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EXCHANGE RATE MOVEMENTS AND THE EXPORT SECTOR: NEW EMPIRICAL EVIDENCE FROM NIGERIA

The impact of exchange rate movements on the export sector in Nigeria is examined in this study through the use of time series data and the classical linear regression model (CLRM) estimation technique. The variables employed in this study are exchange rate, agric. output, manufacturing output, total export earnings, government capital expenditure, foreign direct investment and broad money supply (M2). From the result, it becomes apparent that exchange rate movements play a significant role in the performance of the export sector in Nigeria. More specifically, the findings show that exchange rate, manufacturing output, agric. output, government capital expenditure and foreign direct investment are positively related to export earnings while the broad money supply (M2) is negatively related. It is therefore recommended that the apex bank should keep a close watch on exchange rate developments in order to enhance exchange rate stability, which will in turn contribute to the development of the export sector in Nigeria.

Keywords: exchange rate; movements; export sector; empirical analysis

JEL: F31; O24; F14

The exchange rate is a key macroeconomic variable which performs a dual role which directly links it to the export sector – it serves as a nominal anchor for domestic prices and maintains international competitiveness (Stein, Fernandez, Rosenow and Zuluaga, 2018).

The export sector is rather strategic as it has been directly linked to the growth and development of economies around the world (Chen, and Juvenal, 2016). It is responsible for facilitating the sale of goods and services produced in the home country. This consequently leads to growth through increased revenue generation and foreign exchange earnings. Over the years, many developed nations (such as the so-called 'Asian Tigers') as well as some developing nations, including Nigeria, have adopted the export promotion industrialization strategy and this has gradually elevated the importance of the export sector in their respective economies.

The Nigerian export sector comprises oil and non-oil exports. Nigeria's major exports in the 1960s were agricultural produce, which accounted for over 80% on average. Non-oil exports continued to make up the bulk of exports in the country until the oil boom era during the 1970s. Ever since then, there has been a continuous decline in the percentage contribution of non-oil products to both the GDP and the

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total foreign exchange earnings in the country. Structurally, the sector, which had been dominated largely by crude oil export, remained unaltered for over three decades. For instance, crude oil exports accounted for 93.8%, 98.4%, 95.8% and 96.6% of the total exports in 1979, 1999, 2009 and 2011, respectively (CBN, 2013). Oil exports, as a percentage of the total exports, averaged 96% in the early 1980s, consequently causing a massive decline of non-oil exports to about 4%. The exchange rate movements witnessed as a result of the deregulation did not make the situation any better as non-oil exports further dropped to 3.1% over the span of the 2007-2011 period (CBN, 2013). As a result of this overdependence on oil exports, the Nigerian economy has been negatively impacted by the vagaries of the international crude oil market.

Furthermore, since the export promotion industrialisation strategy proposed by the Structural Adjustment Programme (SAP) policy did not achieve the desired results, the productive base of the economy was neither improved nor restructured. As a result, the pressures that fell upon the export sector increased causing it to be highly dependent on crude oil as a means of foreign exchange earnings.

Although this decline in the productivity of non-oil products in the country could be attributed to factors such as sheer neglect of the productive sectors, dysfunctional macroeconomic policies and mismanagement, recent arguments which have emerged from the literature on the topic opine that exchange rate movements may be a contributing factor to the truncation of the diversification within the Nigerian export sector. Hence, the present study intends to investigate the extent to which exchange rate movements impact the Nigerian export sector. The classical linear regression model (CLRM) is therefore used to estimate the impact of exchange rate movements on the export sector in Nigeria during the period 1981-2015. The findings show that exchange rate movements have significant positive impacts on the export sector, which in turn points to the conclusion that the Nigerian export sector can reap maximum benefits from exchange rate movements.

Literature review

Theoretical literature

1. Export-based theory

The export-based theory is a theory which emphasizes the development of the export sector as a means towards stronger economic performance. One of the most major proponents of the export-based theory was Douglas North who in the 1950s proposed that overall regional growth and ultimately development is a function of the external sales of locally produced goods and services.

The theory opines that the export sector plays the role of a multiplier because without export markets the expansion of an economy proves to be impossible. Thus, the export-based model suggests that every economy is divided into a basic sector and a non-basic sector. According to Cramon and Rovayo (2006), the basic sector

represents the export sector which engages in the sale of goods outside the local area while the non-basic sector is the local sector that mainly serves the local markets and feeds the export sector with goods and services for sale.

2. Theory of the open economy

An open economy is one which permits economic activities between the domestic community and foreigners. This theoretical model places emphasis on the importance of trade facilitated by two basic sectors – the export sector and the import sector.

Here, the interaction between the export sector and the import sector reflects the performance of the external sector. If exports exceed imports, the external sector is said to be 'in surplus', while the opposite is true when imports are greater than exports.

3. Mundell-Fleming model

The Mundell-Fleming model (MFM) was developed in the early 1960s by Mundell (1973) and Fleming (1962) to show the effects of both fiscal and monetary policies on a country's trade balance under a floating exchange rate regime. The most important assumptions of the theory are the existence of an open economy and perfect capital mobility. Some of the basic propositions made by this theory include that capital flows respond to the exchange rate and the domestic interest rate, that exports are exogenously determined, that imports are positively related to income, and that the interest rate is directly related to the monetary policy.

The model asserts that an expansionary monetary policy decreases the interest rate, and consequently, the capital flows out of the economy as such policy discourages investors. This leads to a deficit in the balance of payments which causes the domestic currency to depreciate in value. The reverse holds true in cases when a contractionary monetary policy is implemented under the same conditions of a floating regime with perfect capital mobility.

Essentially, this model explains that macroeconomic adjustment occurs mainly through exchange rate changes. In other words, the brunt of adjustment is borne by exchange rate movements in foreign exchange markets as a way of maintaining the officially determined exchange rate. The central bank permits the exchange rate to move up or down in response to changing economic conditions. Furthermore, the basic assumption of this model is that the domestic rate of interest (r) in a small open economy with perfect capital mobility is equal to the world rate of interest (r^*). Undoubtedly, any change within the domestic economy may alter the domestic rate of interest, but the domestic rate of interest cannot stay out of line with the world rate of interest for long.

Empirical literature

Some empirical studies have been done to analyse the relationship between exchange rate movements and the performance of the macro-economy. For example,

Kai-Wang and Barret (2007) took a new empirical look at the long-standing question of the effect of exchange rate volatility on trade flows by studying the case of Taiwan's exports to the US from 1989 to 1999. The study adopted the multivariate generalised autoregressive conditional heteroskedasticity (GARCH) estimator with corrections for leptokurtic errors. The results showed that the exchange rate had a positive and significant effect on exports in Taiwan. Wong and Tang (2007) corroborated the results of the previous study in their examination of the effects of exchange rate volatility on the export demand for semiconductors in Malaysia. The results, which were estimated using ordinary least squares (OLS), co-integration and the error correction model (ECM), suggested the presence of a unique positive relationship between quantities of exports demanded and real exchange rate variability.

In another study, Yarmukhamedov (2007) explored the trade effects of exchange rate fluctuations in Sweden during the period 1993-2006. While the study employed multiple regression analysis, the exchange rate volatility was measured through the exponential generalised autoregressive conditional heteroskedasticity (EGARCH) model. The results showed that the short term dynamics of the volatility was negatively associated with exports while, the volatility during the previous period exhibited a positive relationship with exports. The results further indicated that none of the parameters were statistically significant. The above results led the author to the conclusion that the relationship between exchange rate and exports was ambiguous.

Berthou (2008) investigated the effects of real exchange rate movements on the bilateral exports of the Organisation for Economic Co-operation and Development (OECD) over the period 1989-2004. The estimation results obtained through the dependent variable estimation method showed that there is a negative relationship between the real exchange rate and exports. Thus, an appreciation of the real exchange rate would result in a depreciation in bilateral exports. However, the author did stress that the effect differs based on the nature of the destination – hence, the elasticity is greater when the importer is an OECD country and it is reduced when the importer is a developing country.

Kandil and Nergiz (2011) assessed the effects of exchange rate fluctuations on disaggregated data comprising 21 exporting sectors in Turkey. The empirical analysis of the study traced the effects through the supply and demand channels using a theoretical model which decomposed the movements in the exchange rate into anticipated and unanticipated components. The results indicated the existence of a negative relationship between exchange rate and export demand. Thus, following the work of Berthou (2008), it was found that exchange rate appreciation leads to a contraction in the volume of export demanded.

Nyahokwe and Ncwadi (2013) further explored the impact of exchange rate volatility on South African exports from 2000 to 2009. The results of the study corroborated those obtained by Yarmukhamedov (2007), while the empirical evidence in the study asserted that the relationship between exchange rate fluctuations and exports is ambiguous. No statistically significant relationship was observed, however,

the researcher found evidence that South Africa's exports were somewhat sensitive to movements in the exchange rate. The study connoted that, depending on the measure of volatility used, exchange rate volatility either did not have a significant impact on South Africa's export flows or it had a positive impact on aggregate goods and services.

In contrast, Yin-Wong and Sengupta (2013) assessed the impact of exchange rate movements on the exports of non-financial sector firms in India. The study used a Baseline Regression Analysis on data for the period 2000-2010. The empirical analysis revealed that on the average, a substantial negative and significant relationship exists between currency appreciation and volatility and the export shares of Indian firms. Nyeadi et al (2014) investigated the impact of exchange rate movements on Ghanaian exports from 1990 to 2012. The OLS method was used for the estimation and it was observed that the exchange rate had a negative and insignificant impact on the exports of goods and services in India.

Genc and Oskan (2014) carried out a more innovative study in an attempt to give a systematic explanation for the effects of exchange rates on the exports and imports of emerging countries. The study deviated from previous studies by attempting to explain the long and short term relationships between the variables of study. The panel co-integration method was applied to data from 22 emerging countries covering the period from 1985 to 2012. The results confirmed the presence of a long term co-integrating relationship between effective exchange rates and the exports and imports of emerging nations. The empirical analysis revealed that both in the short term and the long term, the exchange rate negatively affected exports. However, while the relationship was significant in the short term, the opposite was true in the long term. Rowbotham et al (2014) empirically analysed the impact of the exchange rate on export performance in a sample of 9 efficiency driven nations over the period 1990-2009. All the countries had floating exchange rate arrangements. Panel data models using the fixed effects method were used and it was observed that the exchange rate had a significant negative effect on export growth.

Oiro (2015) analytically investigated the effects exchange rate volatility had on the tea and horticulture exports of Kenya to the European Union (EU) and the UK during the period from 2005 to 2012. The presence of exchange rate volatility was detected using the GARCH model. The bounds testing approach as well as the autoregressive distributed lag (ARDL) model were employed in order to establish the presence of a stable long term relationship between exchange rate volatility and exports. The results revealed that real exchange rate volatility had a significant negative effect on horticultural exports in both the short term and in the long term, while the exchange rate volatility positively affected tea exports from Kenya to the UK.

Other related studies have also been done within the Nigerian economy and other developing economies to investigate similar issues as these. For example, Umaru et al. (2012) conducted an empirical analysis of exchange rate volatility on export trade in Nigeria. The paper employed OLS, the Granger causality test, as well

as the ARCH and GARCH techniques. The causality test revealed that there is a direct causal relationship between exchange rate and exports. The study further showed that exchange rate depreciation had a positive impact on exports. Similar results were obtained by Akinlo and Lawal (2014) who investigated the impact of exchange rate volatility on non-oil exports in Nigeria from 1986 Q₁ to 2008 Q₄. Making use of the co-integration and ECM methodology, the study confirmed the existence of a statistically significant relationship between real exchange rate volatility and exports. The results of the study revealed that exchange rate volatility positively affected non-oil exports in the long term while a negative relationship was observed in the short term.

Alalade et al. (2014) in their study investigated the effects the different exchange rate regimes in Nigeria had on non-oil export revenue from 1986 to 2010. The study adopted a non-oil model which, according to the author, was proposed by Medhi (2011). The ECM approach was also applied. The empirical results revealed that exchange rate variations had a negative effect on non-oil export revenue. Danladi et al (2015) conducted an empirical assessment of the effects of exchange rate volatility on international trade in Nigeria. The results of the study were obtained through the application of multiple regression analysis and ECM and they indicated the presence of a negative relationship in the short term. However, the author asserted that the people's adaptation to the initial shocks caused by the movements in the exchange rate subsequently led to an expansion of exports in the long term.

Onwe (2015) evaluated the implications of exchange rate volatility on the performance of oil exports in Nigeria. By employing the OLS method, the study found among other things the presence of a bi-directional relationship between exchange rate fluctuation and oil exports in Nigeria. The study also revealed that exchange rate volatility had a significant positive effect on oil exports in the country.

Methodology

This research work is conducted using econometric analysis. The OLS estimation technique was used during the analysis. Other independent variables have also been included in the model because they have been observed in the literature to have a strong influence on the export sector.

Model specification

In order to achieve the set objective of the present paper, a multiple linear regression model is used to evaluate the impact of exchange rate movements on the export sector in Nigeria. In this model, the total export earnings (TEXE) are the dependent variable and will serve as a proxy for the export sector, while the exchange rate (EXCH), the manufacturing GDP (as a proxy for the manufacturing output), the agricultural GDP (as a proxy for the agricultural output), the government capital expenditure (GCEXP), the broad money supply (BMSY) and the foreign direct investment (FDI) are the independent variables.

The econometric specification of the model is:

$$\text{LOGTEXE}_t = \beta_0 + \beta_1 \text{EXCH}_t + \beta_2 \text{MGDP} + \beta_3 \text{AGDP} + \beta_4 \text{GCEXP}_t + \beta_5 \text{BMSY} + \beta_6 \text{LOGFDI} + \mu_t$$

As earlier defined:

TEXE – total export earnings;

EXCH – exchange rate;

MGDP – manufacturing GDP;

AGDP – agricultural GDP;

GCEXP – government capital expenditure;

BMSY – broad money supply;

FDI – foreign direct investments;

β_0 – intercept term;

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ – model parameters;

μ_t – stochastic error term.

Justification for the variables used in the model

Total export earnings (TEXE): This includes all proceeds which accrue to a country from the sale of all goods and services to foreign countries. The total export earnings also shows the monetary or financial position of a country's balance of trade. In the present study it is used as the dependent variable.

Exchange rate (EXCH): Following economic theory, the Marshall-Lerner condition posit that if the sum of a country's of price elasticity for both import and export is greater than one, the balance of payment of such a country will improve with currency devaluation. Thus, if the Marshall-Lerner condition is applied, there may be a positive or negative relationship between exchange rate movements and the export sector in Nigeria.

Manufacturing GDP (MGDP): Manufacturing in its broadest meaning refers to the chemical or physical transformation of raw materials into finished or semi-finished products. Key components of this sector include building and construction, manufacturing, wholesale and retail (including that of oil and gas), as well as services. Thus, we can say that the manufacturing GDP is simply the total monetary value of all final or semi-final goods produced as a direct result of the physical or chemical transformation of raw materials into usable products or commodities. A positive relationship is expected to exist between export earnings and manufacturing output.

Agricultural GDP (AGDP): The agricultural sector consists of all activities which involve crop production and cultivation, livestock farming, forestry and fishing. Therefore, all monetary proceeds accrued from these activities make up the agricultural GDP. In simpler terms, the agricultural GDP is the total monetary value of all agricultural products produced in a country as a result of agricultural activities over a specific or given period. A positive relationship is expected to exist between export earnings and agric. output.

Government capital expenditure (GCEXP): These are expenses made by the government for the acquisition or upgrading of physical assets such as equipment and machinery, industrial buildings and other physical assets which continue to yield benefits in the long term. Such expenditure results in the acquisition of permanent assets as it is non-recurring in nature. It can be predicted that a positive relationship exists between the export sector and government capital expenditure.

Broad money supply (BMSY): According to Mishkin (2004), the so-called 'Broad Money Supply', which is also known as M2, includes currency in circulation, checking account deposits, travellers' checks as well as other assets that have check writing features (money market deposit accounts and money market mutual fund shares) and other assets (savings deposits, small denomination time deposits and repurchase agreements) that are extremely liquid, because they can be turned into cash quickly at very little cost. M2 thus has the advantage of being a highly liquid store of value.

Foreign direct investments (FDI): This refers to the building or establishment of new business enterprises in a country by individuals or investors who are not from that country. It involves the pumping of funds, which take the form of business investments, into a country which happens not to be the country of origin of the investor. According to the World Bank, FDI is one of the critical elements which can be used for the development of the private sector and the general reduction of poverty in developing nations. A positive relationship is thus expected to exist between FDI and total export earnings.

Results presentation and discussion

Table 1 shows the unit root test results. From the table above it becomes clear that all variables are integrated at first difference. Comparing the ADF test statistics and the 5% critical values, we can see that the ADF statistics for all the variables are greater than the 5% critical values in absolute terms. Therefore, all the variables are stationary.

Table 1

Stationarity table for the model

Variable	ADF Test Statistics	Critical value (5%)	Order of integration
LOG TEXE	-4.830429	-1.951332	I(1)
EXCH	-5.294691	-3.552973	I(1)
MGDP	-2.912042	-1.951687	I(1)
AGDP	-5.170115	-3.552973	I(1)
GCEXP	-4.622732	-3.595026	I(1)
BMSY	-15.06813	-1.962813	I(1)
LOG FDI	-10.49902	-3.552973	I(1)

Co-integration test

In order to test for co-integration among the variables, the ADF test is used on the regression residuals, as proposed by Gujarati (2004). This is done by generating the residuals from the regression results obtained and subjecting them to a unit root test using the ADF test.

The hypothesis to be tested is, as follows:

$H_0: \delta=0$ (there is no co-integration)

Decision rule: Reject H_0 if the absolute value for the calculated ADF for any of the variables is greater than the absolute value of the 5% critical. Otherwise do not reject.

Below is the result of the co-integration test:

Table 2

Result of the cointegration test

Variable	ADF Test Statistics	Critical value (5%)
Residual term	-4.663949	-3.552973

As shown in the table above, the ADF test statistics report a result of -4.663949 which is greater than the 5% critical value of -3.552973 in absolute terms. Hence, in line with the decision rule, the null hypothesis is rejected and the conclusion is reached that the variables are co-integrated. This means that the series are stationary at level. Hence, there is a long term relationship between the regressors and the regressand.

Presentation of the OLS regression result

Table 3

Dependent variable: LOGTEXE

Variable	Coefficient	Std. error	t- statistic	Prob.
EXCH	0.020117	0.007230	2.782454	0.0097
MGDP	0.000797	0.000367	2.171771	0.0388
AGDP	0.000123	0.000253	0.485384	0.6313
GCEXP	0.002261	0.001302	1.736460	0.0939
BMSY	-0.000404	0.000279	-1.448252	0.1591
LOGFDI	1.122075	0.245532	4.569971	0.0001
C	2.781008	0.290185	9.583569	0.0000
R-SQUARED	0.918756	F-statistic	50.88843	
DURBIN-WATSON	1.634265	Prob F-Statistic	0.000000	

Discussion of results

The research results point to the conclusion that a positive relationship exists between the exchange rate (EXCH) and the total export earnings. The value of the

coefficient of the EXCH is 0.020117 which implies that, holding all other variables constant, a percentage increase in the exchange rate will on the average increase the total export earnings by 0.020117%. Thus, a percentage increase in the exchange rate (EXCH) will increase the total export earnings by 0.020117%, holding other factors constant. This conforms to a priori because a higher exchange rate encourages export promotion as export prices become cheaper. Hence, the exchange rate could be used as an export promotion strategy for increasing the total export earnings and stimulating growth in Nigeria. The study also reveals that manufacturing GDP, agric. GDP, government capital expenditure and foreign direct investment have a positive relationship with total export earnings in Nigeria. The variables MGD, AGDP, GCEXP and FDI have coefficient values equal to 0.000797, 0.000123, 0.002261 and 1.122075, respectively. Thus, a one naira increase in MGD, AGDP, GCEXP and FDI will raise Nigeria's total export earnings by 0.000797%, 0.000123%, 0.002261% and 1.122075%, respectively. This result conforms to the a priori expectation because increased MGD and AGDP mean more output is available for domestic consumption as well as for exports.

Furthermore, increased government expenditure as well as increased foreign direct investment have a positive impact on total export earnings since a more productive infrastructure and more productive investments in the country's real sector will improve and boost productive activities thus increasing the volume of export products.

The regression results show that the coefficient of the BMSY variable assumes a value of -0.000404. This implies that on the average, a unit increase in BMSY will decrease TEXE by 0.000404%, holding all other variables constant. The regression result shows that the broad money supply is negatively related to the total export earnings, which does not conform to the a priori expectation. Theoretically, an increase in the money supply means more money is available in the economy for carrying out economic activities, thus boosting production and increasing the volume of goods available for exports. However, the regression results show that the reverse is actually true. This is probably due to the fact that in Nigeria an increase in the amount of money in circulation does not increase the amount of productive activities that take place, but rather, induces private individuals to engage more in importation. Nigeria's propensity to import is ridiculously high and as such, available funds are diverted to importation rather than being gainfully used to improve the country's production activities. There is low support for goods made in Nigeria and this has led to the closing down of many local manufacturing industries in the country because of the inability of these industries to compete with highly developed foreign manufacturing industries. Thus, there has been a reduced volume of locally manufactured goods available for exports in the country.

Policy recommendations and conclusion

Good policies are important for enabling the Nigerian economy to reap the full benefits of the export sector. Thus, based on the research results obtained in this work, we recommend the following:

1. The government should take advantage of rising exchange rates in the country by encouraging export promotion strategies and it should encourage export based domestic industries by formulating export friendly policies like export quotas and grants. This will go a long way in diversifying the Nigerian economy and stirring it away from its crude oil dependence. People should be encouraged to consume goods made in Nigerian as this will create higher demand for such goods, which will in turn lead to output growth.

2. Manufacturing activities should be encouraged by the government through incentives and subsidies to local manufacturers and improvements to the technological and infrastructure development so as to increase the sector's contribution to total exports in the country.

3. The results show that the Nigerian government's capital expenditure positively impacts exports. This implies that the higher the government capital expenditure in the productive sectors of the economy is towards things such as good road networks, adequate storage facilities, improved power or electricity generation for industrial use, increases in the available water supply, good communication networks, etc., the higher the total export earnings will be since manufacturers and investors would be able to produce more output for both domestic consumption and exports. Hence, the government should create an enabling environment for businesses to thrive by increasing its spending on the basic infrastructure.

4. The government capital expenditure needs to focus on key sectors that will bring about rapid economic growth since Nigeria is still a growing economy. According to the endogenous growth model, investment in human capital, innovation and knowledge are significant determinants of economic growth. In Nigeria, the necessary tools for boosting real sector activities such as an educated labour force, technical experts as well as good managerial capacity are inadequate. Thus, as a result, even with the necessary infrastructure in place and the increased flow of loans, trade credits and other monetary flows to the private sector, there will still be no appreciable rise in overall productivity. Thus, the government also needs to invest in human capital and not just in the physical infrastructure.

5. The government should implement favourable monetary policies which will not only increase the volume of exports in the economy but will also increase growth. For instance the results of the study show that a reduction of the broad money supply would be a favourable monetary policy. This would reduce inflationary pressures in the economy which adversely affect export prices, thus reducing the total export earnings. It will also ensure a reduction in the amount of money available in the economy in order to reduce the importation of goods which can be produced domestically by the nation's real sector.

6. The government should endeavour to create partnerships and sign mutually advantageous deals with foreign countries in order to boost real sector activities. This will not only increase the total output, but will also create employment, increase managerial capacity and technical expertise as well as increase the overall GDP.

7. Finally, it is imperative for the apex bank to keep a close watch on exchange rate developments. The CBN's role in the foreign exchange market to enhance exchange rate stability should continue to remain a core objective under the monetary targeting framework and should be kept in line with the growth objectives and targets of the country.

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