EVALUATING THE DETERMINANTS OF EXCHANGE RATES IN EMERGING MARKETS: EVIDENCE FROM NIGERIA AND SOUTH AFRICA

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ABSTRACT: *This paper evaluates empirically the determinants of exchange rates in emerging markets, with emphasis on Nigeria and South Africa during the period 2001-2020. By applying the pooled OLS regression method on both panel data and countries as subsamples, the study finds out that under the panel level, inflation rate, government final consumption expenditure and broad money had a negative effect on exchange rate, and that only government final consumption expenditure effect was significant. On the other hand, real interest rate, current account balance, economic health, GDP per capita, gross capital formation, and trade had positive effects on exchange rate, but only the effects of economic health, gross domestic product per capita, and gross capital formation were significant. For Nigeria, inflation rate and GDP per capita had negative non-significant effect on exchange rate, while the economic health had a negative significant effect on exchange rate; consequently, real interest rate, current account balance, gross capital formation, trade, government final consumption expenditure, and broad money had positive non-significant effect on exchange rate. For South Africa, inflation rate, economic health, and gross capital formation had negative non-significant effect on exchange rate, meanwhile government final consumption expenditure and broad money had negative significant effect on exchange rate; in addition, real interest rate, current account balance, and trade had positive non-significant effect on exchange rate, while GDP per capita had positive significant effect on the exchange rate.*

KEYWORDS: Exchange rates, Emerging markets, Pooled OLS regression.

INTRODUCTION

There is no country that grows its economy independently as far as this world is concerned, which means that a country needs to interrelate with others in order to build its economy. However, in this regard, the foreign exchange rate plays a crucial role. The exchange rate of a nation's currency is the value of its money for a foreign trade in finance, goods and services. The central bank of any country as the monetary authority has the discretionary powers to decide on the appropriate foreign exchange policies. Consequently, the price of the foreign currency in terms of local currency plays an essential role in understanding any country's growth (Idris et al., 2019). The requirement of structural transformation in developing nations such as non-oil exports expansion or imports reduction, has stirred controversies on the exchange rates policies. This domestic adjustment has a short-run implication on the prices and demand of goods and services.

When the exchange rate of a country fluctuates, it exerts both negative and positive effects on the economic activities and wellbeing of the people because of its huge involvement in trade and finance (Rajakaruna, 2017). Thus, when the domestic currency of any country appreciates, it causes a fall in the prices of goods and services imported, which implies that fewer units of the domestic currency will be used to pay for any imported goods and services.

This study aims to evaluate the factors affecting the exchange rates in Nigeria and South Africa as emerging markets. We selected nine factors that exert an impact on the exchange rate, namely inflation rate, real interest rate, current account balance, economic health (proxy by unemployment rate), GDP per capita, gross capital formation, trade, government final consumption expenditure, and broad money.

The primary objective of our study is to find out the relationship between inflation rate, real interest rate, current account balance, economic health (proxy by unemployment rate), GDP per capita, gross capital formation, trade, government final consumption expenditure, and broad money with exchange rate.

Our study focused on Nigeria and South Africa emerging markets. We collected data from the World Development Indicator (WDI) and the Central Bank of Nigeria (CBN) Statistical Bulletin. To ascertain the effects of these variables on exchange rate, we applied pooled OLS regression techniques. Our study captured the effects of these variables on exchange for panel data and for the countries involved. This present study was able to show empirically that the effects of these predictor variables on exchange rate were different in Nigeria and in South Africa.

The present study will add to already established literature on the determinants of exchange rates. Second, our study will have a lot of consequences on policy implications such as in monetary policy, fiscal policy, unemployment policy, job policy, trade and exchange rate, and supply-side policy.

The rest of this paper is organised into four sections. The literature review and hypothesis testing are discussed in section 2, the empirical model is discussed in section 3, the data analysis and findings are presented in section 4, and section 5 highlighted the conclusion, limitations, and future directions.

LITERATURE REVIEW AND HYPOTHESES TESTING

Inflation Rate and Exchange Rate Relationship

Inflation is the persistent rise in prices of goods and services. High inflation lowers the purchasing power of people towards purchasing goods and services. A change in exchange rates will affect product costs as there will be a change in the prices of imported goods (Sanam & Fetullah, 2017), for example, if the exchange of goods and services in the international market are made in a high proportion of currency, where there is an appreciation in value of Dollars for instance, and a depreciation in the value of Naira, the prices of the imported goods will reflect on the goods and services in the domestic market, thereby leading to high prices. Fluctuation in exchange rate is one of the major drivers of inflation because it could exert a significant implication on monetary policy formulation (Dornbuch, 1976; Fischer, 2015; Forbes, 2015; Mishkin, 2008). Some of the studies that examined the effect of inflation on exchange rate can be seen in Purnomo (2017) who examined the effect of inflation on the currency exchange rate in Indonesia, using annual data collected from the Bank of Indonesia for the period 2012-2016. The qualitative and quantitative methods were employed for the analysis, the result of this research showed that the effect of inflation on the exchange rate in Indonesia has reduced. Okoli et al. (2016) investigated the impact of inflation on real exchange rate volatility in Nigeria, using quarterly data from 1970Q1 to 2014Q4. They applied the technique of granger causality in a vector autoregressive environment. The result of their finding shows that there is a negative association between inflation rate and exchange rate. This study tends to examine the following hypothesis

H0: Inflation Rate has a positive effect on the exchange rate

2Real Interest Rate and Exchange Rate Relationship

Exchange rate is an essential component that is used in the transmission mechanism, and also in reflecting cross country differences in interest rates via uncovered interest rate parity (Taylor, 2001). The debate of whether to consider exchange rate movements in an open economy has been on a rise (Adam et al., 2020), and many studies have been conducted to understand the association between interest rate and exchange. For instance, Shodipe (2018) examined the impact of real interest rate on real exchange rate in Japan using annual data from 1971 to 2015, by adopting the two stage least square econometric techniques. The results of this study showed that there is a positive relationship between real interest rate and exchange rate. Abbas et al. (2012) examined the relationship between GDP, inflation and real interest rate with exchange rate fluctuations of African countries using regression analysis. The results of this study showed that there is a non-significant effect of interest rate on the exchange rate. Consequently, MacDonald and Nagayasu (2000) investigated the long-run association between real exchange rate and real interest rate differential, using cointegration analysis and OLS panel analysis. The findings of this study showed that there is a very weak association between real exchange rate and real interest rate differential. This study tends to examine the following hypothesis

H0: Real interest rate has a positive effect on the exchange rate

Current Account Balance and Exchange Rate Relationship

Current account plays a very crucial role towards long-term economic growth because of the usefulness of trade as a major source of foreign exchange earnings. Thus, current account balance is an indicator used in determining the state of the economy. Current account balance reflects a country's performance in foreign trade in goods and services and could be in surplus or deficit (Sanni et al., 2019). If the current account balance of a country is in surplus, more goods and services are exported than they are being imported; this will indicate that the prices of the imported goods and services will reduce, and hence the country's currency will appreciate. Sanni et al. (2019) examined the relationship between current account balance, real exchange rate and economic growth in Nigeria using annual data for the period 1970-2016. By applying the techniques of autoregressive distributed lag bounds, the results of the study showed that there is a negative relationship between the real exchange rate and current account balance. This study examines the following hypothesis:

H0: Current account balance has a positive effect on the exchange rate

Unemployment Rate and Exchange Rate Relationship

Unemployment rate is one of the major challenges developing nations are facing, especially Nigeria. However, there is a link between labour market and economic market (Azvaji & Asgari, 2005), and thus many studies argued that this link depends on the characteristics of the labour market (Horst, 2011). Many researches have been carried out in order to ascertain the link between exchange rate and unemployment rate. For instance, the study on the relationship between unemployment rate and exchange rate can be seen in Atya (2017), Chang (2011), Chinmanani et al. (2012), and Nyahokwe and Ncwadi (2013). This study examines the following hypothesis:

H0: Economic health has a positive effect on the exchange rate

Gross Domestic Product Per Capita and Exchange Rate Relationship

GDP per capita is a metric used in determining a country's economic output per resident, and it is used to evaluate a country's standard of living. A country that engages more on production and exporting goods and services, in turn to increase in their GDP per capita. The connection between GDP per capita and the exchange rate can be seen in the following studies. Cottani et al. (1990) investigated the relationship between real exchange rate and GDP per capita, the results of their study showed that there was an inverse relationship between GDP per capita and the real exchange rate. In another study, Dollar (1992) after controlling the impact of variability in the exchange rate and investment level, his results showed that there exists a negative relationship between GDP per capita and the exchange rate fluctuation. This study examines the following hypothesis:

H0: GDP per capita has a positive effect on the exchange rate

Gross capital formation and exchange rate relationship

AC-Ogbonna and Osude (2022) examined the relationship between exchange rate volatility and the gross fixed capital formation in Nigeria, using annual data for the period 1980-2018 from the Central Bank of Nigeria (CBN) Statistical Bulletin and the World Development

Indicator (WDI). By applying the vector error correction techniques, and by controlling some variables, their findings showed that exchange rate has a negative significant relationship with the gross fixed capital formation. In the study carried out by Uzoma and Chukwuma-Ogbonna (2021), using the Johansen cointegration techniques, their finding showed that there exists a stable long run relationship between gross fixed capital formation with other variables and exchange rate. In addition, by applying the OLS regression techniques and controlling other variables, their finding showed that there is a negative insignificant relationship between exchange rate and gross capital formation. This study examines the following hypothesis:

H0: Gross capital formation has a positive effect on the exchange rate

Trade and Exchange Rate Relationship

The relationship between trade and exchange rate depends on the prevalence of small firms and the extent of economic integration across nations. Auboin and Ruta (2013) examined the relationship between exchange rates and trade, and their findings showed that exchange rate and trade have negative relationships. Giovanni (1998) analysed the relationship between exchange rate and international trade, using gravity model and panel data from Western Europe for a period of twenty (20) years (1975-1994). The finding of this study revealed that exchange rate uncertainty has a negative significant association with international trade after controlling for the simultaneity bias. This study examines the following hypothesis:

H0: Trade has a positive effect on the exchange rate

Government Final Consumption Expenditure and Exchange Rate Relationship

Government consumption expenditure is the value of goods and services used by different agencies, departments and institutions of government, in order to make available goods and services to the people (Cavallo, 2005). Neoclassical economists posit that government consumption expenditure on goods and services affect both the output and investment. Moritz and Armando (2021) examined the relationship between government spending and exchange rate in Mexico for the period 1990-2018, using the techniques of autoregressive distributed lag (ADL). Their finding showed that a rise in government consumption leads to a marginal depreciation in the nominal exchange rate. Miyamoto et al. (2016) examined the effects of government spending on real exchange rates, with interest on the military spending for 125 countries for the period 1989-2013. They applied the techniques of panel regression to analyse their data. Their findings revealed that under developing countries' perspective, a rise in government consumption spending leads to appreciation in real exchange rate, while under advanced countries' perspective, rise in government spending leads to depreciation in real exchange rate. Giorgio et al. (2018), in their own study, examined the effect of government spending on exchange rate in a two-country model with productive government purchases and non-Ricardian households. The results of this study showed that the exchange rate will depreciate in the medium run. This study examines the following hypothesis:

H0: Government final consumption expenditure has a positive effect on the exchange rate

Broad Money and Exchange Rate Relationship

Keynes explained theoretically that a rise in money supply will lead to a fall in interest rate, investment rate and exchange rate (Antwi et al., 2020). The study of Eichengreen (2004) and Muchiri (2017) showed that money supply has a strong positive significant impact on the exchange rate. Antwi et al. (2020) examined the effect of macroeconomic variables on exchange rate in Ghana using a multivariate modelling technique of the vector autoregressive for the period 2000-2019. The finding of their study showed that money supply does not granger cause exchange rate, but instead affects exchange rate directly. This study examines the following hypothesis:

H0: Broad money has a positive effect on the exchange rate

MATERIALS AND METHODS

Materials

The data used in this study are annual data extracted from the World Development Indicator (WDI), International Monetary Fund (IMF) and the Central Bank of Nigeria (CBN) Statistical Bulletin for the period 2001-2020. The data were collected based on Nigeria and South Africa perspectives on equal sample sizes of twenty. We selected ten (10) variables for the study, the dependent variable as foreign exchange rate, and its determinants, the predictor variables are inflation rate, real interest rate, current account balance, economic health proxied by unemployment rate, gross domestic product per capita, gross capital formation, trade, government final consumption expenditure, and broad money.

Methods

We used the techniques of pooled ordinary least square (OLS) panel regression to analyse the effects of the selected determinants on foreign exchange rate. To avoid multicollinearity in the predictor variables, we carefully built four pooled OLS panel regression models, and we tested for normality using the Jarque-Bera normality test. The pooled OLS panel regression model for the analysis of the data is given as

$$
\begin{aligned}
EXCHR_t = \beta_0 &+ \beta_1 INFR_t + \beta_2 RINR_t + \beta_3 CAB_t + \beta_4 ECH_t + \beta_5 GDPPC_t + \beta_6 GCF_t \\
&+ \beta_7 TRADE_t + \beta_8 GFCE_t + \beta_9 BM_t \\
&+ \varepsilon_t
\end{aligned} \tag{1}
$$

where $EXHR_t$ is the foreign exchange rate in year t, $INFR_t, RINR_t, CAB_t, ECH_t, GDPPC_t, GCF_t, TRADE_t, GFCE_t,$ and BM_t are the predictor variables of the models that show the effect of foreign exchange rate at time t.

Description of the Variables

Table 1 shows the different variables, that is, the dependent and the predictor variables with their definition and measurements.

Table 1: Variable descriptions and measurements

Variable Type	Variables	Variable name	Definition and measurements
Response (Dependent) variable	EXCHR	Exchange rate	The rate at which a local currency is exchanged to another currency. Measured per $1
Predictor variables	INFR	Inflation rate	The sustained and continuous rise in the general price level of goods and services. Measured in annual percentage (%)
	RINR	Real interest rate	The rate of interest a lender, an investor, or a saver receives after allowing for inflation. Measured in percentage (%)
	CAB	Current account balance	A fraction of the balance of payment that includes all the activities such as capital markets and services. Measured in percent (%) of GDP
	ECH	Economic health proxy by unemployment rate	The percentage of the total labour force that are able, active and willing to work that are unemployed. Measured in percent (%)
	GDPCC	Gross domestic product per capita	The aggregate of gross value added by all the resident manufacturers in the economy plus any product taxes excluded from the valuation of output, divided by mid-year population. Measured in current US$
	GCF	Gross capital formation	It consists of outlays in addition to the fixed assets of the economy and net changes in inventories. Measured in percent (%) of GDP
	TRADE	Trade	The purchase and selling of assets and securities. Measured in percent(%) of GDP
	GFCE	Government final consumption expenditure	The aggregate transaction amount on a country's national income accounts representing the government expenditure on goods and services used for direct satisfaction of individual or group needs. Measured in current US$ billion
	BM	Broad money	An inclusive method of measuring the amount of money in circulation in an economy, which includes narrow money, and assets that can be converted into cash. Measured in percent (%) of GDP

RESULTS AND DISCUSSION

Summary Statistics for Nigeria

In Table 2, the average value of inflation rate, real interest rate, current account balance, economic health proxied by unemployment rate, gross domestic product per capita, gross capital formation, trade, government final consumption expenditure, broad money, and exchange rate is 12.38%, 6.35%, 4.50% of GDP, 5.04%, US$1942, 21.45% of GDP, 35.88% of GDP, US$22.43 billion, 20.57% of GDP, and $0.000625 respectively; and their respective standard deviations are 3.46%, 5.74%, 6.20% of GDP, 2.06%, US$747.66, 5.68% of GDP, 10% of GDP, US$13.19 billion, 5.52% of GDP, and $0.00196. The distribution series for inflation rate, real interest rate, gross domestic product per capita, trade, government final consumption expenditure, broad money, and exchange rate is left tailed and playkurtic. Meanwhile, the distribution series for current account balance, economic health, and gross capital formation is right tailed and playkurtic.

Summary Statistics for South Africa

In Table 2, the average value of inflation rate, real interest rate, current account balance, economic health proxied by unemployment rate, gross domestic product per capita, gross capital formation, trade, government final consumption expenditure, broad money, and exchange rate is 5.19%, 4.33%, -2.63% of GDP, 27.13%, US$6193.05, 17.35% of GDP, 53.63% of GDP, US$59.92 billion, 64.58% of GDP, and US$0.11014 respectively; and their respective standard deviations are 2.37%, 1.50%, 2.05% of GDP, 2.94%, US$1565.42, 2.01% of GDP, 4.96% of GDP, US$19.07 billion, 6.66% of GDP, and US$0.03151. The distribution series for inflation rate, gross domestic product per capita, gross capital formation, government final consumption expenditure, broad money, and exchange rate is left tailed and playkurtic. Meanwhile, the distribution series for real interest rate, current account balance, economic health, and trade is right tailed and playkurtic.

Summary Statistics for the Panel Data

In Table 3, the average value of inflation rate, real interest rate, current account balance, economic health proxied by unemployment rate, gross domestic product per capita, gross capital formation, trade, government final consumption expenditure, broad money, and exchange rate is 8.79%, 5.34%, 0.94% of GDP, 16.08%, US$4067.63, 19.40% of GDP, 44.75% of GDP, US$41.18 billion, 42.58% of GDP, and $0.05819 respectively; and their respective standard deviations are 4.67%, 4.27%, 5.81% of GDP, 11.46%, US$2469.71, 4.69% of GDP, 11.89% of GDP, US$24.95 billion, 23.09% of GDP, and $0.05704. The distribution series for trade is left-tailed and playkurtic. Meanwhile, the distribution series for inflation rate, real interest rate, current account balance, economic health, gross domestic product per capita, gross capital formation, government final consumption expenditure, broad money, and exchange rate are right tailed and playkurtic.

In Table 3, the p-values of the Jarque-Bera test for normality for the panel variables are all greater than 0.05, i.e., ($p > 0.05$), indicating that the variables are normally distributed.

Table 2: Descriptive statistics for country level

		Nigeria					
	Obs.	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
INFR	20	5.39	18.87	12.3835	3.46407	-0.040	-0.255
RINR	20	-5.6	18.2	6.350	5.7403	-0.176	0.234
CAB	20	-3.7	20.8	4.495	6.2029	1.153	1.398
ECH	20	3.70	9.71	5.0400	2.06303	1.375	0.178
GDPPC	20	577	3201	1942.20	747.661	-0.391	-0.558
GCF	20	15	31	21.45	5.680	0.202	-1.575
TRADE	20	16.35	53.28	35.8820	10.00081	-0.194	-0.467
GFCE	20	1.00	38.18	22.4299	13.19074	-0.471	-1.188
BM	20	11.3	27.4	20.570	5.5153	-0.723	-1.131
EXCHR	20	0.00279	0.00900	0.0062475	0.00196003	-0.604	-0.936
		South Africa					
INFR	20	-0.69	10.07	5.1905	2.36954	-0.190	1.631
RINR	20	1.9	8.0	4.330	1.5027	0.700	0.491
CAB	20	-5.3	2.0	-2.625	2.0537	0.663	-0.059
ECH	20	22.41	33.29	27.1250	2.93787	0.511	-0.385
GDPPC	20	2708	8737	6193.05	1565.416	-0.841	0.828
GCF	20	12	21	17.35	2.007	-0.797	1.413
TRADE	20	45.64	65.97	53.6255	4.95569	0.419	0.741
GFCE	20	21.66	83.37	59.9210	19.06973	-0.740	-0.444
BM	20	51.4	74.1	64.580	6.6642	-0.862	-0.122
EXCHR	20	0.06075	0.15723	0.1101410	0.03150597	-0.108	-1.392

Table 3: Descriptive statistics for the panel data

	Obs.	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis	Jarque-Bera	P-value
INFR	40	-0.69	18.87	8.7870	4.67417	0.327	-0.633	1.0635	0.5876
RINR	40	-5.6	18.2	5.340	4.2661	0.430	2.051	0.4310	0.8061
CAB	40	-5.3	20.8	0.935	5.8136	1.615	2.927	5.9090	0.2366
ECH	40	3.70	33.29	16.0825	11.46044	0.057	-1.895	5.8396	0.0539
GDPPC	40	577	8737	4067.63	2469.705	0.307	-1.399	3.7383	0.1543
GCF	40	12	31	19.40	4.689	1.000	0.069	0.4680	0.7914
TRADE	40	16.35	65.97	44.7538	11.89187	-0.652	-0.291	1.9175	0.3834
GFCE	40	1.00	83.37	41.1754	24.94672	0.168	-1.088	4.8977	0.0864
BM	40	11.3	74.1	42.575	23.0888	0.024	-1.832	6.1649	0.0559
EXCHR	40	0.00279	0.15723	0.0581942	0.05703609	0.417	-1.507	4.6841	0.0960

Note: For Jarque-Bera test, the null hypothesis states that the data series is normally distributed; $p > 0.05$ indicates that the series is normal at 5% level of significance.

Correlation Analysis

Table 4 presents the results of the correlation matrix. The results show that there is a strong positive association ($r = 0.800$) between the exchange rate and gross domestic product per capita, and a strong negative association ($r = -0.804$) between exchange rate and government final consumption expenditure. Furthermore, there is a strong negative association ($r = -0.813$) between broad money and economic health, and strong negative association ($r = -0.676$) between government final consumption expenditure and gross domestic product per capita, indicating the presence of multicollinearity in the predictor variables.

Table 4: Correlation analysis for the panel data

	EXCHR	INFR	RINR	CAB	ECH	GDPPC	GCF	TRADE	GFCE	BM
EXCHR	1.000									
INFR	-0.289	1.000								
RINR	0.171	0.180	1.000							
CAB	0.023	0.089	0.502	1.000						
ECH	0.476	0.479	0.339	0.122	1.000					
GDPPC	0.800	0.288	0.158	0.050	0.196	1.000				
GCF	0.010	-0.196	0.223	0.132	0.061	-0.281	1.000			
TRADE	0.108	0.087	0.008	-0.173	0.111	0.022	-0.314	1.000		
GFCE	-0.804	0.101	0.083	0.072	0.371	-0.676	0.313	0.063	1.000	
BM	-0.082	-0.347	-0.174	0.123	-0.813	-0.488	0.176	-0.352	-0.166	1.000

Main Findings for the Panel Data

Table 5 presents the empirical findings of the pooled OLS regression model for the panel data. In Table 5, we carefully developed these four (4) pooled regression models in order to resolve the effect of multicollinearity on the predictor variables, and also to avoid omission bias. Model 1 contains six (6) predictor variables (INFR, RINR, ECH, GDPPC, GCF, and TRADE); model 2 contains six (6) predictor variables (INFR, RINR, CAB, ECH, GDPPC, and GCF); model 3 contains six (6) predictor variables (INFR, CAB, ECH, GDPPC, GCF, and TRADE); and model 4 contains five (5) predictor variables (INFR, GCF, TRADE, GFCE, and BM).

There is a consistency in the empirical results of the pooled panel regression model developed. However, the findings show that inflation rate, government final consumption expenditure, and broad money have a negative effect on the foreign exchange rate, but only the effect of government final consumption expenditure is significant. Consequently, real interest rate, current account balance, economic health proxied by unemployment rate, gross domestic product per capita, gross capital formation, and trade have positive effects on the foreign exchange rates, but only the effects of economic health, gross domestic product per capita, and gross capital formation are significant.

Furthermore, the R-squares of the four pooled OLS regression models lie within the range 0.8 to 1.0, i.e., model 1 ($F = 31.851, R^2 = 0.853$), model 2 ($F = 32.084, R^2 = 0.854$), model 3 ($F = 31.474, R^2 = 0.851$), and model 4 ($F = 40.607, R^2 = 0.835$), indicating a good fit to the data.

Main Findings for Country Level (Nigeria and South Africa)

Table 6 presents the empirical findings of the pooled OLS regression model for the countries (Nigeria and South Africa). Under the Nigeria perspective, from Table 6, the inflation rate ($t = -0.581, p = 0.574$), gross domestic product per capita ($t = -0.817, p = 0.433$), and economic health proxied by unemployment rate ($t = -4.382, p = 0.001$) has a negative effect on the exchange rate, but only the effect of economic health is significant. Consequently, real interest rate ($t = 0.099, p = 0.923$), current account balance ($t = 1.025, p = 0.330$), gross capital formation ($t = 1.134, p = 0.283$), trade ($t = 0.710, p = 0.494$), government final consumption expenditure ($t = 0.172, p = 0.867$), and broad money ($t = 0.482, p = 0.640$) has a positive but non-significant effect on the exchange rate.

Under the South Africa perspective, from Table 6, the inflation rate ($t = -1.507, p = 0.163$), gross capital formation ($t = -1.146, p = 0.279$), and economic health proxied by unemployment rate ($t = -1.428, p = 0.184$) has negative but non-significant effect on exchange rate, while government final consumption expenditure ($t = -10.673, p = 0.000$) and broad money ($t = -2.717, p = 0.022$) has a negative significant impact on the exchange rate. In addition, real interest rate ($t = 0.984, p = 0.348$), current account balance ($t = 0.492, p = 0.633$), and trade ($t = 0.148, p = 0.885$) has positive but non-significant effect on exchange rate, while gross domestic product per capita ($t = 9.857, p = 0.000$) has a positive significant effect on the exchange rate.

Table 5: Pooled OLS regression model for the panel data

	Model 1	Model 2	Model 3	Model 4
Variable	PEM	PEM	PEM	PEM
INFR	0.302	0.347	0.294	0.254
	(-1.048)	(-0.953)	(-1.067)	(-1.254)
RINR	0.554	0.418		
	(0.598)	(0.820)		
CAB		0.553	0.887	
		(0.600)	(0.144)	
ECH	0.000***	0.000***	0.000***	
	(5.256)	(5.557)	(5.094)	
GDPPC	0.084*	0.042**	0.031**	
	(1.784)	(2.120)	(1.677)	
GCF	0.082*	0.052*	0.051*	0.060*
	(1.792)	(2.019)	(1.674)	(1.435)
TRADE	0.698		0.724	0.882
	(0.391)		(0.356)	(0.549)
GFCE				0.000***
				(-3.878)
BM				0.657
				(-0.448)
Constant	0.113	0.101	0.139	0.178
	(-1.630)	(-1.687)	(-1.517)	(-1.154)
Obs.	40	40	40	40
F-statistic	31.851	32.084	31.474	40.607

| R-Square | 0.853 | 0.854 | 0.851 | 0.857 |
| Adj. R-Square | 0.826 | 0.827 | 0.824 | 0.835 |

Note: t statistic in parentheses; $*** p < 0.01$, $** p < 0.05$, and $* p < 0.1$ means significant at 1%, 5%, and 10% level of significance respectively.

Table 6: Pooled OLS regression based on country level (Nigeria and South Africa)

	Nigeria	South Africa
Variable	PEM	PEM
INFR	0.574	0.163
	(-0.581)	(-1.507)
RINR	0.923	0.348
	(0.099)	(0.984)
CAB	0.330	0.633
	(1.025)	(0.492)
ECH	0.001***	0.184
	(-4.382)	(-1.428)
GDPPC	0.433	0.000***
	(-0.817)	(9.857)
GCF	0.283	0.279
	(1.134)	(-1.146)
TRADE	0.494	0.885
	(0.710)	(0.148)
GFCE	0.867	0.000***
	(0.172)	(-10.673)
BM	0.640	0.022**
	(0.482)	(-2.717)
Constant	0.038**	0.043**
	(2.393)	(2.322)
Obs.	20	20
F-statistic	18.733	44.701
R-square	0.944	0.976
Adj. R-square	0.894	0.954

Note: t statistic in parentheses; $*** p < 0.01$, $** p < 0.05$, and $* p < 0.1$ means significant at 1%, 5%, and 10% level of significance respectively.

CONCLUSION, LIMITATION AND FURTHER DIRECTIONS

The aim of this paper is to evaluate the determinants of exchange rate in Nigeria and South Africa emerging markets during the period 2001-2020. We selected inflation rate, real interest rate, current account balance, economic health proxied by unemployment rate, gross domestic product per capita, gross capital formation, trade, government final consumption expenditure, and broad money as determinants of exchange rate. We used panel pooled OLS regression to estimate the effects of these variables on exchange rate for panel data, and for country levels, that is when Nigeria and South Africa are taken as subsamples. We carefully developed four different pooled OLS regression models to avoid the effect of multicollinearity in the predictor variables in the panel data.

The results of the pooled regression analysis on the panel data showed that inflation rate and broad money have a negative non-significant effect on exchange rate, while government final consumption expenditure has a negative significant effect on exchange rate. Consequently, real interest rate, current account balance, and trade have positive non-significant impact on exchange rate, meanwhile, economic health proxied by unemployment rate, gross domestic product per capita, and gross capital formation have positive significant impact on exchange rate.

The result also found that the effects of these variables on exchange rates are quite different when it comes to country level. For Nigeria, the results of the pooled regression showed that inflation rate and gross domestic product per capita have negative non-significant effect on exchange rate, while the economic health proxied by unemployment rate has a negative significant effect on exchange rate; furthermore, real interest rate, current account balance, gross capital formation, trade, government final consumption expenditure, and broad money have positive but non-significant effect on exchange rate. For South Africa, inflation rate, economic health, and gross capital formation have negative non-significant effect on exchange rate, while government final consumption expenditure and broad money have negative significant effect on exchange rate; in addition, real interest rate, current account balance, and trade have positive non-significant effect on exchange rate, while gross domestic product per capita has positive significant effect on the exchange rate.

This present study has a lot of consequences on policy implications such as in monetary policy, fiscal policy, unemployment policy, job policy, trade and exchange rate, and supply-side policy. Our study also have consequences on investors, academic research, and it will also add to already existing literature on determinants of exchange rate.

This present study no doubt has some limitations that can initiate further studies. First, our sample size is small, so we suggest that future study should focus on larger samples. Second, our study focused only on emerging markets, so future studies should anchor more on emerging markets and frontier markets for better comparison.

REFERENCES

Abbas, Q., Iqbal, J., & Ayaz, L. (2012). Relationship between GDP, inflation and real interest rate with exchange rate fluctuation of African countries. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 2(3), 132-141.

AC-Ogbonna, C., & Osude, D. (2022). Analysis of the effect of exchange rate volatility on gross fixed capital formation in Nigeria. *International Journal of Innovative Research and Advanced Studies (IJIRAS)*, 9(8), 48-55.

Adam, H., Kateryna, M., Oleksandr, S., & Andrii, T. (2020). How does the interest rate influence the exchange rate? *Visnyk of the National Bank of Ukraine*, 250, 4-14.

Antwi, S., Issah, M., Abaogyewaa, P., & Antwi, S. (2020). The effect of macroeconomic variables on exchange rate: Evidence from Ghana. *Cogent Economics and Finance*, 8(1), 1821483.

Atya, E. M. (2017). The effect of real exchange rate on unemployment evidence from Egypt. *Arab Journal of Administration*, 37(4), 251-262.

Auboin, M., & Ruta, M. (2013). The relationship between exchange rates and international trade: A literature review. *World Trade Review*, 12(3), 577-605.

Azvaji, A., & Asgari, M. (2005). Evaluation of the factors affecting employment growth in regional and trade unions and political advice for the Iranian labour market. *Growth and Sustainable Development Research*, 18, 21-50.

Cavallo, M. (2005). Government consumption expenditure and the current. San Francisco: Federal Reserve Bank of San Francisco working paper No. 2005-03.

Chang, S. C. (2011). The interrelationship between exchange rate uncertainty and unemployment for South Korea and Taiwan: Evidence from a vector autoregressive approach. *International Economics*, 125, 65-82.

Chinmanani, H., Bhutto, N. A., Butt, F., Sheikh, S. A., & Devi, W. (2012). The effect of exchange rate on unemployment rate in Asian countries. Proceedings of *2nd International Conference on Business Management.*

Cottani, J. A., Cavallo, D. F., & Khan, M. S. (1990). Real exchange rate behavior and economic performance in LDCs. *Economic Development and Cultural Change*, 39(1), 61-76.

Dollar, D. (1992). Outward-oriented developing economies really do grow more rapidly: Evidence from 95 LDCs, 1976-1985. *Journal of Economic Development and Cultural Change*, 40(3), 523-544.

Dornbusch, R. (1976). Expectations and exchange rate dynamics. *The Journal of Political Economy*, 84(6), 1161-1176.

Elchengreen, B. (2004). Monetary and exchange rate policy in Korea: Assessments and policy issues. Paper prepared for a symposium at the Bank of Korea, Seoul.

Fischer, S. (2015). The transmission of exchange rate changes to output and inflation. Speech at Monetary Policy Implementation and Transmission in the post-crisis period, a Research Conference Sponsored by the Board of Governors of the Federal Reserve System, Washington, DC, November 12.

Forbes, K. (2015). Much Ado about something important: How do exchange rate movements affect inflation? Speech at the Money, Macro and Finance Research Group Annual Conference, Cardiff, U.K., September 11.

Giorgio, G. D., Salvatore, N., & Guide, T. (2018). Government spending and exchange. *International Review of Economics and Finance*, 15, 55-73.

Giovanni, D. A. (1998). Exchange rate fluctuations and trade flows: Evidence from the European Union. *a Working Paper of the International Monetary Fund,* No. 107.

Horst, F. (2011). The unemployment effect of exchange rate volatility in industrial countries. *Economics Letters*, 111(3), 268-271.

Idris, I. M., Ashemi, B. A., & Musa, M. (2019). Relationship between exchange rate and gross domestic product in Nigeria ARDL approach. *Journal of Economics and Development Studies*, 7(3), 66-76.

MacDonald, R., & Nagayasu, J. (2000). The long-run relationship between real exchange rates and real interest rate differentials: A panel study. *IMF Staff Papers*, 47(1), 116-128.

Mishkin, F. (2008). Exchange rate pass-through and monetary policy. Norges Bank Conferences on Monetary Policy, Oslo, Norway, March 7.

Miyamoto, W., Nguyen, T. L., & Sheremirov, V. (2016). The effect of government spending on real exchange rates: Evidence from military spending panel data. 1-14.

Moritz, C., & Armando, S. (2021). Government spending and the exchange rate: Exploring this relationship in Mexico using a cointegrated system of equations. *Rev Dev Econ.* 26, 587-605.

Muchiri, M. (2017). Effect of inflation and interest rates on foreign exchange rates in Kenya [Masters Dissertation]. https://www.coursehero.com/file/32524038/Muchiri-Effect-Of-Inflation.And-Interest-Rates-On-Foreign-Exchange-Rates-In-Kenyapdf/

Nyahokwe, O., & Ncwadi, R. (2013). Impact of exchange rate volatility on unemployment in South Africa. *Mediterranean Journal of Social Sciences*, 4(3), 109-120.

Okoli, T. T., Mbah, S. A., & Agu, O. C. (2016). Exchange rate volatility and inflation: The Nigerian experience. *Journal of Economics and Sustainable Development*, 7(10), 6-15.

Purnomo, A. (2017). The effect of inflation on the currency exchange rate seen in the Islamic finance. *Jurnal Muqtasid*, 8(1), 42-53.

Rajakaruna, H. (2017). An investigation of factors affecting exchange rate fluctuations in Sri Lanka. *Journal of South Asian Studies*, 05(02), 101-115.

Sanam, S. M., & Fetullah, A. (2017). The relationship between exchange rates and inflation: The case of Iran. *European Journal of Sustainable Development*, 6(4), 329-340.

Sanni, G. K., Musa, A. U., & Sani, Z. (2019). Current account balance and economic growth in Nigeria: An empirical investigation. *CBN Economic and Financial Review*, 57(2), 83-106.

Shodipe, T. (2018). The impact of real interest rate on real exchange rate: Empirical evidence from Japan. *2018 Awards for Excellence in Student Research and Creative Activity – Documents.* 5.

Uzoma, C. N., & Chukwuma-Ogbonna, J. (2021). On exports and capital formation in Nigeria. *Asian Journal of Economics, Business and Accounting*, 21(19), 1-10.