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INTERVENTION ANNOUNCEMENTS AND NAIRA MANAGEMENT: EVIDENCE FROM THE NIGERIAN FOREIGN EXCHANGE MARKET

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Abstract
Many studies establish how foreign exchange intervention affects the exchange rates. Intervention announcement do also have impact different for the actual financial involvement. Recent evidence has tested this for some countries but none has investigated Nigeria, despite volume of interventions and its announcements made via press circulars by the central bank. The paper applies daily data, from January 02, 2001 to May 15, 2023, to verify the impact of intervention announcements on the Nigerian exchange rate. The paper evaluates the relationship based on an event driven baseline specification, which measure the impact of announcement period windows on the exchange rate. The paper finds conclusive evidence of highly significant impacts that past, contemporaneous and future intervention announcements cause appreciation shocks. The naira is revealed to appreciate by 3.5% upon the intervention announcement, and this further increases to 4.49%, 4.55% and 5.22%, on one day, two day, three days after, but subsequently slow down on fourth day (5.21%) and fifth day (3.45%) after the intervention announcements. Robustness test based using alternative data frequency for the estimation yields close (different) result for the monthly (quarterly) periodicity, therefore supposes that the data frequency matters. The result has implications for future conduct of interventions and conventional monetary policies. Amongst others, higher market uncertainty, low credibility of transmission mechanism and possible predominance of global over the national factors may contribute to influences the effectiveness of interventions. The paper’s major limitation is that it excludes the influence of actual intervention, via sales and purchases of dollar, by the central bank.

Keywords: Intervention Announcements, Naira Management, Nigerian Foreign Exchange Market
https://doi.org/10.57233/gujaf.v4i1.210

1. Introduction
Foreign exchange (FX) intervention occurs when government via the central bank, buys or sells foreign currencies to prevent equilibrium exchange rate. The authorities intervene in foreign currency markets to pursue a monetary target and/or to smooth excessive exchange rate volatility triggered by speculative attacks. Most central banks make the announcement of planned interventions by means of press information (Fratzscher, 2008; Germaschewski et al., 2020; Parra-Polania et al., 2022). Recent evidence reveals how intervention announcements carry information contents that moderate exchange rate levels. Germaschewski et al. (2020) and Fratzscher (2008) reveal that oral FX interventions have been effective to influence different exchange rates. Fratzscher (2008) finds that over the short- to medium run, oral intervention events are highly successful in influencing the exchange rate...
of the dollar-yen and euro-dollar. Germaschewski et al. (2020) note that the announcements can impact output via the exchange rate depreciation and an unexpected increase in oral interventions may significantly weaken the Australian dollar.

Evidence for Nigeria indicates that the naira has depreciated since 1980 till date. The currency keeps wobbling against global currency and more so, its peers in Africa: Reports indicate that the naira depreciated against other global currencies between October 2015 and October 2022 (Central Bank of Nigeria, CBN Bulletin, 2022; Business Day, 2022). The naira depreciated by 122% against the dollar, from an average of N196.5/$ to N436.78/$. The currency which exchanges at N301.7/£ (N216.6/€) depreciated by 63% (98%) to N491.68/£ (N428.66/€) against sterling (euro). The depreciation against the Yen (Yuan) was 79% (94%). Relative to other African currencies, the naira depreciated in same periods against the CFA (WAUA) by 102% (104%) from N0.32 to N0.64 (N273.06 to N556.39).

In curtailing the incessant naira depreciation, the monetary authorities have implemented several exchange rate management approaches (CBN, 2021; Mordi, 2006; Obadan, 2006; Ukeje, 2017). The Nigerian naira has remained excessive volatile since adoption for use in 1970, and the monetary authority, the central bank of Nigeria (CBN), has often watched the movements of the exchange rate and intervene in event of severe and unanticipated market fluctuations. The bank may intervene by announcements that ease foreigners’ decision to transact in domestic assets to cause the domestic currency appreciation. The authority initially circulates news information to intervene, which often elicited reactions from market participants (Gbadebo et al., 2021). Subsequently, implements the planned intervention (mostly to sell the dollars to correct depreciatory shock), action which financed from the reserve (Ahmed et al., 2020; Dayyabu et al., 2016; Omojolaibi & Gbadebo, 2014). In 2020 the central bank completes a pseudo devaluation by making adjustment to unify the importer and exporter transaction windows in order to slow down pressure on the foreign reserves due to FX shortage (Gbadebo et al., 2021). Despite the foreign exchange spent by the CBN in intervening to defend the naira and convince the market that the authority was resolute about halting the excessive naira’s rally beyond fundamental have not yielded result as the naira continues to depreciate yearly.

Current intervention studies based on evidence from Nigeria concentrate on influence of actual financial interventions, as well as focus mostly on exchange rate volatility (Adebiyi, 2007; Ahmed et al., 2020; Akbar, 2016; Aruwa & Ahmed,
No study for Nigeria has considered the announcements impact despite the importance (Germaschewski et al., 2020; Parra-Polina et al., 2022). Understanding why intervention announcements affect the exchange rate an important issue for policy considerations. Because intervention is aimed at targeted exchange rate reference, this paper supposes a paradigm shift to focus on the impact of intervention announcements on exchange the rate in Nigeria.

The paper extends literature by pursuing two objectives. First, the paper finds out whether intervention announcement affects the exchange rate level. The paper follows literature to apply daily data on event driven models and show how exchange rate responds to announcements (Cheung et al., 2019; Fratzscher, 2008; Germaschewski et al., 2020; Parra-Polina et al., 2022; Pyo & Lee, 2020). Since the efficacy of intervention announcement is unrelated to implemented monetary policy but works via the coordination channel (Fratzscher, 2008), the current paper focuses on the events for the naira caused by announcements without the influence of monetary policy (Ponomarenko, 2019) and exogenous macroeconomic factors (Alder et al., 2019; Blanchard et al., 2015; Hoshikawa, 2017). Second, since the data frequency for intervention may impact the outcome (Adler et al., 2021), the paper in line with prior studies on exchange rate and other financial variables verifies how periodicity influence the outcome (Gbadebo et al., 2022; Salisu & Vo, 2021). The robustness is examined for available monthly and quarterly frequency data.

The paper finds conclusive evidence of highly significant impacts that past, contemporaneous and future intervention announcements cause appreciation shocks. This has significant policy relevance as it offers valuable addition to monetary policy. Although FXI is occasionally applicable for Nigeria, the continuous depletion in the reserve has reduced the volume, and the naira remains volatile. Other parts of the work are organized as: Section 2 presents the literature review, and Section 3 the methodology. Section 4 presents the results, while section 5 concludes.

1. Literature

Foreign exchange (FX) intervention occurs when government via her representative, the central bank, buys or sells foreign currencies to influence exchange rates. The central bank interferes in the FX market, by intervention operations, in order to push the exchange rate away from prior equilibrium. If the monetary authority considers that the exchange rate deviates excessively from the expected fundamental, it buys the domestic currency during periods of depreciatory

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pressures and vice versa. There is evidence that intervention is more regular in emerging than in advanced economies (Parra-Polania et al., 2022; Frömmel & Midiliç, 2022; Adler & Mano, 2021; Akdogan, 2020; Ponomarenko, 2019; Disyatat & Galati, 2005).

In floating exchange rate system, the demand and supply of foreign exchange by private agents determine the equilibrium rate. Because private agents may push the rate to fluctuate beyond the equilibrium required for external stability, the central bank often intervene to curtail excessive swings. To curtail the undue fluctuations and consequences, governments of advanced economies and their developing counterparts officially guide the exchange rates through official intervention. Three immediate objectives of intervention include to dampen exchange rate volatility, to influence exchange rate level and to manage the foreign reserves. Aside these, central banks intervene in forex markets in order to maintain competitiveness, control inflation and sustain financial stability (Gagnon, 2012).

Literature contains five channels via which intervention affects the exchange rates. The monetary channel explains that intervention influence the exchange rate through the interest rates. This is possible because the government offsets the effects of intervention on the domestic bank reserves. The portfolio channel, suggested by Branson (1983), explains that intervention influence exchange rate through asset prices. The model assumes that sterilized intervention adjusts investor’s portfolio composition, or the riskiness of foreign denominated assets in relation to the domestic currency assets, which influence the exchange rate if there is existence of imperfect asset substitutability. This channel is more relevant in emerging market countries, where the interventions play major role in domestic markets.

The signalling channel, from MuNigeria (1981), argue that intervention contains information about the future of monetary policy. Hence, a change in expected interest rates would impact the exchange rate. The channel requires that the central bank backs interventions with the expected change in policy. The fourth channel, the market microstructure channel, contains that intervention influences the exchange rate due to informational asymmetric. Because intervention can cause significant impact on order flows, the central bank affect market expectation about the future path of exchange rate (Dominguez, 1999; Hung, 1997). The fifth medium is the ‘coordination’ channel (Tapi & Tokman, 2004). Here, intervention affect exchange rate and its volatility by perforating the irrational speculative bubbles because of possible coordination failure and realigning any disequilibria in the exchange rate.
Intervention can be nonsterilised and sterilised. Intervention is nonsterilised or unsterilized if it causes a shift in the monetary base. The unsterilized intervention is conducted by the monetary authorities if the purported aim of the intervention is to influence the exchange rate without trading domestic assets (Ponomarenko, 2019; Omojolaibi & Gbadebo, 2014). This affects the exchange rate via its effect on money supply by changing interest rates in the domestic economy. In general, any intervention that is nonsterilised will have effects on domestic money supply growth. Nonsterilised intervention is crucial because it induces changes in monetary base, affect interest rates, expectations, capital flows and consequently, exchange rate. The general usage of such intervention is such that it simultaneous pursuit of exchange rate and monetary policy operations. Sterilized intervention may not have substantial effect on domestic money supply growth.

There are debates about FX intervention’s effectiveness and efficiency. A smooth transmission channel matter for intervention to be effective. Almudhaf (2014) finds that unlike the exchange rates of South Africa, Colombia, Indonesia and Turkey that are efficient, the exchange rates of Egypt and Vietnam were inefficient. Kumar (2015) reveals that although the market was inefficient, but that efficiency was attained and improved after the crisis. The efficiency is improved because of foreign exchange interventions. Ning et al. (2017) find that the pre-reform market was more efficient relative to the post-reform. The decline in the market efficiency level is because of the various interventions by the People’s Bank of China since the reform. Khuntia et al. (2018) identifies that the efficiency in the currency’s market had fluctuated because of various events including financial crises, legal reforms, institutional structures, central bank actions, macroeconomic fluctuations, and political instability. Diniz-Maganini et al. (2023) find substantial differences in the efficiency of the countries, with China the least efficient and South Africa the most efficient.

2. Methodology

Considered Model

In assessing the influence of intervention announcements on the USD/NGN exchange rate, the paper focuses on the interventions periods, in which the pre-actual intervention announcements are made through the press publication on the CBN website. The paper estimates the effects of past, current and lead of announcement periods on log-exchange rate. According to Pyo and Lee (2020) and Ben-Omrane et al. (2019), the paper reports an event driven model that analyses how the intervention announcements on five days windows prior ($t - i, for i = -1 to -5$), day of announcement ($t$), and post ($t + i, for i = 1 to 5$), explain
exchange rate levels. The paper specifies a baseline model that considers the stable’
effects of intervention news on exchange rate given as:

\[
\text{Log}(\frac{\text{USD}}{\text{NGN}})_t = \alpha_0 + \sum_{i=-5}^{5} \beta_{t+i} \text{FXINTVDum}_{t+i} + \epsilon_t
\]
\[(1)\]

\[
\text{Log}(\frac{\text{USD}}{\text{NGN}})_t = \alpha_0 + \sum_{i=-1}^{-5} \beta_{t+i} \text{FXINTVDum}_{t+i}
+ \beta_{t} \text{FXINTVDum}_{t} + \sum_{i=1}^{5} \beta_{t+i} \text{FXINTVDum}_{t+i} + \epsilon_t
\]
\[(1')\]

Equation (1) estimate the log transformation of the daily USD/NGN’s exchange
rate on the announcement dummies for FX intervention press releases. Equation
(1’) is a convenient way to write (1) for table presentation. The log-normalization
is used in the empirical estimations to secure suitable estimates (Lahmiri et al.,
2018). Unlike the daily data, the study considers 2, 3, and 4 quarters, months and
weeks periods effects windows for the respective frequency identifies because of
limited data. The explanatory variables (i.e., the \(D_{t+i}\)’s) are dummies identified as
1 for the announcement (immediate) time and 0 otherwise. \(D_{t+i}\),
\(i \in \{-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}\) for the daily estimation involves lagged by
\(i\) (past and future) days from the announcement. Based on standard events models
(Gbadebo et al., 2021; Pyo & Lee, 2020), \(\text{var}(\epsilon_t)\) (i.e., variance of error) follows
the Generalized Autoregressive Conditional Heteroskedasticity (GARCH(1,1))
[(2)], hence, the paper finds whether the \(t\)-test for the variance of GARCH(1,1) of
\(\epsilon_t\) of the exchange rate (1) is significant:

\[
\epsilon_t = \delta + \sigma_t z_t
\]
\[z_t \sim \text{n}id (0,1), \forall t\]
\[(2)\]

\[
\sigma_t^2 = \omega_0 + \omega_1 (\epsilon_{t-1})^2 + \Omega \sigma_{t-1}^2
\]
\[\sigma_t^2 > 0\]

The intercepts \(\alpha_0\) indicate the expected value of the naira when no announcements
released, and expectedly, is non-negative. The coefficient \(\beta_{t+i}\) (for \(i = 1 \text{ to } k\))
corresponding to each \(D_{t+i}\) measures change in the mean level of the exchange rate,
provided that intervention announcement is released time \(t\) for each \(i\) lag. \(\beta_{t+i} >
(\text{<}) 0\) supposes that the mean exchange rate of naira is would be expected to
depreciate (appreciate) by approximately \(\beta_{t+i}\) (times 100 percent for that particular
period i’s announcement.
Data and Basic Statistics
For intervention announcements, the paper employs dummy variables for reported
dates of official press release related to intervention announcements by the CBN
within the considered period is used. The announcements are scrapped on CBN
webpage from the various press release from January 02, 2001 to May 15, 2023.
Table A1 and Table A2 report, with their links, the considered releases. The paper
includes announcement dates involving direct intervention and others with
information content relating to FX transactions such as guidelines and instructions
for BDCs, which are all targeted to moderate the exchange rate undulations. This
is important because of the peculiar nature of the Nigerian FX market, in which the
naira is sensitive to increase reserves (Kalu et al., 2019); financial assets (Bala-Sani
& Hassan, 2018; Oladapo et al., 2017) and FX intervention (Adebiyi, 2007; Ahmed
et al., 2020; Akbar, 2016; Aruwa & Ahmed, 2013; Dayyabu et al., 2016;
Omojolaibi & Gbadebo, 2014).

The paper scrutinizes the webpage reports and secure circulars involving direct
intervention via the Wholesales Dutch Auction System (WDAS), Dutch Auction
System Retail (RDAS) and special intervention for Bureau de Change (BDCs),
which are all geared towards exchange rate stabilization. The RDAS was suspended
in Feb 18, 2015 but since March 3, 2015, the authority makes special FX
intervention through sales of FX to the BDCs. Hence, the paper involves all
announcements on FX sales to BDCs to consolidate the RDAS. A total of 264
releases at distinct days are obtained and conjectured as intervention dummy, which
is denoted as 1 on announcement day for categorized released announcements, and
0 otherwise. For the other series (monthly and quarterly), the paper shares the
sentiment to apply dichotomy variable for intervention announcements. Thus, the
dummy is used to represent the week, month or quarter which intervention news is
released rather than to use discrete variable involving to sum up all days of
intervention for the considered periodicity. This approach is applied in order to have
a fair comparison with the estimation for the daily series. For exchange rates, the
data applied is the daily, monthly and quarterly naira price of the US dollar (i.e.,
USD/NGN rate), from January 02, 2001 to May 15, 2023. The series was sourced
from the CBN online bulletin. The CBN-rate, been the average of the bid-ask price
quotes, is used. The data published does not include weekends and slated national
holidays, due to inherent bias influence the transactions for these days would have
on the quoted prices.

The plots of the daily exchange rate in level (Figure 1) and log-transform (Figure 2
(black line)) are chaotic with jumps and vertical striations, clearly, due to regime
switches, announced devaluations and volatility drifts. Within closer periods, the daily CBN-rate for naira appears stable around same domain between the days except for periods of jumps. The series are nonlinear, although the log transform is relatively smoothened. Figure 3 depicts the breakdown of the exchange rate (log form) with the Seasonal-Trend decomposition using LOESS (STL) into different time-series components. The plot identifies that the Although trend component remains explosives, the remainder convergent and mean reversing, and the seasonality oscillatory but stable around a zero mean.

Figure 1: Time series plots of the daily USD/NGN exchange rate (actual data)
Figure 2: Time series plots of the daily USD/NGN exchange rate (log-transform data)
Note: The daily naira price of the US dollar (i.e., USD/NGN rate), from January 02, 2001 to May 15, 2023, is shown in Figure 1 and 2.
Figure 2 includes a fitted polynomial trend (Brown line).
Source: Author (2023)
Figure 3: Seasonal-Trend decomposition using LOESS (STL) for the log of USD/NGN rate.

**Note:** The STL breakdown of USD/NGN rate into different time-series components.

The trend component remains explosives, the remainder convergent, and the seasonality oscillatory but stable around a zero.

**Source:** Author (2023)

Table 1:
**Statistical properties of the exchange rate**

<table>
<thead>
<tr>
<th>Statistics</th>
<th>( USD/NGN_t )</th>
<th>log(( USD/NGN ))_t</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \mu )</td>
<td>210.831</td>
<td>2.278</td>
</tr>
<tr>
<td>median</td>
<td>155.240</td>
<td>2.191</td>
</tr>
<tr>
<td>maximum</td>
<td>461.000</td>
<td>2.664</td>
</tr>
<tr>
<td>minimum</td>
<td>112.950</td>
<td>2.053</td>
</tr>
<tr>
<td>( \sigma )</td>
<td>103.214</td>
<td>0.192</td>
</tr>
<tr>
<td>( \hat{\mu}_3 )</td>
<td>0.963</td>
<td>0.669</td>
</tr>
<tr>
<td>( \hat{\mu}_4 )</td>
<td>2.461</td>
<td>1.869</td>
</tr>
<tr>
<td>J-B-stat.</td>
<td>872.32</td>
<td>668.8</td>
</tr>
<tr>
<td>( p(JB-stat.) )</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Note:** Table 1 provides the basic statistics, including the mean (\( \mu \)), median (\( med \)), standard deviation (\( \sigma \)), skewness (\( \hat{\mu}_3 \)) and kurtosis (\( \hat{\mu}_4 \)) coefficients, of the exchange rates (\( USD/NGN_t \)) and the log transformed
series. \( p(JB \text{ stat}) \) is the probability of Jarque-Bera (JB) used for the normality test for each series. \( \sigma \) is standard deviation.

**Source:** Author (2023)

Table 1 reports the basic statistical characterization for the exchange rate and the log series. The mean (standard deviation) for the naira exchange rate series is NGN210.831 (103.214). The evidence indicates that the exchange rate has high spread. The exchange rate distribution is asymmetric (positive skewed) and mesokurtic (moderate peaked). The Jarque-Bera test shows that the series is significant, rejecting stated normality null. The series indicate outliers that could generate heteroskedastic because the distribution is very leptokurtic and rightly skewed. The log transformation is adopted for empirical verification of the considered impact of intervention announcement on the daily exchange rates, in order to present standardized scale and interpret the estimates in percent appreciation or depreciation change.

4. Results and Interpretations

**Does FX intervention announcements cause appreciation or depreciation impacts?**

The study offers attempt to answer the pertinent objective question on how intervention announcements affect the exchange rate level in the Nigerian FX market. Because the purpose is purely to establish how announcement events impact the asset price (i.e., FX), the empirical estimation conjectures that the announcement works in the market via the coordination channel. Thus, according to literature (Cheung et al., 2019; Germaschewski et al., 2020; Parra-Polania et al., 2022; Pyo & Lee, 2020) the study applies the daily naira price of dollar on event explainable model (equation 2). The estimation shows how announcements alongside its expectations days before and after the news release drive the exchange rate level without accommodating the influence of exogenous macroeconomic interdependence (Alder et al., 2019; Blanchard et al., 2015; Hoshikawa, 2017), such as monetary policy interaction (Omojolaibi & Gbadebo, 2014; Ponomarenko, 2019). Table 2 reports how log of the \( USD/NGN_t \) clusters around intervention announcements, without the influence of actual financial involvement by the authority.

The estimation process after adjustments due to iterations reflects around 5,231 observations. The naira exchange rate is well driven by the central bank’s interventions announcement according to the long run stable estimates. The evidence, according to the intercept \( (\alpha_0) \) shows that the anticipated value of the
The exchange rate is about 2.3459 (log-form) or NGN210.83 per dollar, if the central bank would not make announcement via circular related intervention to stabilise the naira in the FX market. The past, contemporaneous and future upon the intervention announcement cause appreciation shocks. The estimates $\beta_{t+1}(for -5, -4, ..., 4, 5)$ are all negative and significant, therefore expresses that the mean of the $USD/NGN_t$ rate appreciates on the WDAS/RDAS/BDCs intervention announcement expectations for some days, upon the announcement and even day after FX auctions.

The evidence is not surprising because most exchange rate management in the country has been often gear to stabilise the volatile FX price from short run excessive swings in Nigeria (CBN, 2022, Gbadebo et al., 2021). The naira is expected to appreciate by 3.5% upon the intervention announcement but the naira appreciation would further increase to 4.49%, 4.55% and 5.22%, on one day, two day, three days after, but would subsequently and not surprisingly slow down on fourth day (5.21%) and fifth day (3.45%) after the intervention announcements by the central bank. The combined impact, of the announcement expectation and after, on the exchange rate is significant as well the overall model is robust and fit for policy significance.

The finding is justifiable since the CBN’s announcement of intervention, which unusually involves sales of the US dollars to the BDCs conveys information that provide signal which prevents possible FX hoarding, and makes market participant to bid at lesser price, and seller to accept, due to expected release of dollars into the FX market by the central bank. The increase in forex in circulation definitely pushes appreciation pressure. Although, the efficacy of the announcement intervention may not be directly related to implemented monetary policy (Fratzscher, 2008), but the precise degree of appreciation effect may depend on existence of credible monetary transmission medium. Also, higher uncertainty levels in the market, low credibility of transmission mechanism and possible predominance of global over the national factors are amongst factors that contribute to influences the effectiveness of interventions in the economies. They counter pressure exchange rate by impinging lopsided potentials about expected interventions and the naira future value. Improved digitalized FX and financial system, such as increase financial instruments, may facilitate intermediation that can promote effective mechanism for the intervention announcement to transmit coordinately with other macroeconomic policies to help stabilise the naira and attain targeted value. This is because such would attract more capital inflows and increase the reserve, which is needed to help stabilized the naira or make the currency to appreciate.
presents the estimated change in the naira appreciation rate between days. The outcome identifies continuous appreciation from the intervention announcement day up to the day three.

The evidence is inconsistent with other studies that show how assets prices, such as global stock respond to macroeconomic news in the US (Lucca & Moench, 2015). Ekincia et al. (2019) show appreciation impact of news announcement on the bid, ask and mid-prices in post-release period. This result is consistent and collaborates established evidence, including research on intervention for G3 exchange rates based on events models (Hussaina & Ben-Omrane, 2020; Fatum & Hutchison, 2005). Hussaina and Ben-Omrane (2020) find that the US macroeconomic releases impose significant influence on the market returns in Canada.

Table 2:
Estimated event driven model for daily exchange rate

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter</th>
<th>Estimate</th>
<th>( \sigma )</th>
<th>t-stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>( \alpha_0 )</td>
<td>2.3459*</td>
<td>0.0030</td>
<td>787.61</td>
<td>0.0000</td>
</tr>
<tr>
<td>FXINTVDum_{t-5}</td>
<td>( \beta_{t-5} )</td>
<td>-0.0326*</td>
<td>0.0098</td>
<td>-3.3339</td>
<td>0.0009</td>
</tr>
<tr>
<td>FXINTVDum_{t-4}</td>
<td>( \beta_{t-4} )</td>
<td>-0.0499*</td>
<td>0.0101</td>
<td>-4.9345</td>
<td>0.0000</td>
</tr>
<tr>
<td>FXINTVDum_{t-3}</td>
<td>( \beta_{t-3} )</td>
<td>-0.0501*</td>
<td>0.0101</td>
<td>-4.9551</td>
<td>0.0000</td>
</tr>
<tr>
<td>FXINTVDum_{t-2}</td>
<td>( \beta_{t-2} )</td>
<td>-0.0438*</td>
<td>0.0103</td>
<td>-4.2491</td>
<td>0.0000</td>
</tr>
<tr>
<td>FXINTVDum_{t-1}</td>
<td>( \beta_{t-1} )</td>
<td>-0.0436*</td>
<td>0.0103</td>
<td>-4.2313</td>
<td>0.0000</td>
</tr>
<tr>
<td>FXINTVDum_{t}</td>
<td>( \beta_{t} )</td>
<td>-0.0353*</td>
<td>0.0110</td>
<td>-3.1957</td>
<td>0.0014</td>
</tr>
<tr>
<td>FXINTVDum_{t+1}</td>
<td>( \beta_{t+1} )</td>
<td>-0.0449*</td>
<td>0.0103</td>
<td>-4.3563</td>
<td>0.0000</td>
</tr>
<tr>
<td>FXINTVDum_{t+2}</td>
<td>( \beta_{t+2} )</td>
<td>-0.0455*</td>
<td>0.0103</td>
<td>-4.4142</td>
<td>0.0000</td>
</tr>
<tr>
<td>FXINTVDum_{t+3}</td>
<td>( \beta_{t+3} )</td>
<td>-0.0522*</td>
<td>0.0101</td>
<td>-5.1599</td>
<td>0.0000</td>
</tr>
<tr>
<td>FXINTVDum_{t+4}</td>
<td>( \beta_{t+4} )</td>
<td>-0.0521*</td>
<td>0.0101</td>
<td>-5.1492</td>
<td>0.0000</td>
</tr>
<tr>
<td>FXINTVDum_{t+5}</td>
<td>( \beta_{t+5} )</td>
<td>-0.0345*</td>
<td>0.0098</td>
<td>-3.5221</td>
<td>0.0004</td>
</tr>
</tbody>
</table>

Variance (\( \sigma^2 \))
| Equation                   | \( \omega_0 \) | 0.0000 | 0.0000 | 52.8249 | 0.0000 |
| Variance (\( \sigma^2 \)) | \( \omega_1 \) | 1.1670 | 0.0386 | 30.2273 | 0.0000 |
| Variance (\( \sigma^2 \)) | \( \Omega \)   | 0.1622 | 0.0142 | 11.4254 | 0.0000 |

Statistics
|                   | \( R^2 \) | 0.2091 |
|                   | F-stat.   | 125.32*|
|                   | Prob(F-stat.) | 0.0000 |
|                   | DW-stat.  | 2.0042 |

Note: \( \sigma \), t-stat, p-value, and DW-stat are the standard error, t-statistics and probability of t value, and Durbin Watson statistic respectively.

* implies significant t 1%

Source: Author (2023)
Table 3:
Estimated change in naira appreciation rate between days

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter</th>
<th>Estimate</th>
<th>%CAR*</th>
</tr>
</thead>
<tbody>
<tr>
<td>FXINTVDum_{t-5}</td>
<td>$\beta_{t-5}$</td>
<td>-0.0326</td>
<td>NA</td>
</tr>
<tr>
<td>FXINTVDum_{t-4}</td>
<td>$\beta_{t-4}$</td>
<td>-0.0499</td>
<td>53.10%</td>
</tr>
<tr>
<td>FXINTVDum_{t-3}</td>
<td>$\beta_{t-3}$</td>
<td>-0.0501</td>
<td>0.40%</td>
</tr>
<tr>
<td></td>
<td>$\beta_{t-2}$</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FXINTVDum_{t-2}</td>
<td>$\beta_{t-1}$</td>
<td>-0.0438</td>
<td>12.74%</td>
</tr>
<tr>
<td>FXINTVDum_{t-1}</td>
<td>$\beta_{t}$</td>
<td>-0.0436</td>
<td>-0.36%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FXINTVDum_{t+1}</td>
<td>$\beta_{t+1}$</td>
<td>-0.0449</td>
<td>27.33%</td>
</tr>
<tr>
<td>FXINTVDum_{t+2}</td>
<td>$\beta_{t+2}$</td>
<td>-0.0455</td>
<td>1.27%</td>
</tr>
<tr>
<td>FXINTVDum_{t+3}</td>
<td>$\beta_{t+3}$</td>
<td>-0.0522</td>
<td>14.87%</td>
</tr>
<tr>
<td>FXINTVDum_{t+4}</td>
<td>$\beta_{t+4}$</td>
<td>-0.0521</td>
<td>-0.19%</td>
</tr>
<tr>
<td></td>
<td>$\beta_{t+5}$</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FXINTVDum_{t+5}</td>
<td>-</td>
<td>-0.0345</td>
<td>33.87%</td>
</tr>
</tbody>
</table>

Note: * Change in the appreciation rate of daily naira exchange rate. NA: Not applicable.

Source: Author (2023)

Is the estimation sensitive to the nature of data frequency?
Here, the study attempts to know whether the estimation would change significantly upon use of a different data frequency for the high frequency naira rate. The paper appraises the soundness reposed in the previous findings using different frequency of the exchange rate, as demonstrated by some empirical analyses that the nature of data frequency matter (Gbadebo et al., 2022; Narayan & Liu, 2015; Narayan & Sharma, 2015; Salisu & Adeleke, 2016). The previous analysis is replicated for monthly (quarterly) data frequency and the estimates are presented in Table 4 (Table 5).

Interestingly, the results for the monthly frequency supposes similar evidence with the previous. Most of the estimates remains significant and the overall model remains significant as with the daily data estimation. However, because monthly data supposes a relatively longer time than usual day announcement, the overall effect is depreciatory. All the intervention announcement coefficients $\beta_{t+i}$, for the various months are positively signed, hence, would cause exchange rate depreciation. The disseminated releases on intervention are significant at 1 to 10% level, identifying the exchange rate to depreciate by 6.57% on the month of
announcement, and by 7.85%, 6.36% and 4.16% on three, two and one month, respectively, after the announcement.

The case for the quarterly data shows dissimilar outcomes. The estimates for the different announcement quarters and the overall model are not significant, although, like with the monthly data, the dummies for intervention, supposes depreciation on the expectation of released WDAS/RDAS auction on the quarter before, current quarter and quarter after announcements. Upon the intervention in the quarter, the exchange rate would depreciate by approximately 3.55%, on the quarter of announcement, and by 2.77% and 1.8% on three, two and one quarter, respectively, after the announcement. This is not surprising because quarterly data conveys medium run information, and for the Nigeria, curtailing exchange rate undulation has often only been attained temporarily, and in particular, within first quarter of policy implementations. The appreciation tendency seems within the immediate periods of the announcement, whereas in short- and long run, the depreciations is more likely. This probably explains the reasons various exchange rate management approaches by the government, in the considered periods, remains unsuccessful in curtailing the depreciation as the continues to wobble.

Table 4:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter</th>
<th>Estimate</th>
<th>σ</th>
<th>t-stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>$\alpha_0$</td>
<td>2.1677*</td>
<td>0.0187</td>
<td>115.67</td>
<td>0.0000</td>
</tr>
<tr>
<td>FXINTVDum$_{t-3}$</td>
<td>$\beta_{t-3}$</td>
<td>0.0346**</td>
<td>0.0318</td>
<td>1.0865</td>
<td>0.2782</td>
</tr>
<tr>
<td>FXINTVDum$_{t-2}$</td>
<td>$\beta_{t-2}$</td>
<td>0.0479**</td>
<td>0.0330</td>
<td>1.4506</td>
<td>0.1481</td>
</tr>
<tr>
<td>FXINTVDum$_{t-1}$</td>
<td>$\beta_{t-1}$</td>
<td>0.0675***</td>
<td>0.0296</td>
<td>2.2763</td>
<td>0.0236</td>
</tr>
<tr>
<td>FXINTVDum$_{t}$</td>
<td>$\beta_t$</td>
<td>0.0657***</td>
<td>0.0304</td>
<td>2.1641</td>
<td>0.0314</td>
</tr>
<tr>
<td>FXINTVDum$_{t+1}$</td>
<td>$\beta_{t+1}$</td>
<td>0.0787*</td>
<td>0.0296</td>
<td>2.6559</td>
<td>0.0084</td>
</tr>
<tr>
<td>FXINTVDum$_{t+2}$</td>
<td>$\beta_{t+2}$</td>
<td>0.0636***</td>
<td>0.0329</td>
<td>1.9350</td>
<td>0.0541</td>
</tr>
<tr>
<td>FXINTVDum$_{t+3}$</td>
<td>$\beta_{t+3}$</td>
<td>0.0416**</td>
<td>0.0315</td>
<td>1.3203</td>
<td>0.1879</td>
</tr>
</tbody>
</table>

Statistics

- $R^2$: 0.1336
- F-stat: 5.8167*
- Prob(F-stat): 0.0000
- DW-stat: 1.0147

Note: The statistics – σ, t-stat and p-value the standard error, t-statistics and probability of t value, respectively.

* *, **, *** implies significant t 1%, 5%, 10%

Source: Author (2023)
Table 5:
Estimated event driven model for quarterly frequency

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter</th>
<th>Estimate</th>
<th>σ</th>
<th>t-stat</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>(a_0)</td>
<td>2.2237</td>
<td>0.0402</td>
<td>55.332</td>
<td>0.0000</td>
</tr>
<tr>
<td>FXINTVDum(_{t-3})</td>
<td>(\beta_{t-3})</td>
<td>0.0142</td>
<td>0.0522</td>
<td>0.2718</td>
<td>0.7865</td>
</tr>
<tr>
<td>FXINTVDum(_{t-2})</td>
<td>(\beta_{t-2})</td>
<td>0.0219</td>
<td>0.0541</td>
<td>0.4056</td>
<td>0.6862</td>
</tr>
<tr>
<td>FXINTVDum(_{t-1})</td>
<td>(\beta_{t-1})</td>
<td>0.0374</td>
<td>0.0522</td>
<td>0.7168</td>
<td>0.4757</td>
</tr>
<tr>
<td>FXINTVDum(_t)</td>
<td>(\beta_t)</td>
<td>0.0355</td>
<td>0.0526</td>
<td>0.6759</td>
<td>0.5011</td>
</tr>
<tr>
<td>FXINTVDum(_{t+1})</td>
<td>(\beta_{t+1})</td>
<td>0.0277</td>
<td>0.0526</td>
<td>0.5271</td>
<td>0.5996</td>
</tr>
<tr>
<td>FXINTVDum(_{t+2})</td>
<td>(\beta_{t+2})</td>
<td>0.0182</td>
<td>0.0537</td>
<td>0.3399</td>
<td>0.7349</td>
</tr>
<tr>
<td>FXINTVDum(_{t+3})</td>
<td>(\beta_{t+3})</td>
<td>0.0077</td>
<td>0.0515</td>
<td>0.1505</td>
<td>0.8808</td>
</tr>
</tbody>
</table>

Statistics

\(R^2\) | 0.0158
F-stat. | 0.1794
Prob(F-stat.) | 0.9888
DW-stat. | 0.0172

**Note:** The statistics – \(\sigma\), t-stat and p-value are the standard error, t-statistics and probability of t value, respectively.

*, ***, ***, implies significant t 1%, 5%, 10%

**Source:** Author (2023)

5. Conclusion

Policymakers, and in particular, the central banks, are often committed to intervention in FX market in order to moderate the magnitude and pace of their domestic currency fluctuations and volatility. Due to the impacts, some central banks make the announcement of planned interventions by means of press released information. Recent evidence reveals how such intervention announcements transmit information contents that moderate exchange rate value (Parra-Polania et al., 2022; Germaschewski, Horvath & Zhong, 2020).

Since 1980 till date, the Nigerian naira has kept wobbling against global currency and more so, its peers in Africa, despite several exchange rate management approaches implemented by the CBN to curb the incessant depreciation (CBN, 2021; Gbadebo et al., 2021; Mordi, 2006). Some studies have been investigated on operations in the FX market, particularly related to determinant of exchange rate (Kalu, et al. 2019; Bala-Sani & Hassan, 2018; Oladapo et al., 2017), while other evidence reports how actual FX intervention impact the exchange rate (Ahmed et al., 2020. Dayyabu, Adnan & Sulong, 2016; Akbar, 2016; Omojolaibi & Gbadebo, 2014). However, there is no available study that has considered the influence of the
central bank announcements on the naira exchange rate, therefore, the current paper fills this gap.

This paper pursues two objectives – The first conforms whether the intervention announcement affects the exchange rate level, and the second confirms whether the frequency of the data explore matters for the conclusion. The event driven model, from standard literature, is applied to establish the aims. According to the baseline specification, the paper finds conclusive evidence of that pasts, contemporaneous and future intervention announcements significant cause appreciation shocks. According to the daily data utilized for the main analysis, the naira is expected to appreciate by 3.5% upon announcement, and this further increases to 4.49%, 4.55% and 5.22%, on one day, two day, three days after, but slowdown in subsequent days after the intervention announcements. Robustness test based using alternative data frequency for the estimation yields close (different) results for the monthly (quarterly) periodicity, supposing that frequency matters.

They counter pressure exchange rate by impinging lopsided potentials about expected interventions and the naira future value. Improved digitalized FX and financial system, such as increase financial instruments, may facilitate intermediation that can promote effective mechanism for the intervention announcement to transmit coordinately with other macroeconomic policies to help stabilise the naira and attain targeted value. This is because such would attract more capital inflows and increase the reserve, which is needed to help stabilized the naira or make the currency to appreciate. Since the Nigerian economy and FX market is integrated in the global financial system, the paper recommends the central bank should implement policies to largely hold more foreign exchange in the reserves in order to have sufficient fund to intervene aggressively to prevent excessive depreciation of the naira. The result has implications for future conduct of interventions and conventional monetary policies. The paper’s major limitation is that it excludes the influence of actual intervention, via sales and purchases of dollar, by the central bank.
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References


