Monetary Policy and Nigeria's Trade Balance, 1980-2018

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Abstract
Several countries have integrated monetary easement into their foreign policy to faucet the gains from trade thereby, assuring that market forces determine monetary policy instruments such as interest rate and exchange rate. It is on this note and this paper empirically evaluate the effect of monetary policy on Nigeria's trade balance using the Autoregressive Distributed Lag Model on the time series data spanning from 1980 to 2018. The findings reveal that monetary policy tools of real interest and effective exchange rate have a long-run co-integration relationship and significant adverse effects on Nigeria's trade balance both in the short-run and long-run. Thus, the paper concludes that monetary policy is a veritable tool through which Nigeria can maintain a favorable trade balance. Therefore, policymakers should step on measures that will maintain low-interest rates to sustain a flexible exchange rate and remove all rigidities associated with the international payment system.

Keywords:
autoregressive distributive lag, monetary policy, trade balance.

How to Cite:
Introduction

Over time, countries have increasingly opened their borders to international trade to tap from the benefits of international economic integration and the need to transact with/buy from other countries of the world (Haile, 2017; Sakanko & David, 2019). The interaction between countries has been suggested to improve their incomes and enhance their growth (Ramzan et al., 2013; Sakanko & David, 2019; Sakanko & David, 2017). Moreover, the opening up of economies provides opportunities for individuals/businesses to invest outside their country and access a more comprehensive range of goods and services and raw materials. To tap into the gains from trade, various countries have incorporated financial liberalization into their trade policy, ensuring that market forces determine monetary policy instruments such as interest rate and exchange rate.

Economic theory suggests that its management of monetary policy tools would influence a country’s foreign trade position. Given a small economy operating a floating exchange rate regime with perfect capital mobility, a decrease in interest rate would depreciate the country's currency. The higher exchange rate would make prices of foreign goods relatively expensive and thus, discourage imports. At the same time, currency depreciation would make the country’s goods less expensive in the international market. Hence, exports would increase. Overall, net exports would improve. On the other hand, an increase in the interest rate would imply a currency appreciation. The currency appreciation would make domestic products more expensive relative to foreign goods, leading to a decline in net exports (Mundell, 1963; Fleming, 1962).

Nigeria is adjudged to be an open economy, albeit a small open economy, due to the inability to influence foreign income and the world interest rate. However, the country asserts appreciable monetary policy independence, coupled with the implementation of diverse forms of exchange rate regimes – with the current being the managed floating exchange rate regimes – in more recent times (Onuchuku et al., 2018). The Central Bank of Nigeria (CBN) – the monetary authority – is vested with the mandate of managing the internal and external macroeconomic balance through its monetary policy, using exchange rate targeting and monetary targeting frameworks to implement its monetary policy. In recent years, the CBN has relied on the policy framework of market base techniques driven by increased bank credit to the domestic sector to strengthen the stabilization of the naira exchange rate and the interest rate and manage the growth of money supply towards improving economic activities (Enoma & Isedu, 2011; Onuchuku et al., 2018; Danmola & Olateju, 2013; Fasanya et al., 2013).

Nigeria’s market-based policy stance gained prominence in the mid-1980s, especially with the adoption of the Structural Adjustment Programme (SAP) in 1986. This has resulted in the reduction/removal of the country’s rigidities associated with monetary policy management. Consequently, interest rate ceilings have ceased to be operated. More so, the Naira exchange rate has been allowed to be determined by market forces. Hence, the Naira exchange rate has changed over time, from an average of ₦3.32 to US$1 in 1986 to an average of ₦306.08 to US$1 in 2018. However, the country’s
trade balance has not reflected this trend. Nigeria's trade balance has instead fluctuated over time. The statistics show that from 1986 to 1990 net exports grew by an average of 90%, and from 1991 to 1995 it grew by an average of 7%.

Nevertheless, the second half of the 1990s recorded a negative average growth rate for net exports of -75%. In the 2000s, while net exports grew by an average of 0.01% and 143% in the first and second halves of the first decade, respectively, between 2011 and 2015, net exports grew by an average of -9%. Moreover, the country recorded a deficit in net exports in 2016 and 2017. Furthermore, the consequences are that it reduces the domestic companies' competitive strengthen, weakens local currency, reduces income and national savings. This would ultimately affect the national income and are critical to economic and financial stability. As such, appropriate policies would be needed to reverse them.

Notwithstanding, despite adopting the market base policy, Nigeria's trade balance often has been fluctuating. Usually, this should encourage exports and improve foreign exchange earnings and, on the other hand, reduce imports and thus increase foreign reserves and the current account balance of payments through improved trade balances. However, this has not been the case over time in Nigeria. Although it was argued that deficit does not cause a significant long-term effect for the whole economy, it is better off by allowing foreign capital investment inflow and running deficit than the shortfall in savings force to reduce investment.

The empirical study of Imoughele & Ismaila (2015) discovered that financial policy would regulate external imbalances. However, the findings of (Bonga-Bonga, 2017; Oluyemi & Isaac, 2017; Michael & Emeka, 2017; Adeyemi & Ajibola, 2019) confirmed the contrarily view in Nigeria that the monetary policy has no binding effect on Nigeria trade balance. These studies suffer from some flaws by including imports and exports as part of the analysis's informative variables, for example, Micheal & Emeka (2017). This raises endogeneity issues as these same variables together constituted the explained variable. Simultaneously, that of (Bonga-Bonga, 2017; Adeyemi & Ajibola, 2019) standard rule of econometrics analysis was violated. This includes a check for the unit root of the series that is incredibly paramount as its outcome determines the proper technique of study to be adopted. Another gap identified in this study was a few empirical attempts to examined the effect of monetary policy on Nigeria's trade balance.

This study aims to handle these gaps by providing empirical proof of monetary policy's effects on Nigeria’s trade balance. The study was set out following the Mundell-Fleming framework, utilized similar variables as those previously used. Hence, the analysis variables are restricted to interest rate, exchange rate, and net exports. Moreover, the analysis followed a robust estimation procedure of the ARDL technique towards getting plausible estimates that explain the link between the monetary policy instruments and Nigeria’s trade balance. This study’s main objective was to examine the effect of monetary policy on Nigeria’s trade balance between 1980 to 2018.
Methods

This study utilizes secondary data. Secondary data is already available data collected by someone other than the researcher. The choice was motivated by data availability on the variables employed and is very simple to use. The study used time series data sourced from the World Bank Development Indicators. The data sourced include Net export - the difference between the export and import value of goods and services traded in a country, usually a year. Calculated \((X - M = NEX)\), where \(X\) is export, \(M\) denotes import, and \(NEX\) represents net export. The real interest rate - the approved percentage charge for credit/money obtained or borrowed from financial institutions or wealthy individuals-and the real effective exchange rate is measured as Naira’s amount is changing for international currency. The data was analyzed using the Autoregressive Distributive lag model developed by Pesaran et al. (2001). The method was used to obtains plausible and robust results to determine the short-run and long-run effect of monetary policy on Nigeria’s trade balance and bounds test for co-integration. The ARDL was built on the assumption that the variables are stationary at the level \(I(1)\) or the first difference \(I(0)\) or mixture, no variable stationery at the second difference \(I(2)\), the data must be free from autocorrelation and Heteroskedasticity.

The analysis in this paper was built upon the Mundell-Fleming model. The model allows for trade amongst countries and has it that net exports \((NX)\) depend on the real exchange rate \((\varepsilon)\). Thus,

\[
NEX = f(\varepsilon)
\]

The real exchange rate is defined as

\[
\varepsilon = \frac{eP}{P^*}
\]

where \(e\) is the nominal exchange rate, \(P\) is the domestic price level, and \(P^*\) is the foreign price level. A major assumption of the Mundell-Fleming model is that of an open economy with perfect capital mobility. Hence, for any two countries involved in trade, the return on investments in the home country must equal the return on investments abroad. This is known as the interest rate parity condition and can be represented by:

\[
1 + i = \frac{(1 + i^*)e}{Ee'}
\]

where \(i\) and \(i^*\) are the nominal interest rate in the home country and abroad, respectively. \(e\) represents the exchange rate, and \(Ee'\) is the future expected exchange rate. From equation 3, the gross return on investment in the home country is represented by the value on the left-hand side, while the expected gross return on investment abroad is shown by the value on the right-hand side. The interest rate parity condition thus holds; when the domestic interest rate is lower than the foreign interest rate, the exchange rate should appreciate, and if the domestic interest rate is higher than the foreign, the exchange rate depreciates. Equation 3 can be rewritten as
Equation 4 shows that a higher domestic interest rate would appreciate the exchange rate (holding foreign interest rate and the future exchange rate constant). The currency appreciation makes domestic products more expensive relative to foreign goods, resulting in lower net exports. For an open economy, equation 4 suggests that net exports are also determined by interest rate. Therefore, equation 1 can be modified to include the influence of interest rate on net exports as follows:

\[ NEX = f(e, i) \]  \hspace{1cm} (5)

Under the Mundell-Fleming model, prices are exogenous hence, any differences between real and nominal variables can be ignored unless exogenous changes to prices or inflation expectations are considered. Thus, equation 5 can be rewritten as

\[ NEX = f(e, r) \]  \hspace{1cm} (6)

Where \( r \) the real interest rate. To achieve the objective of this paper, equation 6 was estimated as represented in equation 7:

\[ NEX_t = \alpha - \beta_1 RINT_t - \beta_2 REER_t + \mu_t \]
\[ t = 1, 2, 3, ..., 39 \]  \hspace{1cm} (7)

NEX, RINT, REER denote net exports, real interest rate, and real effective exchange rate. \( \mu \) is the error term, and the subscript \( t \) represents the period. \( \alpha \) is the intercept, and \( \beta_1 - \beta_2 \) are coefficients of the regressors. The negative sign denotes a prior expectation of the estimates. Real interest rates and real effective exchange rates are expected to have inverse effects on net export.

**Results and Discussion**

The descriptive statistics of the variables employed in the analysis of the paper is as shown in Table 1. The summary statistics reveal that the mean values for NEX, RINT, and REER throughout the study are 6.446, 0.101, and 154.053, respectively. The deviations from the mean scores were 5.71 for NEX, 14.60 for RINT, and 121.72 for REER. The highest deviation is that recorded for REER. Also, the Skewness of 0.77 for NEX, -2.59 for RINT, and 1.71 for REER imply that while most of the data points of NEX and REER lie on the right-hand side of the normal curve that for RINT are to the left-hand side of the normal curve. The Jarque-Bera test for normality’s probability values shows that NEX is normally distributed at a 10% level of significance, whereas RINT and REER are normally distributed at a 5% level of significance.
The procedure for estimating the study’s empirical model involved testing first the time-series properties of the individual data towards ascertaining the appropriate procedure to be used in the estimation. Consequently, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests for unit root were conducted, and the results are presented in Table 2.

Table 1. Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>NEX</th>
<th>RINT</th>
<th>REER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>6.445688</td>
<td>0.101028</td>
<td>154.0531</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>5.707774</td>
<td>14.60288</td>
<td>121.7197</td>
</tr>
<tr>
<td>Skewness</td>
<td>0.771817</td>
<td>-2.593902</td>
<td>1.712246</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>3.679599</td>
<td>12.11553</td>
<td>5.094967</td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>4.622577</td>
<td>178.7602</td>
<td>26.18855</td>
</tr>
<tr>
<td>Probability</td>
<td>0.099133</td>
<td>0.000000</td>
<td>0.000002</td>
</tr>
</tbody>
</table>

Table 2. Results of the Test for Unit Root

<table>
<thead>
<tr>
<th>Series</th>
<th>Level ADF</th>
<th>Level PP</th>
<th>First Difference ADF</th>
<th>First Difference PP</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEX</td>
<td>4.5868***</td>
<td>4.5349***</td>
<td>4.2245***</td>
<td>17.0511***</td>
</tr>
<tr>
<td>RINT</td>
<td>-4.5111***</td>
<td>4.5111***</td>
<td>4.3061***</td>
<td>11.9827***</td>
</tr>
<tr>
<td>REER</td>
<td>1.8796</td>
<td>1.9944</td>
<td>-4.2476***</td>
<td>4.2411***</td>
</tr>
</tbody>
</table>

*** significant at 1% level and ** significant 5% level
Source: Authors’ Computation (2020)

The null hypothesis of the tests has it that a particular series has a unit root. Hence, Table 2 shows that while NEX and RINT are stationary at level, REER attained stationary only after the first difference, in both the ADF and PP tests. The results of the unit root tests suggest the possibility of a long-run relationship among the variables. Therefore, the Autoregressive Distributive Lag (ARDL) Bounds test was used to establish whether such a long-run relationship exists. The result of the ARDL Bounds test is as shown in Table 3.

Table 3. Result of the Bounds Test

<table>
<thead>
<tr>
<th>Test Statistics</th>
<th>Value</th>
<th>Significance</th>
<th>I(0)</th>
<th>I(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistics</td>
<td>6.7593</td>
<td>10%</td>
<td>3.17</td>
<td>4.14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5%</td>
<td>3.79</td>
<td>4.85</td>
</tr>
</tbody>
</table>

Note: The automatic lag selection was used to determine the maximum lag length.
Source: Authors’ Computation (2020)

Given that the F-statistics value (6.7593) is greater than the upper boundary at 10% and 5% level of significance, the variables are said to have a long-run relationship, implying
that the response variables have a long-run relationship with the dependent variable. Hence, the use of the ARDL model was considered appropriate. The ARDL model was estimated to capture both the short-run and long-run effects of interest rate and exchange rate on Nigeria’s net exports. The short-run estimates are presented in Table 4.

Before considering the ARDL estimates, the model was evaluated for multicollinearity, normality, serial correlation, Heteroskedasticity, and stability. As shown in Table A2 in the appendix, the result of the multicollinearity test reveals that the variance inflation factor (VIF) was less than 10. Hence, the regressors included in the model were not highly correlated. The result of the Jarque-Bera test for normality of residuals presented in figure A1 in the appendix indicates that the residuals are normally distributed. From the lower part of table 4, it can be seen that the probability values for the Breusch-Godfrey Serial Correlation LM test and Breusch-Pagan-Godfrey Heteroskedasticity test are all greater than 0.05; thus, the null hypotheses of no serial correlation and homoscedasticity were not rejected.

Furthermore, the probability value (0.85) of the Ramsey RESET test for stability is more significant than 0.05. Hence, we fail to reject the null hypothesis that the model is correctly specified. Moreover, the result of the Cumulative Sum of Recursive Residuals and Cumulative Sum of Recursive Residual squares presented in figure A2 and figure A3 (see appendix) respectively concur with the result of the Ramsey RESET test that the model is correctly specified.

Table 4. Short-run Estimates of the ARDL Model

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Dependent Variable: NEX</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
</tr>
<tr>
<td>Constant</td>
<td>10.66055***</td>
</tr>
<tr>
<td>NEX(-1)*</td>
<td>-1.117052***</td>
</tr>
<tr>
<td>RINT**</td>
<td>-0.174052**</td>
</tr>
<tr>
<td>RECH**</td>
<td>-0.018895**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diagnostic Tests</th>
<th>F-statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breusch-Godfrey Serial Correlation LM Test</td>
<td>0.1242</td>
<td>0.8832</td>
</tr>
<tr>
<td>Breusch-Pagan-Godfrey Heteroskedasticity Test</td>
<td>1.7459</td>
<td>0.1546</td>
</tr>
<tr>
<td>Ramsey RESET Test</td>
<td>0.0341</td>
<td>0.8548</td>
</tr>
</tbody>
</table>

***significant at 1% level, ** significant at 5% level.
Source: Authors’ Computation (2020)

The short-run estimates shown in Table 4 indicate that the lagged value of net exports, real interest rate, and real effective exchange rate all have an inverse relationship with net exports. Specifically, a unit increase in net exports’ lagged value would lead to a decline in current net exports equal to 1.12, and a 1 percentage point increase in real
interest rate would result in a 0.17 decrease in net exports. Also, a unit increase in the real effective exchange rate would reduce net exports by 0.02. This finding implies that an open economy with a depreciated exchange rate and the low-interest rate will record more net exports. This outcome supported the discovery of Aftab & Aurangzeb (2002), Ajie & Nenbee, 2010; Adamu & Itsede, 2014; Costamagna (2014), Nizamani et al. (2016), but contrarily to the findings of Bonga-Bonga (2017), Michael & Emeka (2017), and Adeyemi & Ajibola (2019) in Nigeria. For the long-run dynamics of the effects of interest rate and exchange rate on net exports, the results are presented in Table 5.

Table 5 shows that in the long-run, both the real interest rate and real effective exchange rate have a negative and statistically significant relationship with net exports at 10% and 5% level, respectively. This agrees with the a priori expectation. While a 1 percentage point increase in real interest rate would decrease net exports by 0.16, a unit increase in the real effective exchange rate will decrease net exports by 0.02. Ncube & Ndou (2013) obtain this collaboration result.

Table 5. Results of the Long-run Estimation

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Dependent Variable: NEX</th>
<th>Coefficient</th>
<th>t-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>RINT</td>
<td>-0.155814*</td>
<td>1.776648</td>
<td></td>
</tr>
<tr>
<td>REER</td>
<td>-0.016915**</td>
<td>2.639334</td>
<td></td>
</tr>
<tr>
<td>Number of Observations</td>
<td>39</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** significant at 5% level, * significant at 10% level.
Source: Authors’ Computation (2020)

Generally, it is formative to note that these monetary policies (interest rate and exchange rate), based on this study’s findings, the real interest rate has more impact on net export than the real effective exchange rate. This could be tagged to how the paramount interest rate stands to influence the exportation of goods and services because domestic companies required affordable interest to enhance borrowing to expand productions. Hence restructuring and development of Nigeria financial institutions to deliver more credit become unavoidable while fluctuating exchange rate. According to Mundell-Fleming’s assertion, in any two countries with an open economy and perfect capital mobility, the return on investments in the home country must equal the return on investments abroad. This is known as the interest rate parity condition. The theory states further that exporting countries’ interest rate has a powerful inflicting mechanism that easily influences the trading partner. This happens because of the perfect mobility of factors among them.

Conclusions

The objective of this paper was to evaluate the effects of monetary policy on Nigeria’s trade balance. The findings from the analysis revealed that real interest rates and real effective exchange rates have significant and adverse effects on net exports in both the short-run and long-run. Therefore, we conclude that monetary policy is a veritable
tool through which Nigeria can attain a favorable trade balance, and the followings are policy implications. The monetary authority in Nigeria is implored to implement measures that will maintain low-interest rates and sustain flexible exchange rates and remove all rigidities associated with the international payment system. This can be achieved by making available more credit to financial institutions and discontinuing sector allocations of foreign exchange. Also noteworthy is the need to improve the nation's productive capacity so that the nation is better positioned to take advantage of the opportunities that could arise from the liberalization of the financial sector. This way, the country would effectively consolidate its trade balance.

The policymakers should achieve independent financial stability for export and import banks in Nigeria to guarantee their easy and affordable credit access to potential investors to increase local productions to promote economic growth and development. Sometimes access to credit is guaranteed, but the protocols are cumbersome. It is also suggested that policymakers should make sure that the unrestricted process to access funds is provided. This is because interest is found to have a tremendous negative and significant effect on net export in Nigeria.

References


