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Testing for spillovers in *Naira* exchange rates: The role of electioneering & global financial crisis

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Abstract

This study offers a new dimension to the analysis of spillover transmission in foreign exchange markets by accounting for the role of electioneering in addition to the global financial crisis. It does so by using Nigeria as a case study whose electioneering activities seem to be characterized by “money bags” with attendant effects on the behaviour of its domestic currency (*Naira*). Thus, the study tests for spillover transmission among Nigeria’s six most traded currencies namely the US Dollar, Euro, Pound Sterling, Yen, Swiss Franc and the West African Unit of Account (WAUA). Data utilized involve daily frequency over the period of 2001 to 2015 and is partitioned into sub-samples on the basis of the electioneering periods in Nigeria and global financial crisis. The novel approaches of Diebold and Yilmaz (DY) (2009, 2012) are employed to compute the spillovers. The results show that electioneering process in Nigeria appears to have greater spillover effects on the *naira* than the global financial crisis and this finding is robust to alternative measures of exchange rates. Some implications of the findings to investors and policy makers are documented.

Keywords: *Naira* exchange rates, Spillover analysis, Electioneering, Global Financial Crisis

JEL Classification: C32; D72; F31; F47

Testing for spillover in *Naira* exchange rates

1.0 Introduction

The need to capture possible dynamics of naira exchange rate has become imperative owing to the recent sustained depreciation of the currency relative to major foreign currencies like US dollar, Euro, Pound sterling, and Swiss Franc, among others. This need is more pressing than envisaged on account of the implications of naira depreciation to an economy that is largely import dependent and oil-based. In any case, both the investors and policy makers are apprehensive when exchange rates are confronted with high risks and uncertainties. For instance, profit maximizing investors such as the portfolio investors are concerned about the risk associated with exchange rate volatility while the policy makers are deeply concerned about the multiplier effects of the volatility on the macro-economy ranging from price, trade, to investment and consumption. Thus, when exchange rate exhibits persistent volatility, the implications on the macro-economy are quite grievous. There is preponderance of empirical researches that have concluded that financial markets in developing countries are poorly developed and largely inefficient. However, the swooping consequences of the recent global financial crisis in 2007 – 2009 on financial markets in Africa (Collins and Bekpe, 2004) have renewed the interest to ascertain how well financial markets in developing economies are integrated to the global financial markets. After all, spillovers have been considered as a vital precondition to financial integration (McMillan and Speight, 2010).

Motivated by these considerations, we analyze the spillovers using the Diebold and Yilmaz (DY hereafter) (2009, 2012) approaches. These approaches allow for the computation of total spillover index. These are novel approaches that have not received much attention in terms of application in the empirical literature. The most traded foreign currencies in Nigeria are the US dollar, Pound sterling, Euro, Swiss Franc, Waua, and Yen. In order to more carefully distil the behaviour of the spillovers over time, we consider different episodes using periods of election and global financial crises as the bases for the sub-samples. Nigeria is a developing economy that appears to have witnessed untoward behaviour in its financial structure given these two factors. Firstly, the economy is increasingly becoming integrated into the global financial market (see Collins and Bekpe, 2004) and, through contagion effects, is bound to react to global financial behaviour. Secondly, the economic dimension of the Nigerian nation relies largely on its political 'barometer'. This makes electioneering processes to substantially affect the direction of foreign exchange behaviour where noise feeds into the rate at which the domestic currency is exchanged for some international referenced currencies. More so, the "money bag" electioneering process in the country begets some irrational behaviour which tends to introduce internal shocks into the economy with attendant implications on the macro-economy including exchange rate.

Also, portfolio investors seeking to maximize their returns are usually sceptical about successful transitions from one civilian rule to another due to the high risks and uncertainties that usually characterize a nascent democratic process like that of Nigeria. Thus, more insightful findings are discernible from using the subsamples determined by the electioneering period and global financial crisis. Above all, we also document the analytical procedures for the implementation of all the techniques used in the paper for spillover analysis. We do hope this will facilitate the application of these techniques in future research.

The remaining sections of the paper are as follows: Section 2 provides a brief review of the literature; and the next section would be concerned with the theoretical specifications of the Diebold and Yilmaz (2009, 2012) theoretical framework while section 4.0 provides some insights and stylized facts through some data and preliminary analysis. Section 5.0 discusses the findings and in section 6.0, conclusions were reached and policy suggestions were recommended.

2.0 A brief review of the literature

Empirical studies on spillover effects have hugely concentrated on vertical spillovers; where spillover in one market (say the oil market) is expected to affect another market (say the stock market or other segment of the financial markets). Studies in this strand of literature include Awartani and Maghyereh (2013) among others. Also, some extant literature considered the horizontal spillovers; where investigations were conducted on the spillovers within the same horizon. For example, spillover effects within the financial markets. This could be spillovers between the equity and bond markets (see for example, Antonakakis, 2012; Louzis, 2012; Fernández-Rodríguez et al., 2015) or between the money and capital markets (see for example, Conefrey and Cronin, 2013; Fernández-Rodríguez et al., 2015). All these papers found evidence for the interdependencies among the financial markets; although the degree of intensity varies across regions.

Studies have been sparsely conducted on intra-market or intra-horizon spillovers (see for example, Duncan and Kabundi, 2013; Sugimoto et. al., 2013; Nishimura et al., 2015). It is on this background that the spillovers among foreign exchange markets are highlighted. Studies that have tested for spillover effects in foreign exchange markets can generally be considered in two main strands. The first strand relates to those studies that investigated foreign exchange returns spillovers (see for example, Albulescu et al., 2018) while the second strand are those that tested for the volatility (variance) spillovers (see for example, Lahaye and Neely, 2016; Grosby and Heinonen, 2017). It is instructive to note that return spillovers have been categorised as co-movements and that of variance spillovers have been identified as volatility spillovers (see for example, Antonakakis, 2008). To form the third strand of the literature, very few studies have examined both the returns and variance (volatility) spillovers (see McMillan and Speight, 2010; Antonakakis, 2012). And as a fourth strand, there are a collection of

studies that just developed various approaches to test for spillover effects (see for example, Aguilar and Hill, 2015) and some others proceeded further to employ these tests to investigate the intra-horizon spillovers among foreign exchange markets (see for example, Hong, 2001). This latest classification constitutes a significant part of the methodological literature.

In furtherance of this, the analysis of spillovers in the FX market have largely used the novel approaches developed by DY (2009, 2012) while some other studies have extended the Diebold and Yilmaz (2012) methods. In fact, Diebold and Yilmaz (2014) have revised the early methods to incorporate some of the concerns raised by later researches but an extension of this model has only been applied to the stock markets (see Nishimura and Sun, 2018). However, a large retinue of studies still found the autoregressive approaches embedded in the GARCH family of methods (including its various extensions) desirable for investigating volatility spillovers (see for example, Lahaye and Neely, 2016; Inagaki, 2007; Speight and McMillan, 2001; Antonakakis, 2008; Raputsoane, 2008). The concerns that these GARCH methods addressed are related to the symmetric and asymmetric interdependencies among foreign exchange markets and also the linearity and non-linearity of relationships among these markets. While these newest development in the methods have been accommodated already in the literature, the Diebold and Yilmaz (2009, 2012) approaches are still desirable in testing for spillover effects in some respects. First, the rapid transition to other approaches will be less circumspect. This is because the full appreciation of economic implications of empirical investigations will become completely lost to methodological elegance.

Secondly, this paper will be the first, to the best of our knowledge, to investigate the influence of political elections on volatility spillovers among foreign exchanges. The study of Nishimura and Sun (2018) conducted a pioneer study on the effects of political elections on spillover effect. The authors developed and applied a volatility spillover index, as an extension of the Diebold and Yilmaz (2014) approach, to investigate the role of the Brexit vote on volatility spillovers. However, the study focused only on the stock markets among five (5) European economies. Without prejudice to providing general inferences to all the financial markets, however, the foreign exchange market is distinct from the stock market in many respects. Majorly, the FOREX market is short-term oriented than the stock market. This suggests that the data generating process (DGP) in the foreign exchange markets has memory horizon that is shorter. Therefore, the application of an approach with a relatively medium-term or long memory horizon will be a misfit. More so, the propagation speed with which the effects of financial crises transmitted to these markets differ. As a result, this peculiarity was rightly captured in the Diebold and Yilmaz (2009, 2012) approaches. It is the collection of these distinctive features that suggests that the blanket generalization might not be valid after-all and that the use of the Diebold and Yilmaz (2009, 2012) approaches would still be appropriate. This is, also, because the applications of these methods have not been fully

appreciated to elicit important market information for policy making; especially for developing economies such as Nigeria.

Stemming from the foregoing, this study contributes in three significant ways to the extant literature. First, it will be the first study to consider the effect of political elections on the spillover effects of foreign exchange markets. Secondly, this study will be the first, to the best of our knowledge to employ the Diebold and Yilmaz (2009, 2012) approaches to evaluate spillovers for identical foreign exchange assets of different foreign currencies in emerging markets such as Nigeria. Another addition to the empirical literature is that this study accounts for how the global crisis has altered the degree of spillover within and among the foreign exchange markets. Studies that have investigated the role of global crisis were particular about how it affects the efficiency or otherwise of the foreign exchange markets. Prominent in this regard are the studies investigated by Speight and McMillan, (2001); Lazar et al. (2012) and Al-Khazali et al. (2012). Table 1 gives a cursory review of the extant literature.

Table 1: A cursory review of the literature

Author(s)	Regions/Countries	Market Analyzed	Proxy(ies) used	Data	Methodology	Findings
Albulescu, Aubin and Goyeau (2018)	Selected trading partners of the US: European countries, Canada, Japan and Britain.	Selected Euro FX market	Nominal exchange rate (Euro, British pound, Canadian Dollar, Japanese Yen relative to the US dollar)	Daily data: January, 1999 to December, 2014	Copular function approach and Marginal Distribution Models of GARCH	Evidence of significant positive dependencies among exchange rate returns
Inagaki (2007)	Selected trading partners of the US: European countries and the Britain.	Selected Euro FX market	Nominal exchange rate (British Pound and Euro relative to the US dollar)	Daily data: January 1999 to December, 2004.	MA (1) with GARCH (1,1) and Lag-augmented VAR (LAR-VAR) model developed by Toda and Yamamoto (1995) for robustness.	Evidence of strong simultaneous interaction but uni-directional volatility impact from Euro to British pound.
McMillan and Speight (2010)	Selected trading partners of the European Union: US, Japan and British	Selected Euro FX market	Nominal exchange rate (US Dollar, Japanese Yen and British Pound relative to the Euro)	Daily 5-min data: January 2002 to April, 2006.	Diebold and Yilmaz (2009)	Presence of return and volatility spillovers was found
Speight and McMillan (2001)	Selected East European trading partners: Bulgaria, Czechoslovak, Hungary, Poland, Rumania and Soviet Union	Selected Euro FX market	Nominal black market exchange rate (Bulgarian lev, Czechoslovak koruna, Hungarian forint, Polish zloty, Rumanian lei and Soviet ruble relative to the US Dollar)	Daily data: January 1955 - December, 1990.	GARCH model and robust Wald test to control for cross-country effects.	The results showed support for currency efficiency and significant time-varying volatility effects.

Kocenda, Bubak and Zikes (2011)	Selected European countries: Czech, Hungary, Poland and the US	Emerging European FX markets	Nominal exchange rate: Czechoslovak koruna, Hungarian forint, Polish zloty relative to the US dollar.	Daily data: January, 2003 to June, 2009.	Heteroscedastic Autoregressive GARCH (HAR-GARCH) model developed by Corsi et. al., (2008); Granger Causality test and Diebold and Yilmaz (2009) Spillover index was constructed	Although with different volatility transmission patterns, there was evidence of volatility spillovers among the FX markets of Central Europe.
Antonakakis (2008)	Selected countries within the Euro zone	Pre- and Post European FX markets	Nominal exchange rate: Euro, British pound, Japanese Yen, and the Swiss franc	Daily data: January 1990 - December, 2007.	Multivariate GARCH model with time-dependent properties (Dynamic Conditional Correlation model)	Significant volatility spillovers and co-movement across the four exchange rates. These behaviour declined since the introduction of the Euro.
Raputsoane (2008)	South Africa and developed and emerging European as well as Asia and Latin American countries	South African, European and Asian FX markets	Nominal exchange rate of 14 currency markets for South Africa, Euro area, Japan, UK, Canada, Poland, Russia, Turkey, China, India, Korea, Argentina, Brazil and Mexico	Daily data: January 1999 - April, 2008.	Augmented Exponential GARCH model	Found evidence for volatility spillovers among the currencies but could not ascertain whether the spillover effects have intensified overtime.
Lahaye and Neely (2016)	Selected European countries.	European FX market	Nominal cross exchange rate between the Euro, US dollar and the Japanese Yen	Daily 5-min data: January, 1999 - April, 2013.	Heteroscedastic Autoregressive GARCH (HAR-GARCH) model developed by Corsi et. al., (2008);	Intertemporal spillover was found more prominent than geographic spillover.

Note: GARCH - Generalized Autoregressive Conditional Heteroscedasticity; VAR - Vector Autoregression.

3.0 Measuring spillovers among the *Naira* exchange rates

We also measure the interdependence of the various exchange DY (2009, 2012) approaches. These spillovers have implications on both investment and policies. For instance, information about the possible spillovers between markets will guide policy makers particularly monetary policy authority on how to structure their policies to achieve desired results. For example, if the magnitude of spillovers between money market and capital market is high, then, policies directed towards one market (say money market) is more likely to affect the other market (i.e. capital market). Therefore, such spillovers cannot be ignored when taking policy decisions that will influence any of the markets. Similarly, profit maximizing investors are keenly interested in how best to diversify their portfolio of assets in order to maximize returns. Thus, the spillover analysis renders useful insights into how shocks to one market can affect other markets. A profit maximizing investor would certainly want to avoid the combination of assets that are highly correlated (high spillovers) and would prefer those with low correlations (low spillovers). We describe below the approaches used in the computation of individual spillovers as well as the spillover index.¹

3.1 Diebold and Yilmaz (2009) approach

The underlying framework for the spillover analysis is the vector autoregressive (VAR) model which allows for forecast error variance decompositions. The novelty of this approach however lies in its ability to compute spillover index which is a scalar value. This spillover index shows the intensity of interdependence of time series variables. Thus, a higher spillover index suggests a higher degree of intensity implying that unanticipated movements in one variable are more likely to spill over to other variables under examination. In setting up the spillover index, a two-variable first order stationary VAR is considered:

$$r_t = \Phi r_{t-1} + \varepsilon_t \quad (1)$$

where $r_t = (r_{1t}, r_{2t})$ and Φ is a 2×2 parameter matrix. The moving average representation can be written as:

$$r_t = (I - \Phi L)^{-1} = \Theta(L) \varepsilon_t \quad (2)$$

For convenience, equation (2) is rewritten as:

$$r_t = \Theta(L) Q_t^{-1} u_t = A(L) u_t \quad (3)$$

As a consequence, $u_t = Q_t \varepsilon_t$; $E(u_t u_t') = I$ and Q_t^{-1} is defined as the unique lower-triangular Cholesky factor of the covariance matrix of ε_t .

¹ Details of these approaches can be obtained from the original papers of Diebold and Yilmaz (2009, 2012), in order to conserve space, only the important features are highlighted in this paper.

Using the Wiener-Kolmogorov linear least-squares forecast, the 1-step-ahead forecast is given as:

$$\mathbf{r}_{t+1,t} = \Phi \mathbf{r}_t \quad (4)$$

With the corresponding 1-step-ahead error vector given as:

$$\mathbf{e}_{t+1,t} = \mathbf{r}_{t+1} - \mathbf{r}_{t+1,t} = \mathbf{A}_0 \mathbf{u}_{t+1} = \begin{bmatrix} a_{0,11} & a_{0,12} \\ a_{0,21} & a_{0,22} \end{bmatrix} \begin{bmatrix} u_{1,t+1} \\ u_{2,t+1} \end{bmatrix} \quad (5)$$

Given equation (5) and its covariance matrix defined as $E(\mathbf{e}_{t+1,t} \mathbf{e}'_{t+1,t}) = \mathbf{A}_0 \mathbf{A}'_0$, the spillover index, expressed in percentage, is written as:

$$S = \frac{a_{0,12}^2 + a_{0,21}^2}{\text{trace}(\mathbf{A}_0 \mathbf{A}'_0)} \times 100 \quad (6)$$

Note that the spillover index described in (6) is for a simple first-order two-variable case with 1-step-ahead forecast. For a p^{th} - order N -variable VAR with 1-step-ahead forecast, the spillover index is written as:

$$S = \frac{\sum_{\substack{i,j=1 \\ i \neq j}}^N a_{0,ij}^2}{\text{trace}(\mathbf{A}_0 \mathbf{A}'_0)} \times 100 \quad (7)$$

The spillover index for the general case of a p^{th} - order N -variable VAR with H -step-ahead forecast is written as:

$$S = \frac{\sum_{h=0}^{H-1} \sum_{\substack{i,j=1 \\ i \neq j}}^N a_{0,ij}^2}{\sum_{h=0}^{H-1} \text{trace}(\mathbf{A}_0 \mathbf{A}'_0)} \times 100 \quad (8)$$

Note that $a_{0,ij}^2$ and $a_{0,ji}^2$ are cross variance shares or spillovers where $i \neq j$ while $a_{0,ii}^2$ and $a_{0,jj}^2$ are own variance shares. Thus, $\sum_{\substack{i,j=1 \\ i \neq j}}^N a_{0,ij}^2$ gives the sum of all the spillovers while $\text{trace}(\mathbf{A}_0 \mathbf{A}'_0)$ gives the total forecast error variation.

3.2 Diebold and Yilmaz (2012) approach

One of the limitations of the DY (2009) approach is that it is sensitive to VAR ordering. In essence, the spillover index obtained from a particular VAR ordering may change if the variables are reordered. This is due to the Cholesky factorization used by DY (2009) in which the variance decompositions are influenced by the ordering of the variables. This is one of the contributions of DY (2012). Essentially, the latter proposed a modification that is invariant to ordering, among other things. They employed the generalized VAR framework of Koop et al. (1996) and Pesaran and Shin (1998) (KPPS

hereafter) to produce variance decompositions which are invariant to the ordering. The KPPS H -step-ahead forecast error variance decompositions denoted by θ_{ij}^g is written as:

$$\theta_{ij}^g(H) = \frac{\sigma_{jj}^{-1} \sum_{h=0}^{H-1} (e_i' A_h \Sigma e_j)^2}{\sum_{h=0}^{H-1} (e_i' A_h \Sigma e_i)} \quad (9)$$

where Σ is the variance matrix for the error vector ε , σ_{jj} is the standard deviation of the error term for the j th equation and e_i is the selection vector, with one as the i th element and zeros otherwise. Since the sum of the contributions to the variance of the forecast error is not equal to one - that is $\sum_{j=1}^N \theta_{ij}^g(H) \neq 1$; DY (2012) normalized each entry of the variance decomposition matrix by the row sum in order to use the full information of the matrix. The normalized KPPS H -step-ahead forecast error variance decompositions represented by $\tilde{\theta}_{ij}^g(H)$ is expressed as:

$$\tilde{\theta}_{ij}^g(H) = \frac{\theta_{ij}^g(H)}{\sum_{j=1}^N \theta_{ij}^g(H)} \quad (10)$$

where $\sum_{j=1}^N \tilde{\theta}_{ij}^g(H) = 1$ and $\sum_{i,j=1}^N \tilde{\theta}_{ij}^g(H) = N$ by construction. Given (9) and (10), the total spillover index is written as:

$$S^g(H) = \frac{\sum_{i,j=1}^N \tilde{\theta}_{ij}^g(H)}{\sum_{i,j=1}^N \tilde{\theta}_{ij}^g(H)} \times 100 = \frac{\sum_{i,j=1}^N \tilde{\theta}_{ij}^g(H)}{N} \times 100 \quad (11)$$

In our analysis, we consider a second order 6-variable VARs with 10-step-ahead forecasts. The results obtained are discussed in the next that follows. ²

4.0 Data and preliminary analysis

This section begins with providing the descriptive analyses of the Nigeria's foreign exchanges against its six most traded currencies in the World namely the US Dollar, Britain Pound Sterling, the European Union Euro, the Swiss Franc, the West African Unit of Account (*waua*) and the Japanese Yen (see CBN, 2015). This becomes imperative as we seek to obtain some statistical properties of both the level and return series of these exchanges for insightful investigations of the presence of the MDH in these markets. Intuitively, we trend the graphical patterns of these series in order to observe the behavioural dimensions of these series along regime, structural and fundamental

²The program used to compute the spillovers is available on request.

changes in the economy; domestically and internationally. These periodic changes; if identified; tend to produce some noticeable spikes in the behaviour of these series and would have significant implications for arbitrage and stability of the exchanges under consideration (Fama, 1970).

For the purpose of clarity, an increase in exchange rate here denotes depreciation in *naira* relative to these most traded currencies while a decrease implies an appreciation. Importantly, we examine these exchanges for the weak form efficiency test with time series closing rate data set of five-day weekly frequency spanning different time periods for each of these currencies; subject to the available data at the official website of the Central Bank of Nigeria (CBN). Data used ranges between 12/10/2001 and 3/10/2015; spanning 3,241 observations for their level series and 3240 for their return series. Only the data for Swiss Franc begins from 7/12/2005, thus, a total number of 2,289 observations is available and used for this exchange rate.

Exchange rate return is described as the continuously compounded exchange rate percentage returns at time t calculated as below:

$$R_t^i = \log\left(E_t^i / E_{t-1}^i\right) * 100 \quad (12)$$

Where R_t^i is the exchange rate returns of a given country i at time t ; E_t^i is the exchange rate of that country at time t , while E_{t-1}^i represents one period lag in the exchange rate. Even though, we carry out preliminary analyses on both level and return series, empirical analysis is done using the return series to circumvent the problem of non-stationarity usually encountered with the level series (see Escanciano and Lobato, 2009).

Table 2 below captures the statistical properties of both the level and return series of these exchanges detailed in Panels I and II respectively. Let us start with Panel I. Considering the mean values of the level series of exchange rates, the *naira_yen* exchange rate has the lowest positive value of 1.383 as compared to all other currencies such as the British Pound Sterling; being the highest positive mean value, while Swiss Franc and US Dollar hover around 140. The exchange of the *naira* to the *waua* is quite higher than the latter as it is averaged 206.62. The implication of these mean values is that the *naira* performs best with the Japanese Yen and distantly with the duo of the Swiss Franc and US Dollar while it performs worst against the British Pound Sterling and closely worse against the *waua*. Instructively, this suggests that the Nigerian *naira* enjoys its best appreciation against the Yen and with substantial depreciation against the Pound Sterling. The appreciation of foreign exchange currency has an indirect relation with its degree of volatility and as evidently observed, the expected exchange of *naira* to *yen* shows a negligible dispersion with 0.326 value while *Euro*, *Swiss Franc* and *waua* record the highest standard deviation values. Next to the latter in terms of magnitude is Pound Sterling followed by US Dollar. Comparatively therefore, *naira* to

Euro, *Swiss Franc* and *waua* have witnessed more dispersions than other *naira* exchange rates.

Nonetheless, the skewness statistics are quite small and in fact very close to the threshold for normal distribution. In terms of peakedness, virtually all the series are platykurtic in distribution implying that the series are thin-tailed than normal. This is further reinforced with the Jarque-Bera statistics indicating that all the series are not normally distributed. More so, the Ljung Box Q-statistic for residual and its squared residuals show significant presence of serial order correlation for the series since the null hypothesis of serial correlation is rejected at the 1 per cent level of significance. The only exception in this regard is the *Naira-Dollar* exchanges the null hypothesis of no serial correlation cannot be rejected even at the 10 per cent level of significance. The ARCH LM test is also considered to either authenticate or refute the need for robust heteroscedasticity MDH tests. The results of the ARCH LM tests indicate the presence of time varying conditional heteroscedasticity in virtually all the series; thus validating the choice of robust heteroscedasticity MDH tests.

Let us now turn to Panel II. Although, the standard deviation values for all the return series are very small, they are heavy-tailed and are non-normal as a consequence. The Ljung-Box Q statistics also suggest evidence of serial correlation while the presence of conditional heteroscedasticity is not rejected for most of the series. The behaviour of these series (both level and returns) over time is graphically pictured and some notable features are highlighted.

Figure 1 has a set of graphs that is demarcated into various sections in relation to the behaviour depicted by the series across the period under review. The figure reveals that *naira* exchange rates exhibit some changes as highlighted with straight lines on individual graphs. However, the structural change coinciding with the 2007/2008 global financial crisis period (corresponding to 1700th/1800th observation on the graphs) seems more noticeable than other changes identified. Interestingly, the significant movements in these series during the global financial crisis were followed by a relatively period of stability. In essence, it may be an interesting exercise to probe further into how this crisis (which can serve as external shocks) has affected the inherent interactions among the *naira* exchange rates. This is the motivation for the subsamples captured in spillover analysis.

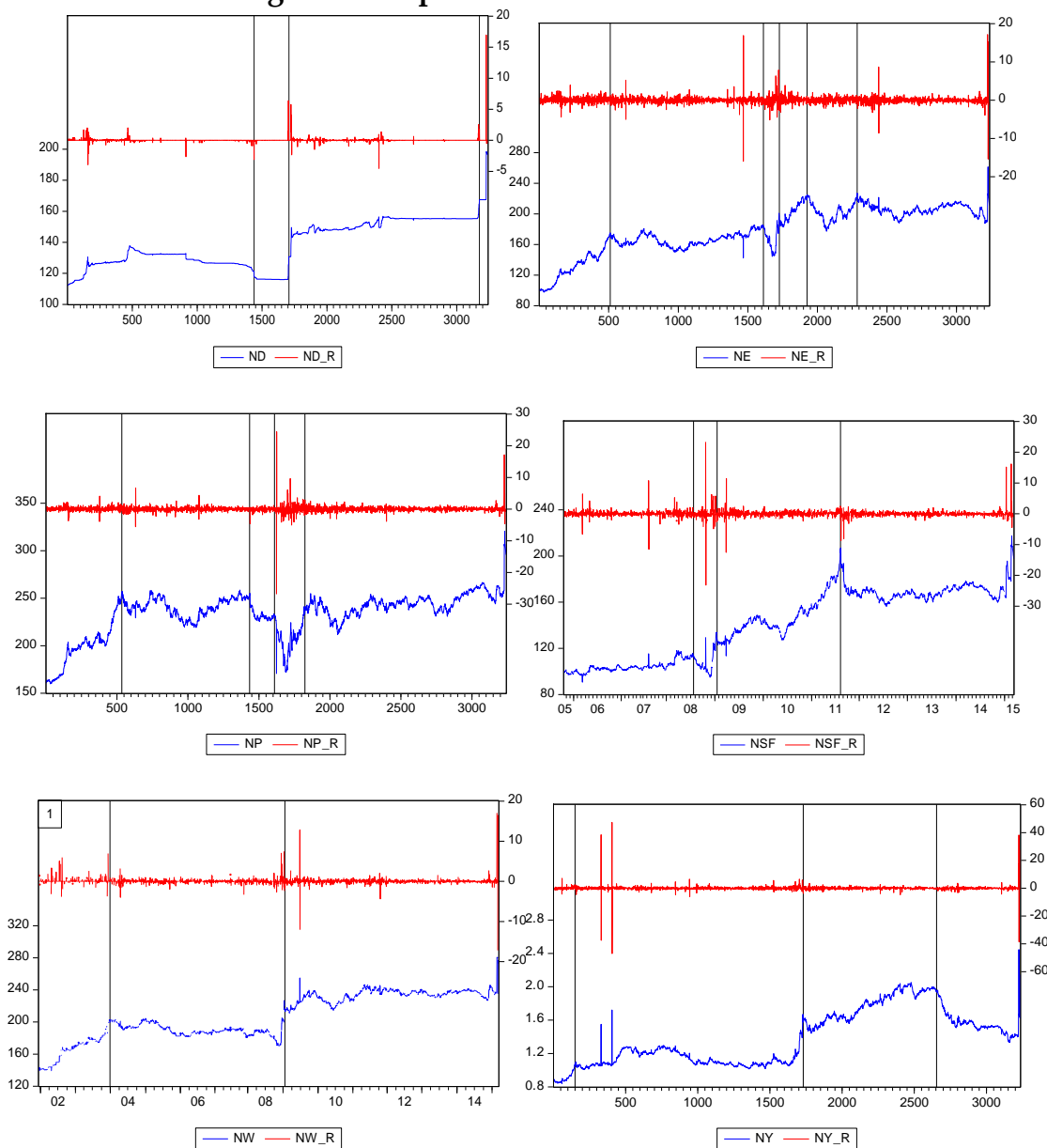
Table 2: Statistical Properties for Nigerian and Most Traded Exchange Rates and their Returns

Panel I: Foreign Exchanges											
Currencies	FX	Obs.	Mean	Std. Dev.	Skew	Kurt	JB	LB-Q(10)	LB-Q ² (10)	ARCH-LM(5)	ARCH-LM(10)
Naira_Dollar	ND	3,241	138.65	14.99	0.192	2.46	59.49*	20.34*	0.09	0.088	0.09
Naira_Euro	NE	3,237	178.33	29.734	-0.66	2.89	236.37*	447.08*	767.28*	1251.66*	1288.67*
Naira_Pound	NP	3,241	232.75	22.73	-1.189	4.679	1143.71*	140.64*	364.37*	424.24*	423.61*
Naira_Swiss_Franc	NSF	2,289	141.20	29.80	-0.159	1.565	205.92*	110.73*	103.19*	107.22*	107.20*
Naira_Waua	NW	3,238	206.62	28.273	-0.279	2.135	142.983*	397.12*	920.97*	433.16*	11119.8*
Naira_Yen	NY	3,235	1.383	0.326	0.430	1.950	248.32*	638.53*	820.54*	1337.08*	1637.19*
Panel II: Returns on Foreign Exchanges											
Currencies	FX	Obs.	Mean	Std. Dev.	Skew	Kurt	JB	LB-Q(10)	LB-Q ² (10)	ARCH-LM(5)	ARCH-LM(10)
Naira_Dollar	ND_R	3,240	0.017	0.410	23.79	953.78	1.2e+08*	46.11*	0.78	0.763	0.771
Naira_Euro	NE_R	3236	0.023	1.784	0.554	774.48	8.0e+07*	138.49*	495.36*	434.15*	433.58*
Naira_Pound	NP_R	3,240	0.019	1.014	0.393	285.42	1.1e+07*	19.88*	402.43*	435.40*	434.76*
Naira_Swiss_Franc	NSF_R	2,288	0.030	1.272	1.33	133.29	1.6e+06*	10.641*	286.56*	299.76*	299.18*
Naira_Waua	NW_R	3,237	0.021	0.779	3.997	256.47	8.7e+06*	136.22*	796.06*	284.57*	785.87*
Naira_Yen	NY_R	3,234	0.027	2.036	1.175	344.90	1.6e+07*	179.80*	437.50*	352.43*	382.87*

Source: Authors' Computation.

Note; NP, NE and NU are the exchange rates of Naira to Pound, Euro and US\$ respectively. Note: *, ** and *** represent rejection of null hypotheses at 1%, 5% and 10% respectively. Ljung-Box Q-statistic and ARCH LM tests are performed on the residual of AR(1). Also, nR² statistic is reported for ARCH LM test

Figure 1: Graph for level and return series



5.0 Results and discussion

Furthermore, Tables 3 - 6 relate to the spillovers among the *naira* exchanges over the full sample and the various subsamples using the periods of electioneering and global financial crisis. The results in Tables 11 and 12 are partitioned into Panel A and Panel B for DY (2009) and DY (2012) respectively. Tables 3 and 5 cover the electioneering case while Tables 4 and 6 are devoted for the global financial crisis. It is instructive to note that the total spillover effects for the two scenarios of electioneering and global financial crisis effects are noted at the bottom-right of the two tables; denoted in percentages. Starting with Panel A, of the full sample for the electioneering sub-sample effects, the own spillover of these currencies hover around 74 - 96 percent with the Swiss Franc and

US Dollar having the highest own spillovers of 96 and 95 percent respectively and the lowest being the Pound Sterling with 74 percent. The implication is that the spillovers from other currencies to these currencies are majorly negligible. The only exception for this behavior is the own spillover of the *waua* that suggests that the currency is largely influenced by spillovers from other currencies to the tune of about 60 percent with only an approximately 40 percent for own spillover.

Considering the effects of the electioneering processes for the three election periods captured in this study, we find that the behaviour significantly changed from their full sample pattern. The election periods considered are the 2007, 2011 and 2015 elections in Nigeria. We capture six (6) months preceding the election and we seek to monitor the effect this would have on the naira exchanges. The 2007, 2011 and 2015 elections seem to generate higher cross spillover effects from other currencies to the Swiss Franc as it increases from 4 percent to as high as 29 percent, 52 percent and 40 percent respectively. The contemporaneous changes for the spillover effects from other currencies to the US Dollar are 12 percent, 9 percent and 42 percent for 2007, 2011 and 2015 elections respectively.

Similarly, the naira exchanges of the Pound Sterling and Euro show that the cross as well as own spillovers for the electioneering effects differ markedly from the full sample case with higher cross spillovers and lower own spillovers during the former period. Even the *waua* which ordinarily has more spillovers from other currencies still reflects the electioneering processes in the country and its impacts on currency exchanges of naira. Also, the total spillover effect for the full sample is computed as 22.1 percent while higher values are obtained for the 2007, 2011 and 2015 election periods. Specifically, we obtain 53.8 percent, 38.2 percent and 43.4 percent for the 2007, 2011 and 2015 elections (see Table 3, Panel A and Table 5). Looking at the Panel B of Table 3, we find that the results obtained from DY (2012) are quite similar to DY (2009) and they both follow the same pattern in terms of the behaviour of own and cross spillovers across the various subsamples. The total spillover effects are also computed as 22.7 percent and 50.7, 37.6 and 47.2 per cent for the 2007, 2011 and 2015 electioneering periods (see Table 3, Panel B).

**Table 3: Spillover tests on *Naira* exchanges
[Full sample and electioneering sub-samples]**

Panel A: Diebold and Yilmaz (2009) Test								
Currency Pairs	FX	NSF	ND	NW	NY	NP	NE	CFO
Naira_Swiss_Franc	NSF	95.9 ^f	0.0 ^f	0.8 ^f	1.6 ^f	0.2 ^f	1.5 ^f	4 ^f
		70.6 ^{e1}	0.0 ^{e1}	8.9 ^{e1}	1.0 ^{e1}	12.0 ^{e1}	7.5 ^{e1}	29 ^{e1}
		48.4 ^{e2}	23.1 ^{e2}	0.9 ^{e2}	9.1 ^{e2}	6.0 ^{e2}	12.5 ^{e2}	52 ^{e2}
Naira_Dollar	ND	60.0 ^{e3}	4.5 ^{e3}	3.5 ^{e3}	16.3 ^{e3}	12.6 ^{e3}	3.2 ^{e3}	40 ^{e3}
		0.1 ^f	94.7 ^f	0.4 ^f	0.2 ^f	0.2 ^f	4.5 ^f	5 ^f
		2.4 ^{e1}	88.8 ^{e1}	1.2 ^{e1}	0.3 ^{e1}	3.3 ^{e1}	4.8 ^{e1}	12 ^{e1}
Naira_Waua	NW	0.9 ^{e2}	91.1 ^{e2}	4.9 ^{e2}	0.1 ^{e2}	1.1 ^{e2}	2.0 ^{*e1}	9 ^{e2}
		0.3 ^{e3}	52.5 ^{e3}	1.7 ^{e3}	0.7 ^{e3}	26.0 ^{e3}	18.7 ^{**e1}	47 ^{e3}
		8.7 ^f	25.4 ^f	40.2 ^f	3.4 ^f	2.5 ^f	19.8 ^f	60 ^f
Naira_Yen	NY	37.3 ^{e1}	2.1 ^{e1}	41.5 ^{e1}	7.1 ^{e1}	3.3 ^{e1}	8.7 ^{e1}	59 ^{e1}
		1.1 ^{e2}	3.6 ^{e2}	36.1 ^{e2}	4.6 ^{e2}	18.3 ^{e2}	36.3 ^{e2}	64 ^{e2}
		0.5 ^{e3}	24.3 ^{e3}	8.6 ^{e3}	5.8 ^{e3}	9.3 ^{e3}	51.4 ^{e3}	91 ^{e3}
Naira_Pound	NP	0.1 ^f	4.5 ^f	12.8 ^f	80.5 ^f	0.0 ^f	2.0 ^f	19 ^f
		44.4 ^{e1}	2.8 ^{e1}	1.6 ^{e1}	34.1 ^{e1}	12.3 ^{e1}	4.8 ^{e1}	66 ^{e1}
		5.7 ^{e2}	1.4 ^{e2}	3.0 ^{e2}	75.8 ^{e2}	1.8 ^{e2}	12.4 ^{e2}	24 ^{e2}
Naiara_Euro	NE	2.0 ^{e3}	1.9 ^{e3}	0.1 ^{e3}	95.0 ^{e3}	0.8 ^{e3}	0.2 ^{e3}	5 ^{e3}
		1.0 ^f	21.3 ^f	1.5 ^f	2.2 ^f	73.6 ^f	0.4 ^f	26 ^f
		10.5 ^{e1}	6.4 ^{e1}	11.6 ^{e1}	45.0 ^{e1}	24.1 ^{e1}	2.3 ^{e1}	76 ^{e1}
Contribution to Others		5.4 ^{e2}	8.5 ^{e2}	2.6 ^{e2}	0.5 ^{e2}	50.8 ^{e2}	32.3 ^{e2}	49 ^{e2}
		1.0 ^{e3}	13.8 ^{e3}	8.7 ^{e3}	4.9 ^{e3}	42.4 ^{e3}	29.2 ^{e3}	58 ^{e3}
		14.8 ^f	0.1 ^f	1.1 ^f	0.4 ^f	1.0 ^f	82.5 ^f	17 ^f
Contribution including Own		38.9 ^{e1}	7.6 ^{e1}	8.9 ^{e1}	16.9 ^{e1}	6.9 ^{e1}	20.9 ^{e1}	79 ^{e1}
		0.7 ^{e2}	21.5 ^{e2}	4.0 ^{e2}	4.3 ^{e2}	0.7 ^{e2}	68.8 ^{e2}	31 ^{e2}
		2.7 ^{e3}	8.2 ^{e3}	2.6 ^{e3}	3.8 ^{e3}	1.7 ^{e3}	81.0 ^{e3}	19 ^{e3}
Contribution including Own		25 ^f	51 ^f	17 ^f	8 ^f	4 ^f	28 ^f	132 ^f
		134 ^{e1}	19 ^{e1}	32 ^{e1}	70 ^{e1}	38 ^{e1}	28 ^{e1}	321 ^{e1}
		14 ^{e2}	58 ^{e2}	15 ^{e2}	19 ^{e2}	28 ^{e2}	95 ^{e2}	229 ^{e2}
Contribution including Own		7 ^{e3}	53 ^{e3}	17 ^{e3}	32 ^{e3}	50 ^{e3}	103 ^{e3}	261 ^{e3}
		121 ^f	146 ^f	57 ^f	88 ^f	78 ^f	111 ^f	22.1% ^f
		204 ^{e1}	107 ^{e1}	74 ^{e1}	104 ^{e1}	62 ^{e1}	49 ^{e1}	53.5% ^{e1}
Contribution including Own		62 ^{e2}	149 ^{e2}	51 ^{e2}	94 ^{e2}	79 ^{e2}	164 ^{e2}	38.2% ^{e2}
		66 ^{e3}	105 ^{e3}	25 ^{e3}	127 ^{e3}	93 ^{e3}	184 ^{e3}	43.4% ^{e3}

Source: Authors Computations. Note: ^f, ^{e1}, ^{e2} and ^{e3} denote full sample and sub-samples of 2007, 2011 and 2015 election periods respectively.

Panel B: Diebold and Yilmaz (2012) Test								
Currency Pairs	FX	NSF	ND	NW	NY	NP	NE	CFO
Naira_Swiss_Franc	NSF	91.3 ^f	0.1 ^f	1.1 ^f	1.3 ^f	0.1 ^f	6.1 ^f	9 ^f
		68.7 ^{e1}	0.4 ^{e1}	21.4 ^{e1}	0.5 ^{e1}	8.4 ^{e1}	0.5 ^{e1}	31 ^{e1}
		39.4 ^{e2}	19.3 ^{e2}	0.8 ^{e2}	12.2 ^{e2}	9.2 ^{e2}	19.1 ^{e2}	61 ^{e2}
		59.8 ^{e3}	5.1 ^{e3}	3.7 ^{e3}	10.9 ^{e3}	14.9	5.6 ^{e3}	40 ^{e3}
Naira_Dollar	ND	0.1 ^f	91.6 ^f	1.0 ^f	1.1 ^f	0.3 ^f	6.0 ^f	8 ^f
		2.4 ^{e1}	90.9 ^{e1}	2.2 ^{e1}	0.3 ^{e1}	1.9 ^{e1}	2.3 ^{e1}	9 ^{e1}
		0.9 ^{*e1}	89.9 ^{*e1}	5.1 ^{e2}	1.4 ^{e2}	0.8 ^{e2}	1.9 ^{e2}	10 ^{e2}
		0.2 ^{**e1}	42.0 ^{**e1}	1.8 ^{e3}	0.8 ^{e3}	33.8 ^{e3}	21.4 ^{e3}	58 ^{e3}
Naira_Waua	NW	8.0 ^f	24.1 ^f	37.8 ^f	5.9 ^f	2.8 ^f	21.4 ^f	62 ^f
		34.4 ^{e1}	1.2 ^{e1}	43.7 ^{e1}	4.9 ^{e1}	4.7 ^{e1}	11.2 ^{e1}	56 ^{e1}
		1.1 ^{*e1}	3.7 ^{*e1}	37.2 ^{e2}	9.3 ^{e2}	17.9 ^{e2}	30.8 ^{e2}	63 ^{e2}
		0.4 ^{**e1}	20.1 ^{**e1}	7.1 ^{e3}	5.5 ^{e3}	11.8 ^{e3}	55.1 ^{e3}	93 ^{e3}
Naira_Yen	NY	0.1 ^f	3.9 ^f	10.4 ^f	83.6 ^f	0.2 ^f	1.7 ^f	16 ^f
		33.4 ^{e1}	3.2 ^{e1}	4.4 ^{e1}	32.8 ^{e1}	22.7 ^{e1}	3.5 ^{e1}	67 ^{e1}
		5.8 ^{e2}	1.3 ^{e2}	3.0 ^{e2}	78.8 ^{e2}	2.4 ^{e2}	8.7 ^{e2}	21 ^{e2}
		1.8 ^{e3}	1.6 ^{e3}	0.2 ^{e3}	87.2 ^{e3}	2.7 ^{e3}	6.6 ^{e3}	13 ^{e3}
Naira_Pound	NP	1.0 ^f	21.3 ^f	1.0 ^f	0.3 ^f	76.1 ^f	0.2 ^f	24 ^f
		7.5 ^{e1}	4.0 ^{e1}	11.0 ^{e1}	32.0 ^{e1}	38.0 ^{e1}	7.6 ^{e1}	62 ^{e1}
		5.7 ^{e2}	8.8 ^{e2}	2.7 ^{e2}	0.7 ^{e2}	57.9 ^{e2}	24.1 ^{e1}	42 ^{e2}
		0.9 ^{e3}	13.1 ^{e3}	8.6 ^{e3}	4.6 ^{e3}	38.2 ^{e3}	34.5 ^{e3}	62 ^{e3}
Naira_Euro	NE	13.6 ^f	0.1 ^f	1.1 ^f	0.5 ^f	1.5 ^f	83.2 ^f	17 ^f
		37.2 ^{e1}	5.6 ^{e1}	16.6 ^{e1}	13.2 ^{e1}	5.5 ^{e1}	21.9 ^{e1}	78 ^{e1}
		0.6 ^{e2}	20.0 ^{e2}	3.6 ^{e2}	3.0 ^{e2}	1.4 ^{e2}	71.4 ^{e2}	29 ^{e2}
		2.4 ^{e3}	7.1 ^{e3}	1.8 ^{e3}	4.0 ^{e3}	2.3 ^{e3}	82.5 ^{e3}	18 ^{e3}
Contribution to Others		23 ^f	50 ^f	15 ^f	9 ^f	5 ^f	35 ^f	136 ^f
		115 ^{e1}	14 ^{e1}	56 ^{e1}	51 ^{e1}	43 ^{e1}	25 ^{e1}	304 ^{e1}
		14 ^{e2}	53 ^{e2}	15 ^{e2}	27 ^{e2}	32 ^{e1}	85 ^{e2}	225 ^{e2}
		6 ^{e3}	47 ^{e3}	16 ^{e3}	26 ^{e3}	65 ^{e3}	123 ^{e3}	283 ^{e3}
Contribution including Own		114 ^f	141 ^f	52 ^f	93 ^f	81 ^f	119 ^f	22.7% ^f
		184 ^{e1}	105 ^{e1}	99 ^{e1}	84 ^{e1}	81 ^{e1}	47 ^{e1}	50.7% ^{e1}
		53 ^{e2}	143 ^{e2}	53 ^{e2}	105 ^{e2}	90 ^{e2}	156 ^{e2}	37.6% ^{e2}
		66 ^{e3}	89 ^{e3}	23 ^{e3}	113 ^{e3}	104 ^{e3}	206 ^{e3}	47.2% ^{e3}

Source: Authors Computations. Note: ^f, ^{e1}, ^{e2} and ^{e3} denote full sample and sub-samples of 2007, 2011 and 2015 election periods respectively.

Table 4 considers the spillover effects among the currencies necessitated by the global financial crisis of 2007 – 2009; we consider 2005 – 2006 as the pre-global crisis period and the 2010 till date as the post crisis period. Interestingly, we find that these three sub-sample periods produce different spillover effects for both own and cross spillovers. Ordinarily without the effect(s) of the global financial crisis, the full sample case suggests spillovers from other currencies to these six reference currencies range between 4 and 26 percent; except for the *waua* which has 60 percent from other currencies. This implies that most of these currencies are largely affected by own spillovers to the tune of 74 – 96 percent.

**Table 4: Spillover tests on *Naira* exchanges
[Full sample and global financial crisis sub-samples]**

Panel A: Diebold and Yilmaz (2009) Test								
Currency Pairs	FX	NSF	ND	NW	NY	NP	NE	CFO
Naira_Swiss_Franc	NSF	95.9 ^f	0.0 ^f	0.8 ^f	1.6 ^f	0.2 ^f	1.5 ^f	4 ^f
		81.2 ^{pr}	0.2 ^{pr}	0.3 ^{pr}	5.1 ^{pr}	2.2 ^{pr}	11.0 ^{pr}	19 ^{pr}
		85.9 ^c	1.2 ^c	2.9 ^c	3.6 ^c	1.9 ^c	4.6 ^c	14 ^c
		93.7 ^{po}	0.0 ^{po}	0.7 ^{po}	2.9 ^{po}	0.3 ^{po}	2.4 ^{po}	6 ^{po}
Naira_Dollar	ND	0.1 ^f	94.7 ^f	0.4 ^f	0.2 ^f	0.2 ^f	4.5 ^f	5 ^f
		4.5 ^{pr}	95.3 ^{pr}	0.0 ^{pr}	0.0 ^{pr}	0.1 ^{pr}	0.1 ^{pr}	5 ^{pr}
		8.3 ^c	73.9 ^c	10.7 ^c	1.2 ^c	4.6 ^c	1.4 ^c	26 ^c
		0.6 ^{po}	73.6 ^{po}	17.0 ^{po}	0.1 ^{po}	2.8 ^{po}	5.8 ^{po}	26 ^{po}
Naira_Waua	NW	8.7 ^f	25.4 ^f	40.2 ^f	3.4 ^f	2.5 ^f	19.8 ^f	60 ^f
		40.2 ^{pr}	0.6 ^{pr}	31.6 ^{pr}	8.9 ^{pr}	6.6 ^{pr}	12.1 ^{pr}	68 ^{pr}
		9.5 ^c	17.6 ^c	35.9 ^c	2.2 ^c	9.2 ^c	25.6 ^c	64 ^c
		14.1 ^{po}	23.2 ^{po}	39.9 ^{po}	6.6 ^{po}	0.1 ^{po}	16.2 ^{po}	60 ^{po}
Naira_Yen	NY	0.1 ^f	4.5 ^f	12.8 ^f	80.5 ^f	0.0 ^f	2.0 ^f	19 ^f
		38.7 ^{pr}	1.1 ^{pr}	0.4 ^{pr}	57.2 ^{pr}	2.4 ^{pr}	0.2 ^{pr}	43 ^{pr}
		9.8 ^c	25.5 ^c	8.2 ^c	55.5 ^c	0.9 ^c	0.0 ^c	44 ^c
		0.1 ^{po}	4.2 ^{po}	10.5 ^{po}	83.6 ^{po}	0.1 ^{po}	1.5 ^{po}	16 ^{po}
Naira_Pound	NP	1.0 ^f	21.3 ^f	1.5 ^f	2.2 ^f	73.6 ^f	0.4 ^f	26 ^f
		46.5 ^{pr}	0.0 ^{pr}	0.3 ^{pr}	3.0 ^{pr}	44.5 ^{pr}	5.6 ^{pr}	56 ^{pr}
		11.3 ^c	0.6 ^c	8.7 ^c	8.3 ^c	69.0 ^c	2.1 ^c	31 ^c
		1.5 ^{po}	41.4 ^{po}	10.5 ^{po}	1.9 ^{po}	42.1 ^{po}	2.6 ^{po}	58 ^{po}
Naira_Euro	NE	14.8 ^f	0.1 ^f	1.1 ^f	0.5 ^f	1.5 ^f	83.2 ^f	17 ^f
		53.5 ^{pr}	0.2 ^{pr}	0.7 ^{pr}	4.6 ^{pr}	12.7 ^{pr}	28.4 ^{pr}	72 ^{pr}
		14.4 ^c	1.1 ^c	0.0 ^c	0.1 ^c	2.7 ^c	81.7 ^c	18 ^c
		22.5 ^{po}	0.9 ^{e2}	4.9 ^{po}	0.8 ^{po}	0.2 ^{po}	70.7 ^{po}	29 ^{po}
Contribution to Others		25 ^f	51 ^f	17 ^f	8 ^f	4 ^f	28 ^f	132 ^f
		183 ^{pr}	2 ^{pr}	2 ^{pr}	22 ^{pr}	24 ^{pr}	29 ^{pr}	262 ^{pr}
		53 ^c	46 ^c	30 ^c	15 ^c	19 ^c	34 ^c	198 ^c
		39 ^{po}	70 ^{po}	44 ^{po}	12 ^{po}	3 ^{po}	29 ^{po}	196 ^{po}
Contribution including Own		121 ^f	146 ^f	57 ^f	88 ^f	78 ^f	111 ^f	21.1% ^f
		265 ^{pr}	97 ^{pr}	33 ^{pr}	79 ^{pr}	68 ^{pr}	57 ^{pr}	43.6% ^{pr}
		139 ^c	120 ^c	66 ^c	71 ^c	88 ^c	115 ^c	33.0% ^c
		133 ^{po}	143 ^{po}	83 ^{po}	96 ^{po}	46 ^{po}	99 ^{po}	32.7% ^{po}

Source: Authors Computations. Note: ^f, ^{pr}, ^c and ^{po} denote full sample and sub-samples for pre-, during and post- global financial crisis periods respectively.

Panel B: Diebold and Yilmaz (2012) Test								
Currency Pairs	FX	NSF	ND	NW	NY	NP	NE	CFO
Naira_Swiss_Franc	NSF	91.3 ^f	0.1 ^f	1.1 ^f	1.3 ^f	0.1 ^f	6.1 ^f	9 ^f
		31.2 ^{pr}	0.2 ^{pr}	0.1 ^{pr}	15.4 ^{pr}	21.9 ^{pr}	31.2 ^{pr}	69 ^{pr}
		76.4 ^c	0.6 ^c	3.6 ^c	2.8 ^c	2.6 ^c	14.1 ^c	24 ^c
		91.0 ^{po}	0.6 ^{po}	1.0 ^{po}	2.0 ^{po}	0.2 ^{po}	5.3 ^{po}	9 ^{po}
Naira_Dollar	ND	0.1 ^f	91.6 ^f	1.0 ^f	1.1 ^f	0.3 ^f	6.0 ^f	8 ^f
		4.2 ^{pr}	90.7 ^{pr}	0.0 ^{pr}	1.4 ^{pr}	2.2 ^{pr}	1.6 ^{pr}	9 ^{pr}
		7.5 ^c	64.5 ^c	11.0 ^c	4.4 ^c	6.5 ^c	6.2 ^c	36 ^c
		0.5 ^{po}	65.7 ^{po}	24.8 ^{po}	0.4 ^{po}	1.1 ^{po}	8.4 ^{po}	35 ^{po}
Naira_Waua	NW	8.0 ^f	24.1 ^f	37.8 ^f	5.9 ^f	2.8 ^f	21.4 ^f	62 ^f
		17.2 ^{pr}	0.5 ^{pr}	13.3 ^{pr}	16.2 ^{pr}	22.0 ^{pr}	30.8 ^{pr}	87 ^{pr}
		7.9 ^c	13.7 ^c	30.2 ^c	5.9 ^c	8.2 ^c	34.0 ^c	70 ^c
		12.9 ^{po}	23.8 ^{po}	39.7 ^{po}	8.5 ^{po}	0.8 ^{po}	14.3 ^{po}	60 ^{po}
Naira_Yen	NY	0.1 ^f	3.9 ^f	10.4 ^f	83.6 ^f	0.2 ^f	1.7 ^f	16 ^f
		19.1 ^{pr}	0.8 ^{pr}	0.2 ^{pr}	45.9 ^{pr}	14.2 ^{pr}	19.8 ^{pr}	54 ^{pr}
		8.1 ^c	19.8 ^c	7.7 ^c	61.1 ^c	0.5 ^c	2.8 ^c	39 ^c
		0.1 ^{po}	3.7 ^{po}	7.6 ^{po}	86.2 ^{po}	1.1 ^{po}	1.3 ^{po}	14 ^{po}
Naira_Pound	NP	1.0 ^f	21.3 ^f	1.0 ^f	0.3 ^f	76.1 ^f	0.2 ^f	24 ^f
		19.2 ^{pr}	0.1 ^{pr}	0.1 ^{pr}	10.3 ^{pr}	38.4 ^{pr}	32.0 ^{pr}	62 ^{pr}
		9.8 ^c	0.3 ^c	8.2 ^c	5.6 ^c	68.2 ^c	7.9 ^c	32 ^c
		1.3 ^{po}	38.0 ^{po}	14.3 ^{po}	1.8 ^{po}	41.8 ^{po}	2.8 ^{po}	58 ^{po}
Naiara_Euro	NE	13.6 ^f	0.1 ^f	1.1 ^f	0.5 ^f	1.5 ^f	83.2 ^f	17 ^f
		21.5 ^{pr}	0.1 ^{pr}	0.2 ^{pr}	12.8 ^{pr}	25.8 ^{pr}	39.6 ^{pr}	60 ^{pr}
		12.7 ^c	0.6 ^c	0.1 ^c	0.2 ^c	2.8 ^c	83.6 ^c	16 ^c
		21.4 ^{po}	0.3 ^{e2}	5.3 ^{po}	1.4 ^{po}	0.2 ^{po}	71.4 ^{po}	29 ^{po}
Contribution to Others		23 ^f	50 ^f	15 ^f	9 ^f	5 ^f	35 ^f	136 ^f
		81 ^{pr}	2 ^{pr}	1 ^{pr}	56 ^{pr}	86 ^{pr}	115 ^{pr}	341 ^{pr}
		46 ^c	35 ^c	31 ^c	19 ^c	21 ^c	65 ^c	216 ^c
		36 ^{po}	66 ^{po}	53 ^{po}	14 ^{po}	3 ^{po}	32 ^{po}	205 ^{po}
Contribution including Own		114 ^f	141 ^f	52 ^f	93 ^f	81 ^f	119 ^f	22.7% ^f
		112 ^{pr}	92 ^{pr}	14 ^{pr}	102 ^{pr}	125 ^{pr}	155 ^{pr}	56.8% ^{pr}
		122 ^c	100 ^c	61 ^c	80 ^c	89 ^c	148 ^c	36.0% ^c
		127 ^{po}	131 ^{po}	93 ^{po}	100 ^{po}	45 ^{po}	103 ^{po}	34.2% ^{po}

Source: Authors Computations.

Note: ^f, ^{pr}, ^c and ^{po} denote full sample and sub-samples for pre-, during and post- global financial crisis periods respectively.

When the effect of the global crisis is accommodated however, the spillovers from other currencies significantly reduce during and post-crisis periods from its pre-crisis period while own spillovers increase substantially. The only exception in this regard is the US Dollar where the spillovers from other currencies during the pre-crisis to the tune of 9

percent is less than those obtained during and post-crisis periods which are estimated as 36 and 35 per cent respectively (see Table 3, Panel B). This behavior is also noticed for the spillover obtained for the DY (2009). Table 5 below summarizes the total spillover effect due to the global financial crisis of 2007 – 2009. The total spillover index shows that the pre-crisis period records the highest spillover which is estimated as 43.6 percent and 56.8 percent for DY (2009) and DY (2012) respectively. During the crisis however, the total spillover reduces to 33.0 percent and 36.0 percent for the two tests respectively and declines further to 32.7 and 34.2 per cent for the two tests respectively after the crisis.

Table 5: Spillover index
[Full sample and electioneering effects sub-samples]

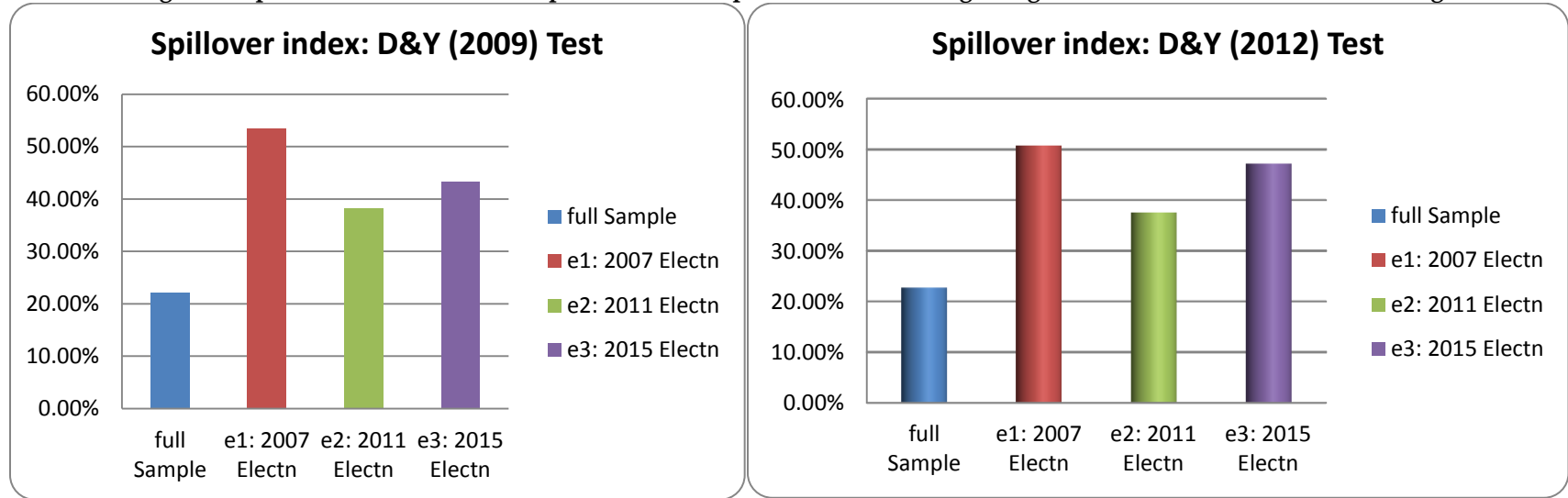
Sample Range	Spillover index: D&Y (2009) Test	Spillover index: D&Y (2012) Test
full Sample	22.10%	22.70%
e1: 2007 Election	53.50%	50.70%
e2: 2011 Election	38.20%	37.60%
e3: 2015 Election	43.40%	47.20%

Table 6: Spillover index
[Full sample and global crisis effects sub-samples]

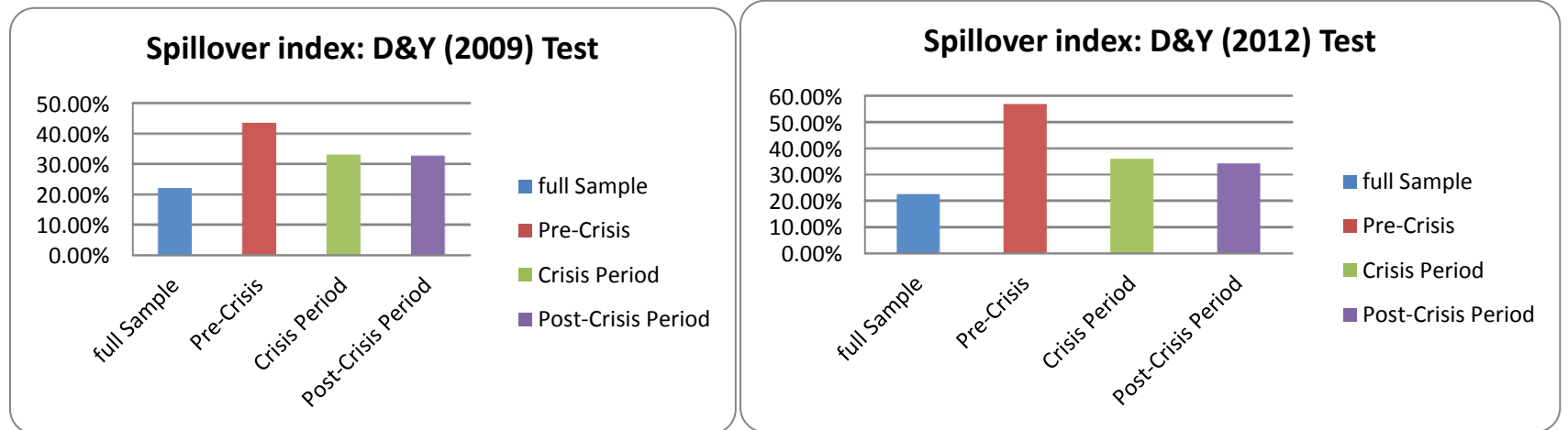
Sample Range	Spillover index: D&Y (2009) Test	Spillover index: D&Y (2012) Test
full Sample	22.10%	22.70%
Pre-Crisis	43.60%	56.80%
Crisis Period	33.00%	36.00%
Post-Crisis Period	32.70%	34.20%

Together with these summary tables (Tables 5 and 6), figure 2 compares the spillover effect among the selected *naira* exchange rates for the electioneering and global crisis effects. As evident, the spillovers from these two effects behave in opposite directions. The three electioneering processes under review (2007, 2011 and the 2015 elections) increase the total spillover effects of these *naira* exchanges with the 2011 election being the least with 38.2 percent and the 2007 election being the highest with 53.5 percent spillover. The spillovers from these elections are all greater than the full sample case which is taken as the average value. For the global financial crisis, total spillover effects follow a downward trend. Intuitively, it suggests that the occurrence of the global crisis has redefined the currency interactions among these economies as the spillover effects continue to reduce and remain low from its pre-crisis level (see figure 2). Nonetheless, internal shocks occasioned by political processes and policy surprises may have implications on the behaviour of the spillovers.

Figure 2: Spillover index for full sample and sub-samples of electioneering and global crisis effects on *Naira* exchanges



Source: Authors



Source: Authors

6.0 Conclusion

This study investigates the spillover effects among six most traded currencies namely the US Dollar, Euro, Pound Sterling, Yen, Swiss Franc and the West African Unit of Account (WAUA). It employs data covering both the electioneering episodes in Nigeria and global financial crisis. The sub-samples for the electioneering activities are determined based on the three election periods covered in the analyses namely 2007, 2011 and 2015 elections. For the global financial crisis, three sub-samples are also considered for the periods of pre-, during and post- crisis. Using the Diebold and Yilmaz (2009, 2012) tests for the spillover effects, we find that during the electioneering episodes, the *naira* exchange rates tend to experience greater spillovers than during the episodes for global financial crisis. In addition, the former produces a somewhat increasing spillover effect, while the latter produces a decreasing spillover effect. In other words, significant variations in the *naira* exchange rates are more likely to be noticed during the electioneering period and these variations may fuel higher volatility among the most traded foreign currencies in the country.

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