CURRENCY DEVALUATION, STOCK MARKET RETURNS AND ECONOMIC GROWTH IN SUB SAHARAN AFRICA COUNTRIES

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ABSTRACT
Achieving sustainable growth in the world economies is one of the United Nations Sustainable Development Goals and also one of the macroeconomic goals targeting Sub-Saharan Africa. As the region aimed to attain growth and development, policy toward currency devaluation and stock market returns became crucial. Hence, this study examined the relationship between currency devaluation, stock market returns and economic growth in Sub-Saharan African (SSA) countries from 2003 to 2023 within the framework of the Mundell-Fleming model. Using panel error components general least squares (PEGLS) and the Dumitrescu-Hurlin panel Granger causality test econometric techniques, findings indicated that currency devaluation and stock market returns are positive and statistically significant to promote the economies of SSA countries. Findings further showed that there is unidirectional causality between balance of payment and currency devaluation, running from balance of payment and not vice versa. The research recommends policies that gear towards improved stock market performances. Also, there is a need for strategic policy that promotes currency devaluation in the SSA region.
Keywords: currency devaluation, economic growth, economic expansion, financial systems, stock market returns**,** panel error component ordinary least squares
JEL Codes: G150, H39, O40, O47

1. INTRODUCTION
Over the years, most of the developing countries, especially African countries, have embarked on various economic and financial reforms with the view of strengthening their macroeconomic performance, and to promote sustainable economic growth and development. As noted by Amoke et. al. (2024) that attainment of sustainable economic development has been the pre-occupation of government in both developed and developing economies of the world. In order to achieve this macroeconomic objective of the government, one of the most common economic reforms is currency devaluation, a macroeconomic strategy that is frequently employed in developing economies to support the growth of local content and boost exports. The reason for the frequent currency devaluation is the exchange rate fluctuations that is common among African countries, and have been implicated in Nigeria's economic woes, with the value of the naira (NGN) experiencing significant volatility against major currencies like the US dollar (USD) (Okungbowa, Osaro, & Eburajolo, 2024). Currency devaluation may also curb social and macroeconomic issues such as inflation, depression and uneven income distribution, given that there are different opinions on whether currency devaluation is contractionary or expansionary in nature that is subject to empirical testing. In most developing countries including the SSA countries, there has been overdependence on loans to finance budget and capital projects. The developed countries' have dominated the financial institutions in issuing of loans especially in the SSA region. This gives room for the adoption of currency devaluation to promote exports and discourage imports of goods and services among SSA

countries. Also, the need for funds for developmental projects has led to the dawn of stock markets in most SSA countries. This is to source for the capital needed for investment, an initiative birthed by economic reforms to reshape the SSA region that has shortage of funds. However, the nations of different economies may be impacted by the stock market in different ways. Because the influence of stock markets on the economy depends on a number of variables such as; the structure of stock exchanges, their interactions with other financial system elements, the nation's governance system, and others. Consequently, the need for a strong stock market development is anticipated. There are numerous studies that validate the stock market as an essential platform for economic growth; for instance, Zhongming et al. (2018) ascertain how much Ghana's stock market contributed to the country's economic expansion.

Thus, the stock market has been the major driving force towards growth in the financial sector of any economy that will contribute immensely to the gross domestic product of any country that has it. In view of this, issues affecting most SSA countries are exchange rate pressure faced by local currencies against world dominant currencies such as dollars, euros, and pound sterling. Recently, with interest fixed on the United States dollar, the thirst for dollar appetite among SSA countries, according to IMF data (2023), states that for the average Sub-Saharan African nation, 84% of exports, 67% of imports, and 60% of external debt are priced in dollars. Compared to 50% and 45%, respectively, in pegged nations, the debt portfolio of non-pegged countries consists of 66% of external debt and 99% of Eurobonds denominated in US dollars. Thus, it appears that most SSA countries make extensive use of the dollar as a store of wealth and a means of exchange.
Therefore, the need for capital for economic growth and development kickstarted the establishment of stock markets as an essential characteristic of a modern economy that promotes economic sustainability (Tokunbo, 2005). It is no longer new that most countries across the globe have embarked on various economic and financial reforms with the view of strengthening the macroeconomic performance of their economies over the years, and in the SSA region one of such reforms is the devaluation of member countries' currencies. Despite these reforms, the majority of these SSA countries' currencies are still nose-diving against the dollar and all other dominant foreign currencies in the exchange rate market, which makes it necessary to explore this field of research.

Also, Ojuolape et al. (2020) reveal that currency devaluation has garnered attention in the global economy in recent times because of currency crises among emerging economies from the 20th century to the present. While Ochenge et al. (2020) believe that low market liquidity obstructs stock price discovery and wealth of research indicating that liquidity is valued in the market, which is often associated with stock pricing efficiency that depicts a nation's economic growth and stock market liquidity interrelatedness. In addition, most previous and current studies related to the subject matter of this research were done in isolation on individual countries across the globe. For instance, Pradhan (2018) examine stock market development and economic growth relationship in the G-20 countries. Studies on the SSA region are more fixated on exchange rates and stock market volatility or stock market and economic growth. Also, outdated reviews due to the passage of time and the incompleteness of recent studies based on the selection criteria of countries that are not SSA countries, coupled with the recent economic reality at present, necessitated the need for the study. To this end, SSA countries' insatiable need for funds for economic growth and development through international financial institutions like the World Bank and IMF, as well as their own financial markets over the years, necessitated the need for this research to establish the direction of the relationship that exists between currency devaluation, stock market returns and economic growth in the SSA region.

Therefore, this study aims to contribute to the existing literature on the impact of currency devaluation and stock market returns on economic growth in SSA countries. The rest of the study is structured as follows: section two reviews the literatures, section three explains the methodology, section four presents the results and discussion, and section five provides the conclusion and policy recommendations.

2. LITERATURE REVIEW

The literature review is divided into two parts. The first part reviews the theoretical literature from which the theoretical framework of the paper emerged. The second part reviews the available empirical literature for both developing and developed countries.

2.1 Theoretical Review

According to Patro, Wald and Wu (2014), economic theory suggests that a devaluation is typically associated with growth in exports, a decline in imports, and a depreciation in the real exchange rate The theoretical discussion of currency devaluation is centered on Marshall-Lerner Condition (MLC) named after Alfred Marshal and Abba Lerner (1944) which states that currency devaluation will only help the balance of payments of a country if the combined demand elasticity for exports and imports is greater than one. This means that devaluation of currency can only improve balance of payments deficits of a country when its exports are increasing and imports are reducing. However, critics emphasize that Marshall-Lerner Condition theory has unrealistic assumptions that do not conform to the dictates of international trade. Some scholars argue that the theory assumed price elasticity remains constant across time, therefore, failing to account for structural changes in trade patterns and global demand shifts (Nopeline et al., 2024). The study also considered Capital Asset Pricing Model (CAPM), Mundell-Fleming Model, and classical growth theories in modeling currency devaluation, stock market and economic growth. The capital asset pricing model is based on estimating the cost of capital for firms in evaluating the performance of managed portfolios (Zhuo et al., 2024) while the Mundell-Fleming Model is used as macroeconomic framework that analyzes the effects of monetary and fiscal policies in an economy with international trade and capital flows. It's a variation of the IS-LM model that incorporates an open economy.

To examine the relationship among currency devaluation, stock market returns and economic growth in SSA countries, several previous studies were reviewed. In the study conducted by Jangwe and Takawira (2022), the relationship between South Africa's stock market and exchange rate from 1980 to 2020 was studied. Similarly, Fasanya and Akinwale (2022) investigates how exchange rate shocks affected the returns on ten (10) Nigerian sectoral stocks between January 2007 and December 2018, where exchange rates and sectoral stock returns are examined for symmetric and asymmetric relationships. According to Javangwe and Takawira's (2022) ARDL model results, there is typically a linkage between regulated stock markets. In a more recent study, Umoru and Omomoh (2023) used the T-Y model to test for a dynamic causal relationship between stock prices and exchange rate devaluation. They revealed how stock prices, consumer price index, the annualised rate of return on loans, and the devaluation of the local currency relative to the US dollar are all related. However, in the previous literature, to the best of our knowledge, no study has been able to work on the relationship between currency devaluation, stock market returns and economic growth in SSA countries. Therefore, this current study is able fill the gap.

2.2 Empirical Review

It is pertinent to examine the previous empirical work in the literature, this will enable the current research to understand the econometric techniques employed and the findings on the relationship among currency devaluation, stock market returns and economic growth in both

developing and developed countries. In the work conducted by Daelemans et al. (2018), the study examined how the Canada-U.S. Free Trade Agreement (CUSFTA) and NAFTA affect stock market returns volatility and how changes in the member countries' bilateral exchange rates relate to each other. It does this by using GARCH models and daily data. The study employed General autoregressive conditional heteroscedaciticity (GARCH) model with findings show that although the CAD/USD exchange rate experienced more volatility, the CUSFTA stabilized the Canadian and US equity markets. In contrast to CUSFTA, NAFTA also lessened the volatility of the CAD/USD exchange rate. This further decreased the volatility of the two stock markets. Also, Mroua and Trabelsi (2020) examine the relationship between exchange rates and stock market indices, both causally and dynamically. It makes an effort to determine how the US dollar affects the main stock market indices of the BRICS (Brazil, Russia, India, China, and South Africa) countries both short- and long-term. Using Panel GMM and ARDL model, findings demonstrate that fluctuations in exchange rates have a major impact on both the historical and present volatility of the BRICS stock indices. Additionally, ARDL estimates show that changes in exchange rates have a major impact on the short- and long-term stock market indices for each of the BRICS nations.

Meanwhile, Manasseh et al. (2019) used monthly data from January 2000 to October 2014 in Nigeria to investigate the interactions between stock prices (SP) and exchange rates (ER) using a multivariate VAR-GARCH model. The findings of the co-integration tests by Engle, Granger, and Johansen demonstrate that SP and ER have a stable, long-term relationship. The VAR-GARCH model's empirical evidence demonstrates a significant mean spillover from the stock market to the exchange market, but not from the exchange market to the stock market.
Lakshmanasamy (2022) examines the impact of exchange rate volatility on stock market return volatility from India's perspective for the months of January 2010 to December 2015 using Generalised Autoregressive Conditional Heteroskedasticity Model. The BSE SENSEX return volatility is predicted to be significantly positively impacted by the volatility of the Euro/Rupee exchange rate, whereas the volatility of the US dollar/Rupee and British pound/Rupee exchange rates is negligibly negatively impacted.

Ribeiro et. al., (2020) re-examine the real exchange rate misalignment and growth in some developing economies. The study employed the dynamic panel data technique to empirically test the relationship between undervaluation of currency on growth. Although, several studies concluded a positive impact of real exchange rate misalignment on growth, however, their study revealed a negative impact.

3. METHODOLOGY

3.1 Theoretical Framework

The theoretical framework of this study is based on the Mundell-Flemming (1962) model. The model provides a framework for analysing monetary and fiscal policy in a small open economy that operates both in goods markets and financial assets. It extends the IS-LM model to include international transactions and capital mobility. The IS-LM model shows the relationship between the goods market and the money market. Suppose the output from both the product market and money market are a function of balance of payments (BoP), foreign direct investment (FDI), real interest rate (iR), stock market returns (StockR) and real effective exchange rate (EXr). Therefore, stating this functional relationship form becomes:

$$Y = f(BoP, FDI, iR, \text{StockR}EXr) \quad (3.1)$$

3.2 Data and Sources

This study is based on selected ten (10) SSA countries, they are; Nigeria, Ghana, Cameroon, Coted'Ivoire, South Africa, Botswana, Mauritius, Namibia, Zambia and Kenya. The justification of these countries is based on Gross National Income (GNI) per capita grouping, sub regional block in the region, couple with proven history of different macroeconomic reforms in money and capital markets. This study employs secondary data from 2003 to 2023, and sourced the data from the World Bank development index (WDI) database (2024).

3.3 Estimation Techniques

3.3.1 Panel stationary tests

The study employs panel unit root test of Levin, lin and chu (LLC), Im, Pesaran and Shin (IPS), AD- fisher Chi square and Philips Peron Fisher Chi square to examine the fundamental requirements for estimating macroeconomic data. The essence of employing different four panel unit tests is to examine the robustness of the data used in this paper. To also avoid spurious result, it is important to test the stationarity of the data used in the estimation process. The Descriptive statistics, unit root test, Johansen Fisher panel co-integration test, Panel Error Components Generalized Least Squares (PEGLS), Grouped Mean Fully Modified Ordinary Least Squares (GMFMOLS), and the Dumitrescu-Hurlin panel Granger causality test (2012) was adopted to investigate the causal relationship that exist between currency devaluation, stock market returns and economic growth. The cointegration test enable the long run relationship among the variables in the study to be examined while the panel error components general least squares give room for flexibility among lag structures and accommodates different dynamics among variables as well as insights to long term relationships among variables. The method also enables the pooling of data across cross sectional units and allows more observations as well as handles correlations among units in the panel data. The PEGLS is more suitable than the traditional estimation technique because it also takes care of heteroskedasticity and autocorrelation issues, therefore, leading to more efficient and unbiased estimates. To check for the robustness of results of the PEGLS, the study employed the econometric technique of Grouped Mean Fully Modified Ordinary Least Squares (GMFMOLS)>

The pairwise Dumitrescu-Hurlin panel Granger causality test (2012) is a modification of the Granger causality test developed in 1988 for analyzing the causal relationship between time series. The test is a statistical test to determine if one time series can be used to predict another. It gives room to examine the cause and effect between two variables in a bivariate form. Several studies have been carried out using the co-integration and Granger causality test for instance, Asiamah (2023) employed the estimation technique to examine the cause and effect between economic growth and financial system in Ghana. Also, Idenyi (2017) explained how Nigeria's economic growth was affected by capital market indicators between 1986 and 2016 within the same estimation technique.

3.3.2 Model Specification

Based on the theoretical framework of the Mundell-Flemming (1962) model, the relationship between currency devaluation, stock market returns and economic growth is captured by a linear model expressed in equation (3) below. Following the work of Anawude and Osakwe (2017), the estimated equation is as follows:

$$RGDP_{it} = \alpha_0 + \beta_1 EXR_{it} + \beta_2 MKCAP_{it} + \beta_3 BOP_{it} + \varepsilon_{it} - - - (3.2)$$

Where $RGDP_{it}$ is the economic growth proxy by real gross domestic product per capital, EXR_{it} is the currency devaluation proxy by exchange rate, $MKCAP_{it}$ is the stock market

returns proxy by stock market capitalization, BOP_{it} is the balance of payment used as control variable while α_0 represents the intercept, β_1- β_3 are the coefficients of the explanatory variables. Lastly, the ε_{it} is the stochastic term.

To estimate for the causal relationship between currency devaluation, stock market returns and economic growth in sub–Saharan Africa, the regression models would be set up as follows: Causality from currency devaluation to economic growth (EXRR ⟷ GDP) and economic growth to currency devaluation (RGDP ⟷ EXR)

$$EG_{i,t} = \alpha_0 + \sum_{j=1}^{K} \beta_j EXR_{i,t-j} + \sum_{j=1}^{K} \gamma_j RGDP_{i,t-j} + \varepsilon_{i,t} - - - (3.3)$$

$$CD_{i,t} = \alpha_0 + \sum_{j=1}^{K} \beta_j RGDP_{i,t-j} + \sum_{j=1}^{K} \gamma_j EXR_{i,t-j} + \varepsilon_{i,t} - - - (3.4)$$

Causality from stock market returns to economic growth (MKCAP ⟷ RGDP) and economic growth to stock market (RGDP ⟷ MKCAP)

$$EG_{i,t} = \alpha_0 + \sum_{j=1}^{K} \beta_j MKCAP_{i,t-j} + \sum_{j=1}^{K} \gamma_j RGDP_{i,t-j} + \varepsilon_{i,t} - - - (3.5)$$

$$StockR_{i,t} = \alpha_0 + \sum_{j=1}^{K} \beta_j RGDP_{i,t-j} + \sum_{j=1}^{K} \gamma_j MKCAP_{i,t-j} + \varepsilon_{i,t} - -(3.6)$$

Causality from currency devaluation to stock market returns (EXR ⟷ MKCAP) and stock market returns to currency devaluation (MKCAP ⟷ EXR)

$$StockR_{i,t} = \alpha_0 + \sum_{j=1}^{K} \beta_j EXR_{i,t-j} + \sum_{j=1}^{K} \gamma_j MKCAP_{i,t-j} + \varepsilon_{i,t} - - -(3.7)$$

$$CD_{it} = \alpha_0 + \sum_{j=1}^{K} \beta_j MKCAP_{it-j} + \sum_{j=1}^{K} \gamma_j EXR_{it-j} + \epsilon_{it} - - - (3.8)$$

4. RESULTS AND DISCUSSION OF FINDINGS

4.1 Panel unit root test

Considering the dynamism nature of macroeconomic variables, it is important to examine the stationarity status of the time series variables used in this study in order to avoid spurious results in the regression. The stationarity test is an econometric technique that examines if the mean and variance vary over time. This is a test to ascertain whether a time series mean, variance, and covariance are time-independent.

Table 1 shows the results of panel unit root at both level and first difference. At 5 percent significant level, INTR results indicate stationary at level across the four panel unit root tests with p-values below 0.05. In other tests, the reverse is the case, this suggests non-stationary of the variables at levels, hence the research accept the null hypothesis of non-stationary at levels and reject the alternate hypothesis that all variables are stationary at levels, hence, the study accept that unit root exists at levels. Following the initial difference, all four variables exhibit extremely significant p-values (0.000) across tests, suggesting they become stable. As a result, each variable is integrated of order one, or I(1), which means that after one differencing, they become stationary.

Table 1: Panel unit root test results

Variables	Levin, Lin & Chut Statistics (prob)*	Im,Pesaran and Shin W-stat Statistics (prob)*	ADF-Fisher Chi-square Statistics (prob)*	PP-Fisher Chi-square Statistics (prob)*	Conclusions
Panel unit root test results at level					
RGDP	-1.1346(0.1283)	0.94618(0.8280)	16.6978(0.6725)	27.6543(0.1176)	I(0)
EXR	0.29247(0.6150)	2.15727(0.9845)	13.7099(0.8449)	18.0025(0.5859)	I(0)
BOP	-2.00810(0.0223)	-1.30250(0.0964)	30.3934(0.0637)	18.8909(0.5289)	I(0)
MKCAP	0.36940(0.3559)	-0.28370(0.3883)	22.8980(0.2938)	41.6136(0.0031)*	I(0)
INTR	-2.29118(0.0110)*	-2.28462(0.0112)*	35.4972(0.0176)*	37.6298(0.0098)*	I(0)
FDI	1.08540(0.5611)	-1.23366(0.8913)	16.8166(0.6648)	62.8693(0.0000)*	I(0)

Panel unit root test results at first difference					
RGDP	-8.87584(0.0000)*	-8.09199(0.0000)*	98.6587(0.0000)*	197.386(0.0000)*	I(1)
EXR	-4.85292(0.0000)*	-4.87683(0.0000)*	62.7376(0.0000)*	96.8270(0.0000)*	I(1)
BOP	-8.35863(0.0000)*	-6.37889(0.0000)*	75.1219(0.0000)*	105.494(0.0000)*	I(1)
MKCAP	-4.31601(0.0000)*	-4.42740(0.0000)*	57.5420(0.0000)*	131.930(0.0000)*	I(1)
INTR	3.90818(0.0000)*	-6.45464(0.0000)*	75.4626(0.0000)*	206.373(0.0000)*	I(1)
FDI	-2.24260(0.0125)*	-5.13163(0.0000)*	65.2919(0.0000)*	160.119(0.0000)*	I(1)

Note: The asterisk values in bracket are the probabilities values at 5% significant level
Source: Authors' computation using data from World Bank (2024)

4.2 Cross-sectional dependence test

The results in Table 2 depicts that there is cross-sectional dependence within the variables employed for this study. Hence, the study rejects the null hypothesis of no cross dependencies among variables and accept the alternate hypothesis of cross dependence among the variables employed in this study. To correct the cross-sectional dependence in data, the best approach is to employ the econometric technique of Panel Error Components General Least Squares (PEGLS). This is evidence in the study by Aninwike et al. (2024).

Table 2: Cross section dependence test results

Variables	Breusch-pagan LM Prob(Statistics)	Pesaran scaled LM Prob(Statistics)	Bias corrected scale LM Prob(Statistics)	Pesaran CD Prob(Statistics)
RGDP	0.000*(672.128)	0.000*(66.105)	0.000*(65.855)	0.000*(25.705)
EXR	0.000*(706.001)	0.000*(69.675)	0.000*(69.425)	0.000*(26.369)
BOP	0.000*(166.589)	0.000*12.816)	0.000*(12.566)	0.000*(5.276)
MKCAP	0.000*(243.893)	0.000*(20.965)	0.000*(20.715)	0.000*(13.195)
INTR	0.002*(86.287)	0.000*(4.352)	0.000*(4.102)	0.000*(4.559)
FDI	0.000*(101.172)	0.000*(5.921)	0.000**(5.671)	0.032*(2.947)

Note: The asterisk values in bracket are the probabilities values at 5% significant level
Source: Authors' computation using data from World Bank (2024)

4.3 Johansen Fisher panel cointegration test

From the results in Table 3, there is a co-integration relationship among variables employed in this study. When there are no co-integrated equations, the null hypothesis is rejected with a p-value of less than 0.05, while at most 1 co-integration relationship, the findings of probability value greater than 0.05 depicts that there may be just a few additional long-term linkages beyond the initial one, without providing substantial evidence. Whereas, in at most 2 to 5 co-integration associations, there are many more long-term associations, as indicated by the evidence for these hypotheses presented in the table at p-values < 0.05. From this panel co-integration approach, there are evidences of a long-term equilibrium relationship among BOP, MKCAP, EXR, INTR, FDI and RGDP.

Table 3: Johansen fisher panel co-integration test results

Hypothesized No of CE(s)	Fisher Stat* (from trace test)	Prob.	Fisher Stat* (from max-eigen test)	Prob.
None	605.3	0.000*	338.0	0.000*
At most 1	313.8	0.000*	212.1	0.000*
At most 2	174.7	0.000*	138.4	0.000*
At most 3	80.15	0.000*	52.80	0.000*
At most 4	48.81	0.003*	41.16	0.003*
At most 5	38.35	0.008*	38.35	0.008*

Notes: That probabilities are computed using asymptotic Chi-square distribution. The asterisk values in bracket are the probabilities values at 5% significant level

Source: Authors' computation using data from World Bank (2024)

4.3 Panel Error Components General Least Squares (PEGLS)

The panel error component generalises least squares results in Table 4.1, reveal a robust positive and statistically significant correlation between EXR (exchange rate) and RGDP as evidenced by a coefficient of 0.209 and a t-statistic of 0.213. The coefficient value of 0.209 implies that a 1% increase in exchange rate increases economic growth by 0.209%. This implies that all economic activities that promote favourable exchange rate should be encouraged by the governments of SSA region. In reality, export-based activity that increase foreign exchange earnings should further enhanced. The result is in line with the previous work by Koroma and Squire (2023). In the same manner, the balance of payments (BOP) exhibits a positive and significant correlation with real gross domestic product (RGDP) as evidenced by a coefficient of 0.545 and a t-statistic of 11.356. The result implies that a 1% increase in the balance of payments increases economic growth by 0.545%. This is possible when a country achieves a favourable balance of payment surplus through friendly international trade and openness. The coefficient for MKCAP is 0.168, accompanied by a t-statistic of 21.199. The result implies that a 1% increase in total market capitalisation increases economic growth by 0.168%. This is not impossible because a high rate of return on investment from the capital market could be used for business expansion and hence promote economic growth. This result is in variation with the previous work by Shobande (2017) who revealed that stock market capitalisation retard economic growth. Also, interest rates (INTR) exhibit a positive yet statistically insignificant correlation with RGDP, and foreign direct investment (FDI) exhibits a negative albeit statistically insignificant correlation with RGDP, indicated by a coefficient of -0.010 and a t-statistic of -1.573.

The model demonstrates a strong fit, evidenced by an R-squared value of 0.8177, indicating that roughly 81.77% of the variation in RGDP is accounted for by the independent variables in the model. This result gives an estimating equation for the PEGLS model employed as follows:

$$RGDP = 0.209EXR + 0.545BOP + 0.168MKCAP + 0.189INTR - 0.016FDI$$

The equation indicates a linear regression model that estimates Real Gross Domestic Product (RGDP) based on various independent variables.

Table 4.1: Panel Error Components General Least Squares (PEGLS) results

Variable	Coefficient	Std error	t-statistic	Probability
EXR	0.209	0.977	0.213	0.000*
BOP	0.545	0.048	11.356	0.000*
MKCAP	0.168	0.007	21.199	0.000*
INTR	0.189	0.116	1.628	0.104
FDI	-0.016	0.010	-1.573	0.117
C	2.52E+09	1.61E+08	15.61902	0.0000
R-Squared		0.817		
Adjusted R squared		0.813		
Standard error of regression		0.969		
Sum of squared residuals		189.085		
Log likelihood		-4994.774		
F- Statistic		180.265		
Prob (F- Statistic)		0.000		
Mean dependent var		1.459		
S.D dependent var		3.1896		
Akaike Info Criterion		48.316		
Schwarz Criterion		48.413		
Hannan-Quinn Criterion		48.355		
Durbin- Watson statistic		1.377		

Note: The asterisk values in bracket are the probabilities values at 5% significant level

Source: Authors' computation using data from World Bank (2024)

4.3.1 Robustness check

For the purpose of robustness check on the relationship between currency devaluation, stock market returns and economic growth in the selected SSA countries, the study employed the grouped mean fully modified ordinary least squares (GM-FMOLS). The estimation test also cater for issues of cross section dependence and heteroskedasticity that may be present among the variables used in the study. Results in Table 4.2 confirm that at 5% statistically significant level, exchange rate, balance of payment, market capitalization, and interest rates are positive and significant in promoting economic growth of SSA region. The results are similar to the results of the Panel Error Components General Least Squares obtained earlier. Hence, the PEGLS results is confirmed to be robust for the analysis of currency devaluation, stock market returns and economic growth data used in the SSA region.

Table 4.2 shows the result of grouped mean fully modified ordinary least squares

Variable	Coefficient	Std error	t-statistic	Probability
EXR	0.021	0.032	0.656	0.000*
BOP	-3.829	0.045	-85.088	0.000*
MKCAP	0.214	0.048	4.464	0.000*
INTR	5.51E+08	0.068	0.008	0.000*
FDI	-1.880	0.041	-45.569	0.000*
R-Squared		0.954205		
Adjusted R squared		0.950683		
Standard error of regression		3.23E+10		
Long run variance		6.54E+20		
Mean dependent variance		1.01E+11		
S.D dependent variance		1.46+11		
Sum square of residual		1.90E+11		

Note: The asterisk values in bracket are the probabilities values at 5% significant level
Source: Authors' computation using data from World Bank (2024)

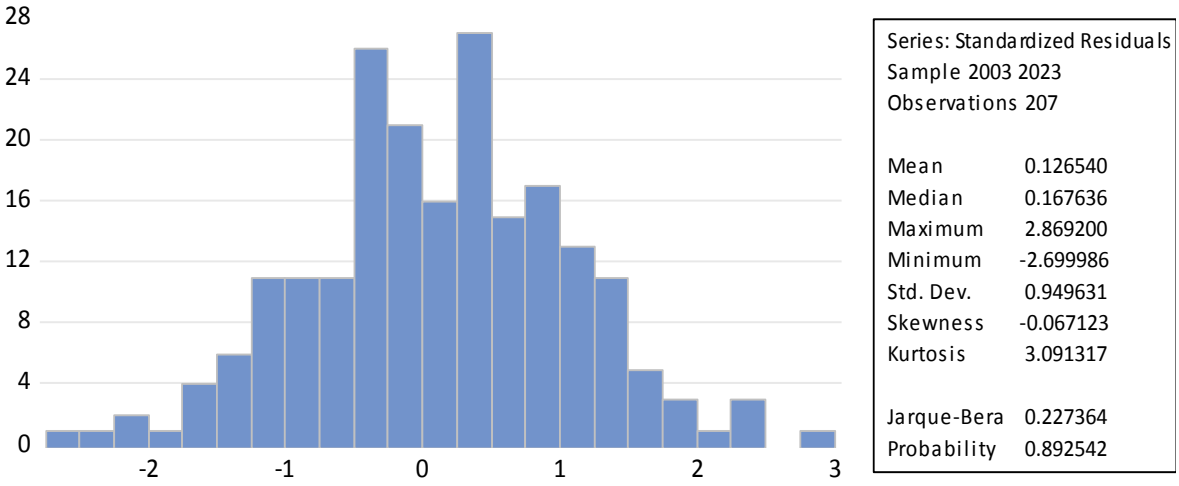
4.4 Diagnostic Test Results

The study employed Panel Error Components General Least Squares, and Grouped Mean Fully Modified Ordinary Least Squares for robustness check. For the purpose of diagnostic check, the study used Breusch-pagan LM test to determine whether there is issue of heteroskedasticity in the study. Also, both Pesaran scaled LM and Pesaran CD were used to check for cross-section dependence. The PEGLS allows for more unbiased estimates by accounting for serial correlation in the error terms, resulting in more accurate and reliable findings. Hence, the study further tested whether the data used are normally distributed. Table 4.4.1 shows the results of the Breusch-pagan LM, Pesaran scaled LM and Pesaran CD. At 5% statistically significant level, the results show that the PEGLS model does not contain heteroskedasticity and cross-section dependence issues. Also, the result of the normal distribution is presented in Figure 1. Since the probabilities values are greater than 5%, the study rejects the null hypothesis that the data used is not normally distributed. Hence, it is concluded that the data used in the study is normally distributed. Therefore, it is concluded that the PEGLS model is fit, efficient and unbiased.

Table 4.4.1 Diagnostic test *results*

Test	Statistic	d.f	Prob.
Breusch-pagan LM	35.78502	45	0.8353
Pesaran scaled LM	-0.971344		0.3314
Pesaran CD	0.341110		0.7330

Figure 1 Histogram normality test



4.5 Dumitrescu Hurlin Pairwise Panel Causality Test Results

The Pairwise Dumitrescu Hurlin Panel causality test results in Table 5 investigate the relationships between exchange rate (EXR), real gross domestic product (RGDP), balance of payments (BOP), interest rate (INTR), foreign direct investment (FDI) and total market capitalisation (MKCAP) in a bivariate form. The results indicate one-way relationships in almost all the bivariate relationships. For instance, the RGDP Granger causes the balance of payments (BOP), and not vice versa. The implication of this is that when an economy is growing in terms of international trade, there is a consequence, that is, the balance of payment surplus, which is good for any nation. Similarly, total market capitalisation Granger causes RGDP, and not vice versa. The result implies that a high return on investment in the stock market has the tendency to promote more investment opportunities through business expansion and, in turn, promote economic growth. Also, the RGDP Granger causes FDI, and not vice versa. The implication of this result is that when a country's economy is growing, this can serve as a signal in attracting foreign investors to a host country, and create employment opportunities. Economic stimulation, exchange rate stability, and many more. The result of EXR also show a one-way causality from EXR to INTR, and not vice versa. The result implies that a stable exchange rate may encourage investors to approach the lending institutions for borrowing of funds and thereby promote a favourable interest rate. Lastly, BOP shows a one-way causality to INTR and not vice versa. The result implies that a favourable balance of payment surplus can increase availability of capital in a country and thereby reduce interest rates on loanable capital, hence promoting investment opportunities through borrowing.

Table 5: Pairwise Dumitrescu Hurlin Panel causality test results

Null hypothesis	**W-stat**	**Z-bar stat**	**Probability**
EXR does not homogeneously cause RGDP	3.047	0.817	0.413
RGDP does not homogeneously cause EXR	7.521	5.942	3.E-09

BOP does not homogeneously cause RGDP RGDP does not homogeneously cause BOP	3.943 5.377	1.844 3.487	0.065 0.0005
MKCAP does not homogeneously cause RGDP RGDP does not homogeneously cause MKCAP	5.770 2.255	3.878 -0.100	0.001 0.919
INTR does not homogeneously cause RGDP RGDP does not homogeneously cause INTR	2.428 4.352	0.108 2.313	0.913 0.020
FDI does not homogeneously cause RGDP RGDP does not homogeneously cause FDI	2.146 4.321	-0.214 2.276	0.830 0.022
BOP does not homogeneously cause EXR EXR does not homogeneously cause BOP	3.599 3.606	1.449 1.458	0.147 0.144
MKCAP does not homogeneously cause EXR EXR does not homogeneously cause MKCAP	7.293 1.807	5.604 -0.608	2.E-08 0.543
INTR does not homogeneously cause EXR EXR does not homogeneously cause INTR	2.867 4.161	0.612 2.093	0.540 0.036
FDI does not homogeneously cause EXR EXR does not homogeneously cause FDI	2.455 2.564	0.139 0.265	0.888 0.790
MCKAP does not homogeneously cause BOP BOP does not homogeneously cause MKCAP	1.304 2.614	-1.177 0.305	0.238 0.760
INTR does not homogeneously cause BOP BOP does not homogeneously cause INTR	1.582 4.600	-0.859 2.597	0.389 0.009

5. CONCLUSION AND POLICY RECOMMENDATIONS

In conclusion, the aim of the study is to empirically study the relationship between currency devaluation, stock market returns and economic growth in Sub-Saharan African countries from 2003 to 2023. The descriptive statistics, unit root test, Johansen Fisher panel co-integration test, Panel Error Components Generalised Least Squares (PEGLS), and the Dumitrescu-Hurlin panel Granger causality test (2012) econometric techniques were employed. The descriptive statistics describe the mean, median, and mode of the macroeconomic data used in this study. The Johansen Fisher co-integration test examined the long-run association among the variables. Also, the Panel Error Components Generalised Least Squares (PEGLS) examined the relationships among the variables, and the Group Mean Fully Modified Ordinary Least Squares (GMFMOLS) was used for a robustness check of the PEGLS estimation results. Lastly, the Dumitrescu-Hurlin Granger causality test was employed to test the causality between the variables. Findings showed that currency devaluation in Sub-Saharan African countries promotes economic growth. Stock market capitalisation is also a good economic growth determinant in the case of SSA countries. In almost all the bivariate relationships between the variables, a one-way causality was revealed. Based on the findings of this current study, it is then recommended that monetary policymakers in the SSA region should continuously provide policy that will encourage currency devaluation, provided export base is increasing and import is decreasing. Also, policymakers in the capital market should provide policies that will aid a good investment atmosphere in the capital market. This is so important because the capital market is a major source of long-term borrowing for both the government and investors. Also, the proceeds from return on investment in the capital market can as well be channeled to other sectors of the economy. This will, overall, boost economic growth in the region. Since a balance of payments promotes economic growth, the government should promote export-orientated policies that are geared toward promoting a balance of payments surplus in the region. Stability of the exchange rate in the region is equally important; therefore, the government should provide policies that promote stability in the foreign exchange market. Since the current research focused on the SSA region, future research may do a comparative study between developing countries and developed countries. Also, the effect of currency devaluation and

stock market returns may be examined in sectors such as telecommunications, agriculture and so on.

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