Symmetric and Asymmetric Responses of Consumer Prices Index Inflation to Exchange Rates in Nigeria

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Perekunah B. Eregha

Research Paper 509

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Bringing Rigour and Evidence to Economic Policy Making in Africa

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Contents

List of tables

List of figures

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Abstract

The question whether domestic prices respond to either official exchange rate or parallel exchange rate movements is a key research issue, especially in an oil-dependent developing country such as Nigeria that has rising fiscal pressures and a vibrant parallel foreign exchange market. From the monetary authority perspective, it is also imperative to know if prices respond symmetrically and/or asymmetrically to both official and parallel exchange rate movements. Consequently, this study examines the response of domestic prices to both official and parallel exchange rate movements for the period 1995.1–2019.1 using Shin et al's (2014) non-linear ARDL approach. The results show that the magnitude of the effect of parallel exchange rates on domestic prices is more than that of the official exchange rate's effect in a symmetric case. However, only domestic prices respond differently to the depreciation and appreciation of the official exchange rate in Nigeria. Consequently, the government needs to ensure some level of fiscal austerity, and possibly exchange rate unification when the premium grows too big, if the intention is to insulate domestic prices from fiscal pressures. Also, the Central Bank of Nigeria needs to be aware of a possible asymmetric relationship in its decisions to ensure price stability so that it does not distort monetary policy effects.

Keywords: Consumer price; Food price; Official exchange rate; Parallel exchange rate; Non-linear Autoregressive Distributed Lag.
JEL Codes: C32; E31; F31

1. Introduction

A firm understanding of the dynamics of inflationary pressures is imperative to ensure not only proper policy direction, but also the effectiveness of the monetary policy stance in an oil-dependent developing economy. In the literature, two prominent approaches dominate in explaining this dynamic, the Phillips curve and quantity theory (Durevall et al, 2013). Most studies on sub-Saharan Africa pay more attention to the use of quantity theory, focusing on excess money supply as the driver of inflation due to a large informal sector and an alarming unemployment rate (see Durevall et al, 2013). However, the role of foreign prices and the exchange rate as a nominal anchor have recently been considered in the literature in modelling inflationary dynamics (see Olubusoye and Oyaromade, 2008; Delatte and López-Villavicencio, 2012; Durevall et al, 2013; Baharumshah et al, 2017). Thus, providing an understanding of the response of domestic prices (both CPI – consumer prices index – and food) to the dynamics of the nominal exchange rate is critical to monetary policy decisions, especially when the primary objective of the central bank is price stability in an oil-dependent developing economy (Delatte and López-Villavicencio, 2012). This is the main thrust of this study on Nigeria.

The Nigerian economy operates multiple exchange rate windows, with the most prominent the official and the parallel exchange rates.[1] Over the years, the gap between these two exchange rates has widened, especially in periods of negative oil price shocks, as the government treats positive oil price shocks as permanent that results in procyclical fiscal shocks. Oil accounts for about 90% of exports and foreign exchange in Nigeria and the country is a major importer of both consumables and capital goods. In fact, non-oil imports account for roughly 91% of imports, which may consequently cause a possible terms-of-trade shock on domestic prices. This partly explains the reason for persistent external imbalances due to global oil price shocks, which may affect domestic prices via the exchange rate. However, the government imposes exchange rate controls with the intention of isolating inflation from fiscal pressures as the parallel rate is expected to absorb this pressure. However, balance-of-payments (BoP) adjustments respond to the real exchange rate via the exchange rate pass-through channel (Delatte and López-Villavicencio, 2012). This necessitates the need to consider exchange rate pass-through to domestic prices in Nigeria, especially as it has both official and parallel market rates.

In addition, the intention of the government is to maintain the role of the official exchange rate as a nominal anchor so as to isolate domestic prices from fiscal pressures. However, available evidence shows that when exchange rate premium gets very big, the isolation of domestic prices from fiscal pressure breaks down (Kaufmann and O'Connell, 1999; Kiguel and O'Connell, 1995). Nigeria is basically a net seller of foreign exchange to the private sector, mainly from oil-export earnings. From existing studies, it is evident that devaluing the official exchange rate when the exchange rate premium is big could curtail fiscal pressure but, conversely, rising the parallel rate might spur inflation (Pinto, 1990; Morris, 1995; Kiguel and O'Connell, 1995). The question, therefore, is how domestic prices (CPI and food) respond to movements in both the official and parallel rates. While there are studies on the response of inflation to the exchange rate, the response to both official and parallel rates in providing policy direction has received less attention in Nigeria. More importantly, previous studies assumed a symmetric long-run connection between price levels and the exchange rate, yet this assumption looks restrictive and might distort the effectiveness of monetary policy (Delatte and López-Villavicencio, 2012). With two prominent exchange rates in Nigeria, it is imperative to further pursue and analyse not only the symmetric response but also the asymmetric response of domestic price levels (CPI and food) to the two exchange rates to provide empirical support for monetary policy decisions in Nigeria.

The literature is mixed on the symmetric connection. For example, Ndulu and Hyuha (1990), Azam (1999) and Rutasitara (2004) find parallel exchange rates do explain domestic prices, Canetti and Greene (1991), Hyuha (1992), Kuijs (1998), Olubusoye and Oyaromade (2008), Imimole and Enoma (2011) provide evidence of domestic prices responding to the official exchange rate, while Chhibber and Shafik (1992), Barungi (1997), Bada et al (2016) show evidence of anti-inflationary effects from the official exchange rate. Also, Durevall et al (2013) show that domestic prices respond to foreign prices. On the asymmetric connection, recent studies like Zhu and Chen (2019), Baharumshah et al (2017) and Delatte and López-Villavicencio (2012) show an asymmetric effect of exchange rates on domestic prices. Regarding exchange rate regimes, fixed regimes can ensure low inflation if there is adherence to prudent fiscal policy. Conversely, floating exchange rates have also been found to ensure stable inflation with prudent fiscal policy (Siklos, 1996; Toulaboe and Terry, 2013). Toulaboe and Terry (2013) argue that the credibility of fixed regimes can be abused with the pursuit of expansionary policy. Also, deteriorating tax collection has the tendency to manifest in macroeconomic disequilibrium resulting in unrealistic exchange rates, deteriorating BOP, monetization of fiscal deficits and growing external debt arrears (Toulaboe and Terry, 2013). Barungi (1997) and Rutasitara (2004) argue that the relevant exchange rate for traded goods and portfolio shifts when the exchange rate is over-valued is the parallel rate in countries where a parallel market exists . However, devaluing the official exchange rate could translate into an improvement in budgetary resources and a reduction of foreign exchange demand, thereby reducing the upward pressure on the price level (Barungi, 1997).

This study contributes to the literature by gauging the symmetric and asymmetric response of both domestic CPI and food prices to both official and parallel exchange rates in Nigeria. The focus on Nigeria is not only understandable but also imperative based on recent experiences, due to a slump in the oil price coupled with a rising debt profile, that could provide a guide to countries with similar experiences. By examining this connection, this study pays specific attention to periods where the exchange rate premium becomes very big and the government maintains some level of exchange rate controls. To the best of our knowledge, except for the studies by Zhu and Chen (2019), Baharumshah et al (2017) and Delatte and López-Villavicencio (2012), previous studies always assumed a symmetric long-run relationship between domestic prices and the exchange rate. This is under a rigid and restrictive assumption that both depreciation and appreciation have the same effect on price level. Consequently, a distortionary effect of monetary policy may ensue with the omission of the asymmetric effect (Delatte and López-Villavicencio, 2012). This is where prices are sticky downwards and price adjustments to exchange rate depreciation and appreciation depend on the underlying fiscal and monetary policies. When a country is unable to curtail spending amidst depreciation or devaluation, as necessary due to a deteriorating BOP position, the aftermath effect is inflationary pressure especially in the case of import and oil-dependent economies (Pinto, 1990; Morris, 1995; Kiguel and O'Connell, 1995; Kaufmann and O'Connell, 1999). This study is different from the works of Zhu and Chen (2019), Baharumshah et al (2017) and Delatte and López-Villavicencio (2012) because both official and parallel exchange rates are considered. Also, the study controls for periods of widening exchange rate premiums in Nigeria.

Therefore, the main objective of the study is to examine the response of domestic CPI and food prices to exchange rate movements in Nigeria. Specifically, the study:

(i) estimates the short-run and long-run (a)symmetric response of domestic CPI and food prices to official exchange rates between the naira and the dollar in Nigeria, and

(ii) analyses the short-run and long-run (a)symmetric response of domestic CPI and food prices to parallel market exchange rates between the naira and the dollar in Nigeria.

2.The Nigerian economy: stylized facts

Nigerian macroeconomic environment

Table 1 presents selected macroeconomic indicators from 1996–2019 characterizing Nigeria's macroeconomy. A cursory look at the table shows that inflation in Nigeria has always been in double digits, hovering around 12% except on a few occasions when the country experienced single-digit inflation. Also, the average growth rate was around 3.06% between 1996 and 2000, with a slight improvement to about 4.03% between 2001 and 2004. The growth rate hovered, on average, around 6.0% from 2005–2014, but declined significantly to an average of 1.24% due to declining oil prices that affected the government's fiscal position.

Table 1: Selected macroeconomic indicators

Series/period	1996–2000	2001–2004	2005–2009	2010–2014	2015–2019
Real GDP growth (%)	3.06	4.03	6.78	6.06	1.24
CPI inflation (%)	12.7	15.32	11.15	10.68	12.94
External reserves (US$ billion)	5.79	9.64	42.07	38.17	34.67
Oil price (US$)	19.68	29.35	72.88	103.48	56.63
Actual deficit to GDP ratio (%)	-1.75	-1.45	-0.67	-1.51	-2.29

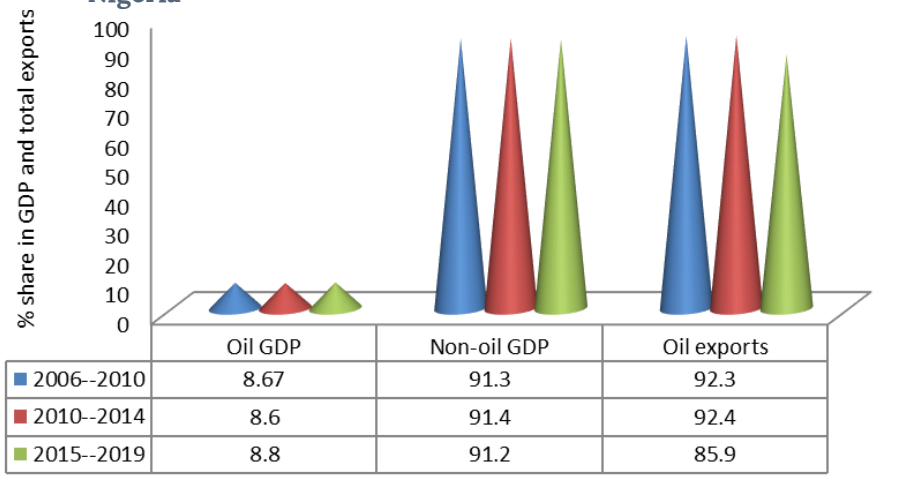
Source: CBN (2019) Statistical Database Online.

Foreign reserves have grown from about US$5.79 billion on average in 1996 to around US$42.07 billion in 2009, but declined in 2015 during the oil price collapse to around US$34.67 billion, on average. This is understandable as oil exports constitute about 90% of foreign exchange earnings in Nigeria. This also partly explains the movement in both the parallel and official exchange rates. From the table, it is evident that the country's fiscal position, which relies so much on oil revenue, has always been in deficit. In fact, even in periods where oil prices averaged above US$100 per barrel, the government was not prudent enough to run a surplus to ensure some procyclicality due to fiscal shocks in the economy.

Structure of GDP and exports in Nigeria

Figure 1 shows that the non-oil sector contributes roughly 91% of GDP in Nigeria, but the reverse is true on the export side as oil exports account for about 91%. Prior to the discovery of crude oil in commercial quantities in Nigeria, the non-oil sector accounted for a significant amount of exports. However, when oil was discovered, the trend was reversed to the extent that the non-oil sector contribution to exports became insignificant over the years. This is an indication of an undiversified economy, and the uncompetitive nature of the significant non-oil production sectors in global trade exposes the economy to incessant terms-of-trade shocks. This may have serious implications for domestic prices through the GDP deflator.

Figure 1: Trend of oil GDP, non-oil GDP and oil exports share in total exports in Nigeria

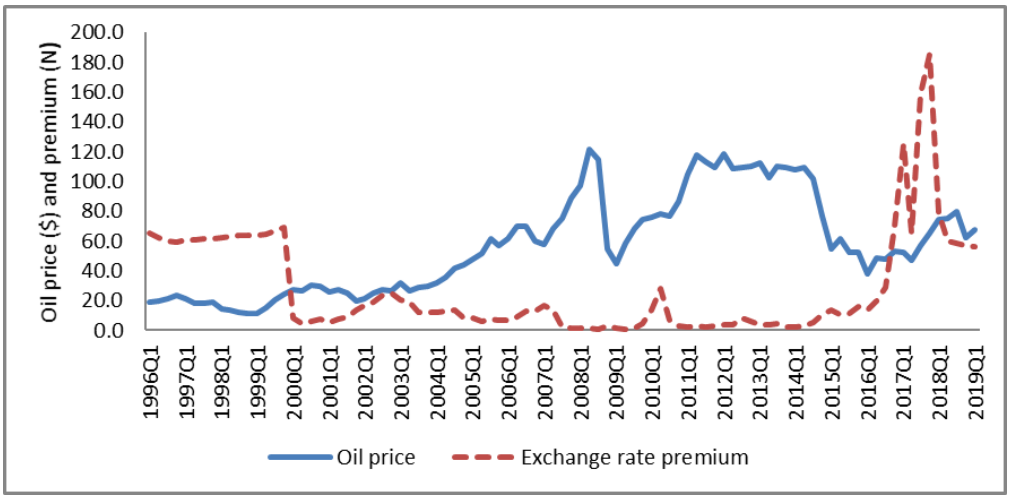


	Oil GDP	Non-oil GDP	Oil exports
2006--2010	8.67	91.3	92.3
2010--2014	8.6	91.4	92.4
2015--2019	8.8	91.2	85.9

Source: CBN (2019) online database.

Figure 2 presents the exchange rate premium and the oil price during the period of the study. The figure shows that there has always been a gap between the official rate and the parallel market rate and that this gap is most pronounced during periods of declining oil prices. The widening gap is largely attributed to foreign exchange supply restrictions as demand surpasses supply in the official foreign exchange market. In Nigeria, oil exports constitute a significant source of foreign exchange earnings, followed by remittances. Thus, foreign reserve accretion in Nigeria is largely dependent on oil exports. Also, the fiscal position of government is closely tied to the oil price benchmark, which largely explains fiscal shocks in Nigeria. In fact, the government often treats positive oil price shocks as permanent without smoothing consumption, and in periods of negative oil price shocks the government finds it difficult to avoid macroeconomic instability.

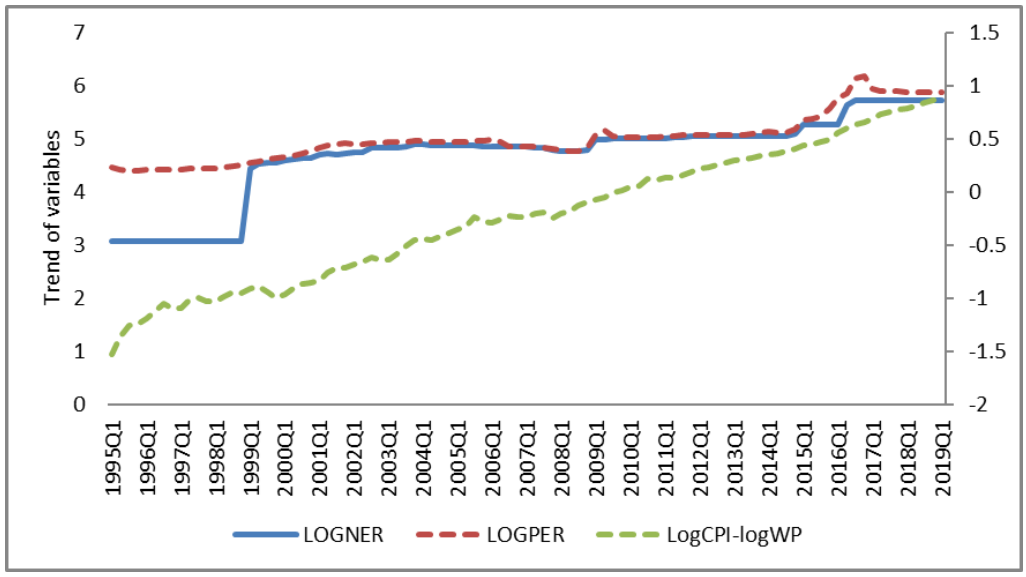
Figure 2: Oil price and exchange rate premium



Source: CBN (2019) online database.

For example, between 1996 and 1999, the premium was significant when the oil price was around US$20 per barrel, but this was reversed as soon as the oil price trended positively from 2004–2008. When there was a sudden decline in 2008/2009, it was reflected in the exchange rate premium in 2009 as the premium again increased slightly during the 2008/2009 global financial crisis. By the end of 2014–2015, there was a sudden oil price plunge as global demand declined, which resulted in negative commodity price shocks around the world. The premium widened in the same period with a rising trend until the second quarter of 2017 when the oil price picked up largely due to rising global demand. This shows some relationship between oil price movements and exchange rate premiums in Nigeria. Figure 3 presents the trend of the consumer prices index compared to the two exchange rates in Nigeria. From the figure, it is clear that the log of the consumer prices index and the log of both official and parallel exchange rates show some observable correlations.

Figure 3: Exchange rate trends and consumer prices



Source: CBN (2019) online database.

The rate of change differs between exchange rates and domestic prices. From Figure 3 there seems to be a relationship between the trends. It is clear that official exchange rates and parallel rates have some collinearity over the years as they show similar patterns in their movement. The rising trend of domestic prices in Nigeria can largely be attributed to terms-of-trade shocks due to the import-dependent nature of the economy, as well as other supply constraints and excess money supply.

The Nigerian case is an oil story. Rising oil prices may have informed the government's decision to use expansionary fiscal policy over the years in Nigeria. This is also due to the fact that budget preparation relies largely on the oil price benchmark per barrel. Thus, oil price movements may cause twin deficits that could result in declining output and, invariably, put pressure on domestic prices. This is not far-fetched as rising oil prices ensure support for increasing foreign exchange earnings and improving government revenue. This helps to support price stability as the fiscal position improvements coupled with rising foreign reserves support the domestic currency.

Exchange rate management in Nigeria: Brief historical review

Before the establishment of the CBN (Central Bank of Nigeria) in 1958, foreign exchange management was underdeveloped. However, with the CBN in place, the fixed exchange rate system existed until the introduction of Structural Adjustment Programme (SAP), when the system was liberalized. Historically, the monetary authority has introduced a fixed, flexible and hybrid of both systems, depending on the economic situation and

objectives of the government. Table 2 provides a brief historical review of the various exchange rate management practices in Nigeria.

Table 2: Exchange rate administration and practices in Nigeria

Period	Exchange rate system	Remarks
1995	Flexible exchange rate system	Done with guided deregulation of market to curb substantial depreciation and ensure efficient allocation
1999	Reintroduction of interbank exchange system (IFEM)	To further free up market to restore stability
2002	Re-introduction of Retail Dutch Auction System (RDAS)	To further strengthen the naira
2006	Wholesale Dutch Auction System (WDAS)	To strengthen gains of RDAS and further free up market
2009	Reintroduction of RDAS	Because of financial crisis of 2008 due to large foreign exchange outflow
2015	Managed floating system introduced (closed official window)	Due to demand and widening exchange rate premium, CBN directed all demand to interbank market
2016/2017	Investor and exporter window (continuation of managed float system)	To ensure liquidity in interbank market and narrow widening premium

Source: Compiled by author from CBN (2016).

The main thrust of exchange rate management is price stability coupled with the preservation of foreign reserves to defend the naira, also to ensure economic diversification and the narrowing of the exchange rate premium. However, Nigeria has operated multiple exchange rates over the years, accompanied by a delay in unification when the need arises due to macroeconomic imbalances. Nigeria has an official window, a parallel market rate, and different windows for the manufacturing sector, Small and Medium Enterprises (SMEs), and a rate for those embarking on a pilgrimage. In the literature, Pinto (1990), Morris (1995), Kiguel and O'Connel (1995) and Kaufmann and O'Connell (1999) suggested that with exchange rate unification the existence of multiple exchange rates undermines the efficient allocation of resources, which invariably aids the likelihood of domestic and external imbalances in the economy.

3. Literature review

In a country where official and parallel exchange rates exist, governments often impose exchange controls to isolate the inflation rate from fiscal pressures, with the intention that the parallel rate will absorb the pressures while retaining the nominal anchor role as official exchange rate (Kaufmann and O'Connell, 1999; Kiguel and O'Connell, 1995). However, when the premium becomes too big, the insulation of prices from fiscal pressures may break down. The literature shows that when a country is a net seller of foreign exchange (from oil-exporting earnings) to the private sector, the devaluing of the official rate when the parallel premium is large will actually reduce inflation, while increases in the parallel rate will spur inflation (Pinto, 1990). On exchange rate regimes, it is postulated that during periods when foreign reserves are depleted and foreign exchange demand cannot be met, a fixed policy results in an overvalued exchange rate that makes the export sector uncompetitive, and with an active parallel market where the rate is determined by market forces the relevant rate of exchange for portfolio shifts and traded goods is the parallel market rate, as it is the marginal cost of foreign exchange (see Barungi, 1997). The implication is that instead of a fixed policy to maintain price stability, the reverse might be the case in such a situation. Therefore, the response of domestic prices to the official and parallel exchange rates might differ, and an asymmetric response is also possible.

Looking at empirical studies in the literature, there is still very little on the effect of the parallel market rate and the focus is more on the effect of official exchange rate and exchange rate policies on inflation. However, most studies on exchange rate policy are panel data studies on a combination of developing countries. For example, Ndulu and Hyuha (1990), Camen (1994), Azam (1999) and Rutasitara (2004) found that the parallel exchange rate influences inflation. Surprisingly, while Canetti and Greene (1991), Hyuha (1992), Kuijs (1998) and Imimole and Enoma (2011) found that an official exchange rate influences inflation, Chhibber and Shafik (1992), Barungi (1997) and Bada et al (2016) found that it is anti-inflationary.

On exchange rate policy, Ghosh et al (1997), Rogoff et al (2003), Domac et al (2004), Bleaney and Francisco (2007), Sokolov et al (2011) and Toulaboe and Terry (2013) found fixed exchange rate regimes to be less inflationary than flexible policies. However, Levy-Yeyati and Sturzenegger (2000) found inflation rates to be similarly correlated with fixed and pure floating policies, but higher for intermediate policy. Olubusoye and Oyaromade (2008) found petroleum prices, money growth and exchange rates to

significantly explain inflation although output was insignificant. However, Ghanem (2010) found a fixed regime to be unsuccessful in maintaining low and stable inflation with a de jure classification, but found inflation to be considerably lower with a de facto classification. Baharumshah et al (2017) and Delatte and López-Villavicencio (2012) utilized an asymmetric cointegration model that showed exchange rate depreciations pass through to prices more than appreciations. Durevall, et al (2013) found that domestic prices respond to foreign food prices in the long run, while in the short-run, food inflation responded to agricultural supply shock and money supply growth affects non-food inflation.

Regarding exchange rate unification: due to its perceived effect on money growth and inflation, Pinto (1990) showed that if government is a net seller of foreign exchange, unification imposes a fiscal shock that triggers money creation and inflation in the long run, unless government makes a concerted effort to ensure fiscal austerity. Morris (1995) illustrated a case where the Pinto (1990) results can be reversed. According to the author, if money creation does not take place, unification is not inflationary, otherwise it is. If the foreign exchange account is in surplus, unification should not be inflationary, but if it is in deficit, then unification is inflationary. Kiguel and O'Connell (1995) identified illegal trade and prices as the two channels through which parallel exchange rates transmit to the economy. According to the authors, it promotes the diversion of exports from official to unofficial rates, while the reverse is true for imports, which undermines trade tax revenue. The study further highlighted that domestic prices of imported goods are determined by the world price and the parallel exchange rate, and that governments, mostly in developing countries, respond to external imbalances by tightening monetary policy and/or exchange rate controls instead of contractionary fiscal policy. Consequently, fiscal indiscipline amidst devaluation or depreciation results in an inflation tax to service the country's debt obligation. Kaufmann and O'Connell (1999) later revealed that there was no economic benefit from delayed or gradual unification when there are serious macroeconomic woes. In fact, the study showed that a more aggressive attempt at unification will engender a fiscal bonus, and curtail money growth and inflationary pressures.

4.Data and methodology

In modelling the dynamics of inflation in Nigeria, this study follows Durevall et al's (2013) framework that allows for testing various hypotheses without restriction, while also accounting for specific peculiarities of Nigeria as an oil-dependent economy. The framework is based on the quantity theory focusing on the role of money demand as against the Phillips curve theory due to the low degree of labour-market organization, extensive underemployment and a large informal sector, which is also the case in Nigeria. This explains the idea of excess money as a driver of inflation due to fiscal pressure that is largely due to the monetization of deficit financing. In the Durevall et al (2013) framework, the long-run determinants of the domestic price level are based on the fact that inflation is usually expected to originate from the monetary and foreign sectors in an open economy via money demand and purchasing power parity

Consequently, Durevall et al (2013) showed that variation in domestic prices can be explained by deviations from the steady-state equilibrium in the monetary and external sectors, thus:

$$\log\left({}^{m}/_{p}\right) = \alpha_0 + \alpha_1 y + \alpha_2 r \quad (1)$$

$$p = \vartheta_1 e + \vartheta_2\, wp - \vartheta_4 t_1 \quad (2)$$

$$pf = \gamma_1 e + \gamma_2 wfp - \gamma_4 t_2 \quad (3)$$

Where m/p = real money balance, y = log of real output, r = rate of return, p and pf = log of general domestic and food prices, e = log of the exchange rate, wp and wfp are logs of world prices and world food prices and t_1 and t_2 are trends in prices. Equations 2 and 3 indicate the purchasing power parity (PPP) relationship between the long-run external market equilibrium for the general domestic and food sectors. Equation 2 shows that domestic consumer prices are assumed to adjust to world consumer prices and the exchange rate in the long run, while Equation 3 indicates that domestic food prices adjust to world food prices and the exchange rate. Durevall et al (2013) estimated Equations 1–3 separately and included their long-run deviations in explaining four prices in a single-equation Error Correction Mechanism (ECM), although with variations to account for specific other drivers. Through supply shocks, agricultural goods affect food inflation; several other drivers such as exchange rate

changes, energy prices, imported inflation and world fertilizer prices were included. As the framework is not restrictive and allows testing for several hypotheses, this study adopts it with modifications to account for our variables of interest (official and parallel market exchange rate changes). The main thrust of this study is the short-run and long-run asymmetric response of general CPI and food inflation to exchange rates. The study used oil prices instead of energy prices, used by Durevall et al (2013), because of the importance of oil in Nigeria. The use of oil prices is also supported by Baharumshah et al (2017).

Therefore, based on the Durevall et al (2013) framework in Equations 1–3 informing the empirical specification, and the Baharumshah et al (2017) and Delatte and López-Villavicencio (2012) specifications that specifically account for asymmetric exchange rate pass-through to domestic prices, we specify our Autoregressive Distributed Lag (ARDL) equation accounting for the ECMs of Equations 1–3: as

$$\Delta p_t = \vartheta + \sigma_p p_{t-1} + \sigma_e e_{t-1} + \sigma_o op_{t-1} + \sigma_w wp_{t-1} + \sigma_m ecm\_mb_{t-1} + \sum_{k=1}^{n} \beta_k{}' \Delta p_{t-k} + \sum_{k=0}^{n} (\gamma_k{}' \Delta e_{t-k} + \alpha_k' \Delta Op_{t-k} + \delta_k' \Delta m2_{t-k} + \varphi_k' \Delta wp_{t-k} + b_k' \Delta y_{t-k}) + \sigma_D PreDum_t + \sigma_t trend_t + \epsilon_{1t} \quad (4)$$

$$\Delta pf_t = \vartheta + \sigma_p pf_{t-1} + \sigma_e e_{t-1} + \sigma_o op_{t-1} + \sigma_w wfp_{t-1} + \sigma_m ecm\_mb_{t-1} + \sum_{k=1}^{n} \beta_k{}' \Delta pf_{t-k} + \sum_{k=0}^{n} (\gamma_k{}' \Delta e_{t-k} + \alpha_k' \Delta Op_{t-k} + \delta_k' \Delta m2_{t-k} + \varphi_k' \Delta wfp_{t-k} + b_k' \Delta y_{t-k}) + \sigma_D PreDum_t + \sigma_t trend_t + \epsilon_{2t} \quad (5)$$

Equations 4 and 5 are the ARDL specifications for the general domestic and food prices in Equations 2 and 3, respectively. e_t e_t in the models represents both official exchange ($\boldsymbol{e_{ot}} \boldsymbol{e_{ot}}$) and parallel exchange ($\boldsymbol{e_{pt}} \boldsymbol{e_{pt}}$) rates. $ecm_{mb} = ecm_{mb} =$ error correction mechanism of the real money balance in Equation 1 as a measure of excess money supply:

$$ecm\_mb = \log(m/p) - \alpha_1 y - \alpha_2 r \quad (6)$$

Oil price is added to the specification later as Nigeria's main budgetary assumption is based on oil price and it is evident that during periods of declining oil prices, the country experiences negative revenue shocks that widen the country's deficit, which may put pressure on domestic prices. Also, movements in the oil price have an effect on foreign reserves via export earnings, thus transmitting into exchange rate pass-through to domestic prices via imports. In fact, the premium between the official rate and parallel rate becomes bigger during periods of negative oil price shocks. The inclusion of the oil price is also supported by the inclusion of oil prices by Baharumshah et al (2017) and energy prices by Durevall et al (2013) and Delatte and López-Villavicencio

(2012) in their final estimations. The study also controls for widening exchange rate premiums. A dummy variable (PreDum)[2] accounting for periods of widening exchange rate premiums is also included; it takes a value of 1 for periods of widening premiums and zero otherwise. This is also an indication of periods where the government decided to allow exchange rate controls, which led to negative oil prices.

Equations 4 and 5 are the Pesaran et al (2001) symmetric ARDL specification. The main variable of interest is e_t (log of exchange rate for both parallel and official), ϵ_{1t} and ϵ_{2t} are iid processes. Equations 4 and 5 are the ARDL specification and allow both short-run and long-run analyses with a series of either I(1) or I(0), or both. This study adopts both the Banerjee et al (1998) and Pesaran et al (2001) approaches for testing symmetric long-run relationships. For the Banerjee at al. (1998) approach, (t_{BDM}), if $\sigma_p = 0$, it means there is no symmetric long-run relationship using the t-statistic. However, with the Pesaran et al (2001) approach (F_{pp}), the joint F-statistic test is computed against the Pesaran et al (2001) critical values taken from the lower and upper bounds, depending on whether the regressors are I(1) or I(0); if the computed F-statistic is above the upper critical values, there is a symmetric long-run relationship, if it lies below the lowest critical values, there is no evidence of a long-run relationship.

The purpose of this study is to allow for asymmetric responses. Following Baharumshah et al (2017) and Delatte and López-Villavicencio (2012), this study adopts the asymmetric long-run relationship model (non-linear ARDL) by Shin et al (2014). The study employs the Shin et al (2014) non-linear ARDL approach, which is an extension of the Pesaran et al (2001) ARDL approach. This is to ascertain whether the effect of rising parallel or official exchange rates on inflation (both domestic CPI and food) is different from that of declining rates both in official and parallel markets. The main aim of this is to account for the different effects of the appreciation (declining) and depreciation (rising) of both parallel and official exchange rates on both headline and food price inflation in Nigeria. Consequently, the movement of the exchange rate is decomposed into positive (depreciation) and negative (appreciation) partial sums, which is the starting point for Equations 7 and 8:

$$logE_t = logE_0 + logE_j^+ + logE_j^- \tag{7}$$

$$\begin{cases} e_t^+ = \sum_{j=1}^{t} \Delta logE_j^+ = \sum_{j=1}^{t} \max(\Delta logE_j, 0) \\ e_t^- = \sum_{j=1}^{t} \Delta logE_j^- = \sum_{j=1}^{t} \min(\Delta logE_j, 0) \end{cases} \tag{8}$$

Equation 8 is used to calculate the partial sum variables and thus replace the exchange rate variable to examine the non-linear effect. Consequently, Equations 4 and 5 can be modified to account for an asymmetric relationship as follows:

$$\Delta p_t = \vartheta + \sigma_p p_{t-1} + \sigma_e^+ e_{t-1}^+ + \sigma_e^- e_{t-1}^- + \sigma_o op_{t-1} + \sigma_w wp_{t-1} + \sigma_m ecm\_mb_{t-1} + \sum_{j=1}^{n} \beta_j' \Delta P_{t-j} + \sum_{k=0}^{n} (\gamma_k^{+\prime} \Delta e_t^+ + \gamma_k^{-\prime} \Delta e_t^- + \alpha_k' \Delta op_{t-k} + \delta_k' \Delta m2_{t-k} + \varphi_k' \Delta wp_{t-k} + b_k' \Delta y_{t-k}) + \sigma_D PreDum_t + \sigma_t trend_t + \epsilon_{1t} \quad (9)$$

$$\Delta pf_t = \vartheta + \sigma_p pf_{t-1} + \sigma_e^+ e_{t-1}^+ + \sigma_e^- e_{t-1}^- + \sigma_o op_{t-1} + \sigma_w wfp_{t-1} + \sigma_m ecm\_mb_{t-1} + \sum_{j=1}^{n} \beta_j' \Delta Pf_{t-j} + \sum_{k=0}^{n} (\gamma_k^{+\prime} \Delta e_t^+ + \gamma_k^{-\prime} \Delta e_t^- + \alpha_k' \Delta op_{t-k} + \delta_k' \Delta m2_{t-k} + \varphi_k' \Delta wfp_{t-k} + b_k' \Delta y_{t-k}) + \sigma_D PreDum_t + \sigma_t trend_t + \epsilon_{2t} \quad (10)$$

Where e_t in the models represents both the official exchange (e_{ot}) and parallel exchange rate (e_{pt}) as defined in Table 3.

Equations 9 and 10 are standard Shin et al (2014) non-linear ARDL specifications, and the sign with the size of the partial sum coefficients are used to determine the general and food inflation response to the exchange rate (either official or parallel asymmetries). Following from Equations 9 and 10, an asymmetric long-run cointegration test can be performed using the Banerjee at al. (1998) (t_{BDM}) and Pesaran et al (2001) (F_{pp}) approaches. Data for the study cover the period 1995.1–2019.1 as shown in Table 3.

Table 3: Variable definition and sources

Variables	Name		Source
p_t	Consumer prices index to capture inflation	Price index	CBN
p_{ft}	Food price index to capture food inflation	Price index	CBN
m_2	Money supply to capture quantity theory		CBN
op	Oil price	Crude oil price per barrel	CBN
gdp_t	Domestic output to capture aggregate demand	Nominal	CBN
e_{ot}	Official exchange rate	Nominal	CBN
e_{pt}	Parallel exchange rate	Nominal	CBN
e_t^+	Positive exchange rate movement to capture depreciation of both official ($e_{ot}^+ e_{ot}^+$) and parallel ($e_{pt}^+ e_{pt}^+$) rates	Nominal	Asymmetric measurement
e_t^-	Negative exchange rate movement to capture appreciation of both official ($e_{ot}^- e_{ot}^-$) and parallel ($e_{pt}^- e_{pt}^-$) rates	Nominal	Asymmetric measurement
r	Interest rate (lending rate)	Nominal	CBN
ecm_mb	Excess money supply		Generated with Equation 6
$PreDum$	Exchange rate premium dummy for periods of widening premium	Dummy variable	1 for periods of widening; 0 otherwise
wp_t wp_t	World consumer prices index to capture world prices	Price index	IMF-IFS
wfp_t	World food price index	Price index	IMF-IFS

Notes: CBN = Central Bank of Nigeria; IMF-IFS = International Monetary Fund-International Financial Statistics.
Source: Author's compilation.

5. Empirical analysis

Unit root test

In an ARDL framework, the order of integration of the regressors does not matter, in other words, whether the regressors are I(0) or I(1) or a combination of the two. However, it is imperative to test for the unit root status in the series to avoid the inclusion of I(2) regressor(s). According to Pesaran et al (2001), this is because with a bounds test cointegration approach, the lower and upper bound critical values assume the series to be I(0) and I(1), respectively. Consequently, this study employs unit root tests without a breakpoint (ADF and PP), and with a breakpoint. The results are reported in Table 4.

Table 4: Unit root test results

	Unit root without breakpoint					Unit root with breakpoint				
Variables	ADF I(0)	I(1)	PP I(0)	I(1)	rmk	I(0)	BP	ZA test I(1)	BP	Rmk
p_t	-0.61	-9.88*	-1.66	-14.15*	I(1)	-1.55	2015Q4	-10.56*	2005Q3	I(1)
p_{ft}	0.13	-10.32*	0.15	-10.34*	I(1)	-1.04	2008Q1	-10.52*	2003Q1	I(1)
e_{ot}	-1.64	-9.27*	-1.63	-9.27*	I(1)	-5.87*	1998Q4	-	-	I(0)
e_{pt}	-0.24	-4.79*	-0.13	-6.59*	I(1)	-2.88	2014Q4	-7.02*	2016Q3	I(1)
m_2	-2.24	-10.56*	-2.46	-10.56*	I(1)	-3.08	1994Q4	-12.34*	2008Q1	I(1)
op	-1.49	-8.00*	-1.58	-7.86*	I(1)	-3.36	2003Q4	-9.46*	2008Q4	I(1)
gdp_t	-0.05	-0.29	-2.21	-10.72*	I(1)	-3.15	2016Q2	-10.75*	1998Q2	I(1)
e_{ot}^{+}	-0.57	-6.02*	-0.39	-5.98*	I(1)	-3.81	2007Q2	-11.22*	2007Q4	I(1)
e_{ot}^{-}	0.11	-8.41*	0.01	-8.37*	I(1)	-2.39	2014Q4	-11.58*	2016Q2	I(1)
e_{pt}^{+}	0.94	-8.22*	0.75	-8.23*	I(1)	-3.44	2016Q3	-34.05*	2017Q2	I(1)
e_{pt}^{-}	0.73	-5.85*	1.02	-6.05*	I(1)	-3.36	2015Q3	-11.31	2016Q3	I(1)
wp_t	1.14	-4.64*	0.45	-7.98*	I(1)	-2.33	2007Q1	-8.32*	1996Q2	I(1)
wp_t wfp_t	-1.61	-1.67	-1.09	-3.51**	I(1)	-2.33	1998Q1	-4.22**	2009Q1	I(1)
wfp_t										

Notes: P_{ft} = food price; e_{ot} = official exchange rate; e_{pt} = parallel exchange rate; BP = breakpoint; * and ** indicate 1% and 10% significance levels, respectively; ADF = Augmented Dickey-Fuller; PP = Phillips-Perron; ZA = Zivot and Andrews unit root test.

A cursory look at the table shows that all variables are integrated of order (1) with confirmation from both with and without breakpoint tests. However, for the official exchange rate, the unit root test with breakpoint confirmed an integration of order (0), while the integration of order (1) is confirmed for the same series in the case of unit tests without a breakpoint.

Symmetric and asymmetric ARDL long-run relationship test

After establishing the order of integration, the next step is to estimate the equations and test for the existence of both a symmetric and asymmetric long-run relationship between prices (CPI inflation and food inflation) and exchange rates as well as for the monetary sector. The Banerjee at al. (1998) test (t_{BDM}) and the Pesaran et al (2001) F-test (F_{PP}) reported in Table 5 were used. From the results, a symmetric relationship is confirmed for both official and parallel exchange rates with both prices, but an asymmetric long-run relationship is established only for the official exchange rate with both prices (general and food price levels) in Nigeria. For the monetary sector, a long-run relationship is also established using the symmetric case and the Johansen test (see Appendix A1).

Table 5: Symmetric and asymmetric ARDL cointegration tests

	Symmetric case			Asymmetric case			LR coefficients		
Models	t_{BDM}	F_{PP}	k	t_{BDM}	F_{PP}	k	α_1	α_1^+	α_1^-
CPI with official exchange rate	-0.27***	4.92***	4	-0.26***	6.45***	5	0.04	0.08	-0.15
CPI with parallel exchange rate	-0.34***	5.97***	4	-0.37*	3.72	5	0.18	0.005	0.003
Food price with official exchange rate	-0.19***	12.24***	4	-0.04***	9.16***	5	0.11	0.25	-0.5
Food price with parallel exchange rate	-0.36***	4.64***	4	-0.06*	3.60	5	0.19	0.05	0.02
Monetary sector	-0.22***	7.45***	2	-	-	-	-	-	-

Notes: t_{BDM} = Banerjee et al. (1998) test; F_{PP} = Peseran approach; α_1; α_1^+ and α_1^- = corresponding long-run coefficients associated with total positive (depreciation) and negative (appreciation) exchange rate changes; ***; ** and * stand for 1%, 5% and 10% significance levels; LR = long run.

This confirms the need for modelling the exchange rate's asymmetric effect to inform policy decisions, which was neglected in previous studies on Nigeria. Baharumshah et al (2017) and Delatte and López-Villavicencio (2012) found similar

results for Japan, Germany, UK and USA. In the following step, symmetric short-run and long-run tests were performed to establish the existence of asymmetric responses of prices to both official and parallel exchange rate movements using the Wald test. This is reported in Table 6.

Table 6: Short-run and long-run symmetric tests

Models	Short-run Wald test	Long-run Wald test
CPI inflation with official exchange rate	3.05 (0.00)	7.26 (0.00)
CPI inflation with parallel exchange rate	-	1.72 (0.18)
Food inflation with official exchange rate	3.66(0.00)	9.58 (0.00)
Food inflation with parallel exchange rate	-	1.88 (0.17)

Notes: Short-run Wald test is for additive symmetric testing of the null hypothesis $\sum_{k=0}^{n} \gamma_k^{+\prime} = \sum_{k=0}^{n} \gamma_k^{-\prime}$ in Equation 9; long-run Wald test is for testing the long-run symmetric null hypothesis $\alpha_1^{+} = {}^{\sigma_\varepsilon^{+}}/_{-\sigma_p} = \alpha_1^{-} = {}^{\sigma_\varepsilon^{-}}/_{-\sigma_p}$ in Equation 9; p-values in parentheses.

The Wald test results show that both general and food prices responded asymmetrically to official exchange rates, both for the short and long run, however, this could not be confirmed for parallel exchange rates in Nigeria. This implies that only the official exchange rate, not the parallel exchange rate, had an asymmetric effect on prices in Nigeria.

ARDL and NARDL estimation result

The result of the monetary sector as specified with the money demand function shows that the coefficients had the correct signs, and a long-run relationship is also established (see Appendixes A1 and A2). Tables 7 and 8 present the symmetric and asymmetric ARDL estimation results, respectively. One significant thing to note is that the exchange rate premium dummy was found to positively influence prices in Nigeria, indicating that allowing for large premiums undermines the government's plan to isolate inflation from fiscal pressures. In the symmetric case, the parallel exchange rate was found to have a positive and significant effect on prices (CPI and food price), while the official exchange rate had a weak positive effect in Nigeria. In fact, the symmetric long-run effects of parallel and official exchange rates on the general price level were estimated to be 0.18 and 0.04, respectively, while the symmetric long-run effect of parallel and official exchange rates on food prices were estimated to be 0.19 and 0.11, respectively. From the results in Table 7, it is clear that the response of prices to the official exchange rate is weak compared to the parallel exchange rate in Nigeria. This implies that the parallel exchange rate had a more pronounced positive effect on prices compared to the official exchange rate. In the short run, only the official exchange rate had a negative and significant effect on prices. The intuition is that, generally, a rise in the parallel exchange rate has a long-run effect to cause higher prices than to the official rate, especially when the exchange rate premium becomes very big.

Table 7: Official and parallel exchange rates symmetric ARDL results on domestic prices

	Dependent variable: CPI inflation				Dependent variable: Food inflation			
	Model 1		Model 2		Model 1		Model 2	
Variables	Coeff.	t-values	Coeff.	t-values	Coeff.		Coeff.	t-values
c	0.19	0.15	-3.37	-2.47	2.45	2.80	0.48	1.20
p_{t-1}	-0.27	-3.44	-0.34	-4.68	-0.19	-5.87	--0.36	-3.69
e_{t-1}	0.01	1.63	0.06	3.29	0.02	1.72	0.07	2.25
op_{t-1}	-0.02	-1.93	-0.02	-1.82	-0.03	-2.34	-0.04	-1.97
wp_{t-1}	0.15	1.87	0.22	2.87	-	-	-	-
wfp_{t-1}	-	-	-	-	0.13	4.01	0.14	3.12
ecm_mb_{t-1}	0.02	1.51	0.06	2.75	0.12	2.50	0.07	1.88
Δe_t	-	-	-	-	-	-	-	-
Δe_{t-1}	-0.05	-3.05	-	-	-	-	-	-
Δe_{t-2}	-0.03	-1.99	-	-	-	-	-	-
Δe_{t-4}	-	-	-	-	-0.18	-6.02	-	-
Δop_{t-1}	-	-	-	-	0.19	5.59	-	-
Δop_{t-2}	-	-	-	-	0.17	4.33	-	-
Δp_{t-1}	0.16	1.61	0.25	2.59	0.64	3.99	0.23	2.13
Δp_{t-4}	0.25	3.08	-	-	0.71	4.80	0.25	2.33
$PremDum$	0.01	1.96	0.02	4.31	0.01	1.63	0.03	1.96
$Trend$	0.01	3.04	0.003	1.62	0.03	5.17	0.01	3.11
R^2	0.91		0.90		0.89		0.88	

Notes: Lags in ARDL are chosen based on a general-to-specific procedure; Model 1 indicates a model with an official exchange rate; Model 2 indicates a model with a parallel exchange rate; all variables as earlier defined; LM = Breusch-Godfrey LM test for serial correlation; parentheses indicate p-values; optimal lag order was selected using the Schwarz bayesian criterion with a maximum lag of 4. Seasonal dummies are included.

Source: Author's estimation.

After establishing how inflation responds to both official and parallel exchange rates, it is imperative to go a step further to determine whether these relationships are asymmetric. This is because recent studies (Zhu and Chen, 2019; Baharumshah et al. 2017; Delatte and López-Villavicencio, 2012) have underscored the need to examine the asymmetric relationship. It is also crucial for Nigeria because the main objective of the central bank is price stability, and the omission of the asymmetric effect, if it exists, may cause distortionary monetary policy effects. The asymmetric ARDL results are reported in Table 8 where an asymmetric relationship was only confirmed for the official exchange rate. In the long run, positive movements (depreciation) of the official exchange rate has a positive and significant impact on prices (CPI and food prices), but negative movements (appreciation) of the official exchange rate were confirmed to have a negative impact.

Table 8: Official and parallel exchange rates asymmetric ARDL results on domestic prices

	Dependent variable: CPI inflation				Dependent variable: Food inflation			
	Model 1		Model 2		Model 1		Model 2	
Variable	coeff.		Coff.		coeff.	t-values	coeff.	
CC	-2.27	-2.21	-4.50	-3.15	3.17	5.47	1.62	5.09
p_{t-1}	-0.26	-4.41	-0.37	-1.74	-0.04	-6.52	-0.06	-1.81
e_{t-1}^{+}	0.02	4.61	0.002	1.50	0.01	4.54	0.003	1.53
e_{t-1}^{-}	-0.04	-3.13	0.001	1.48	-0.02	-4.17	0.001	1.49
op_{t-1}	-0.02	-1.57	-0.04	-1.82	-0.07	-4.20	-0.05	-2.32
wp_{t-1}	0.12	2.49	0.09	3.64	-	-	-	-
wfpt-1	-	-	-	-	0.08	1.65	0.06	1.75
ecm_mb_{t-1}	0.20	1.54	0.05	1.68	0.23	1.73	0.04	1.66
Δe_t^{+}	0.001	2.54	-	-	-	-	-	-
Δe_{t-1}^{+}	-0.001	-3.17	-	-	-0.001	-2.85	-	-
Δe_{t-2}^{+}	-0.001	-2.26	-	-	-0.001	-1.93		
Δe_t^{-}	0.01	1.86	-	-	-	-	-	-
Δe_{t-1}^{-}	-	-	-	-	0.01	2.22	-	-
Δe_{t-2}^{-}	-	-	-	-	0.01	1.93		
Δe_{t-4}^{-}	-0.02	-2.49	-	-	-	-		
Δp_{t-1}	0.47	2.67	-	-	0.59	3.97	0.50	2.99
Δp_{t-2}	-	-	-	-	0.56	4.45	0.43	4.06
Δp_{t-3}	-	-	-	-	-	-	0.22	1.86
Δop_t	-0.04	-1.68			-	-		
Δop_{t-2}	-0.13	-2.77	-	-	-	-	-	-
Δwp_{t-1}	0.11	1.77	-	-	-	-	-	-
$PremDum$	0.01	1.74	0.02	3.17	0.03	2.08	0.02	2.26
$Trend$	0.02	1.56	0.002	1.91	0.02	2.12	0.02	1.99
R^2	0.98	-	0.98	-	0.97	-	0.97	-
LM	0.52	(0.46)	0.41	(0.56)	0.53	(0.43)	0.49	(0.51)

Notes: Lags in ARDL are chosen based on a general-to-specific procedure; Model 1 indicates a model with an official exchange rate; Model 2 indicates a model with a parallel exchange rate; all variables as earlier defined; LM = Breusch-Godfrey LM test for serial correlation; parentheses indicate p-values; optimal lag order was selected using the Schwarz Bayesian criterion with a maximum lag of 4. Seasonal dummies are controlled for.

Source: Author's estimation.

The long-run effects of official exchange rate depreciation on CPI and food prices were estimated to be 0.08 and 0.25, respectively, while for appreciation it was found to be -0.15 and -0.5 for both prices. Similar findings were confirmed by Zhu and

Chen (2019), Baharumshah et al (2017) and Delatte and López-Villavicencio (2012). The economic intuition is that prices respond differently to the depreciation and appreciation of the official exchange rate. Intuitively, the Nigerian government has always pursued an expansionary fiscal policy and exchange rate controls amidst the need for devaluation or floating the exchange rate to ensure unification, which imposes a fiscal shock that increases money growth, and invariably prices, in the long run. The country has always delayed exchange rate adjustments, which is a fiscal cost that causes money growth and inflation.

6. Conclusion

The intention of government to maintain the role of the official exchange rate as a nominal anchor in order to isolate domestic prices from fiscal pressures through the parallel exchange rate may break down, especially when the premium gets too big. This poses the question whether domestic prices respond to either official exchange rate or parallel exchange rate movements in an oil-dependent developing country like Nigeria, which has rising fiscal pressures and a vibrant parallel market. Thus, this study examined the response of domestic prices to official and parallel exchange rate movements in Nigeria. Using both linear and non-linear ARDL models, which were selected based on a general-to-specific approach and controlling for periods of large exchange rate premiums in the estimation, some interesting findings emerged that have policy implications. First, the presence of asymmetric long-run relationships is confirmed for the official exchange rate, but only a symmetric long-run relationship could be confirmed for the parallel exchange rate in Nigeria. The policy implication is that when the Central Bank of Nigeria takes a decision on price stability in the long run, the asymmetric effect of the official exchange rate is plausible and must be reflected in their decision. Second, the results also underscore that domestic prices respond to parallel exchange rates rather than official exchange rates, especially when the exchange rate premium becomes too big in the symmetric case. By implication, the intention of government to retain the nominal anchor role of the official exchange rate with a bid to isolate domestic prices from fiscal pressures fails when the premium becomes too big. Consequently, in such circumstances, the parallel exchange rate transmits fiscal pressures to domestic prices. The reason is not incomprehensible, as the Central Bank of Nigeria sometimes finds it difficult to control the parallel exchange rate due to the monetization of deficit financing by the government, resulting in excess money supply. Third, only prices respond differently to an appreciation or depreciation of the official exchange rate. This implies that a depreciation of the official exchange rate spurs rising prices, while an appreciation is a disincentive for an increase in prices in Nigeria. This confirms that the asymmetric relationship should not be neglected so that the monetary policy effect in Nigeria would not be distorted. If the intention is to insulate prices from fiscal pressures, the government should ensure some level of fiscal austerity and possible unification when the premium gets too big.

Notes

1. The official exchange rate is the rate announced by the Central Bank of Nigeria for official government transactions such as government foreign revenue calculations, while parallel exchange rate is the exchange rate in a dual system; especially as Nigeria has more than one window. It can also refer to black market rates in a black market system.
2. It is considered wide when the gap is 25% and above.

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Appendixes

Appendix A1 presents the Johansen cointegration test for monetary equation to establish a long-run relationship for the symmetric case.

Appendix A1: Johansen cointegration (long-run) result for monetary sector

Series: LOG(M2/P) LOG(Y) LOG(R)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical value	Prob.**
None *	0.252947	43.67186	42.91525	0.0419
At most 1	0.110550	16.25972	25.87211	0.4719
At most 2	0.054294	5.247429	12.51798	0.5612

Source: Author's estimation.

Appendix A2 presents the fully modified OLS results for the monetary equation, as a long-run relationship is established.

Appendix A2: FMOLS estimation result for monetary sector

Dependent variable: LOG(M2/P)				
Method: Fully modified least squares (FMOLS)				
Variable	Coefficient	Std. Error	t-statistic	Prob.
LOG(Y)	0.580736	0.030613	18.97014	0.0000
LOG(R)	-0.252195	0.223662	-1.127575	0.2624
C	-0.314814	0.673518	-0.467417	0.6413
R-squared	0.934480	Mean dependent var		3.977959
Adjusted R-squared	0.933071	S.D. dependent var		0.715224
S.E. of regression	0.185033	Sum squared resid		3.184068
Long-run variance	0.118703			

Source: Author's estimation.

Mission

To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is sustained sound management of the economy, and that such management is more likely to happen where there is an active, well-informed group of locally based professional economists to conduct policy-relevant research.

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