dwindle again. The behaviours of these endogenous variables represent shocks to the economy which the economy reacts to. Exchange rate devaluation was found influence investment growth negatively in the short run but positively influenced investment growth in the long run though the long run influence was not found to be significant. Devaluation will raise inflation and lead to a contractionary economy slowing growth of investment from weakened purchasing power of investors. Investors are also likely to hold back further investments or liquidate current investments with currency devaluation in the short run. However, investments begin to rise in the medium term into the long term but by less rate than it initially fell. Ogun et al (2012) and Fofanah (2021) also found worsening exchange rates negatively affected growth. Emmanuel (2019) had similar findings in which the short run revealed growth declining with currency devaluation and growth rising over time in the long run from deregulation.

Contrarily, interest rate volatility was found to directly influence investment growth in the short and long run. Rising interest rates encourage foreign investments and increase capital mobility for expansionary economies. Furthermore, positive shocks from interest rate volatility will cause investment to grow faster in the first six years. Subsequent periods would experience growth but at a diminishing rate. Waziri et al (2017) had opposing results when

they examined the influence of interest rates on economic growth in ECOWAS countries. They found that interest rates had negative effect on growth of the economy. Investment growth is largely varied in response to shocks in its internal dynamics. In the short run, it responds negatively to innovations in itself but in the third year, it starts to respond positively to the past values. Thus, other investment conditions such as improved infrastructure, political stability and other macroeconomic variables should be pursued in the initial years to drive investment growth.

Research Findings

Specific findings in relation to study objectives are stated below:

1. Exchange rate devaluation has a negative influence on investment growth in ECOWAS nations. However, this is not found at a significant level.
2. Interest rate volatility has a positive influence on investment growth in ECOWAS nations. However, this is not found at a significant level.
3. Past values of investment growth have significant effect on the current value of investment growth in sampled ECOWAS countries. The effect is negative in the short run but becomes positive in the long run while converging to zero.

We recommend as follows:

1. Devaluation of currency should be a last resort to salvaging the economy to reduce the inflationary pressure and at least, sustain current living standards for higher growth rates of investment.
2. A balance should be reached on interest rates to get an optimum trade-off between the interests of surplus and deficit units; as well as create increased capital mobility for the private sector.
3. Governments of ECOWAS nations should drive growth through investments to create an expansionary effect in the economy in the long run.

Conclusions

This study empirically employed the structural vector autoregressive model to ascertain the effect of interest rate volatility and exchange rate devaluation, two major macroeconomic indices affecting developing countries- especially countries in West Africa. The devaluation of exchange rate would initially cause weakened investment growth but this changes after year 3 when investors begin to get comfortable with the shocks from exchange rate. Interest rate volatility shocks on the other hand directly influence investment growth with investors deploying resources in line with positive interest rate volatility shocks and pulling out when shocks are negative. In line with theoretical discussions, the findings support the Mundell-Fleming model that these three macroeconomic objectives represented as variables in this study cannot be pursued simultaneously as a negative effect of one (of interest rate volatility and exchange rate devaluation) runs concurrently with a positive effect of the other on investment growth. However, this is only applicable in the short run. Shocks from these variables will even out in the long run and contribute to investment growth.

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