POLICY BRIEF

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

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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

1995Q1–2019Q1 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 their decisions to ensure price stability so that it does not distort monetary policy effects.

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 (Duravall 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 Duravall 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-Villaviciencio, 2012; Duravall 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-Villaviciencio, 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. 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-Villaviciencio, 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'Çonnell, 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 have 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-Villaviciencio, 2012). With two prominent exchange rates in Nigeria, it is imperative to further pursue and analyze 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 Rustasitara (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'Çonnell, 1995; Kaufmann and O'Çonnell, 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) analyzes 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.

The Nigerian economy: Some stylized facts

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

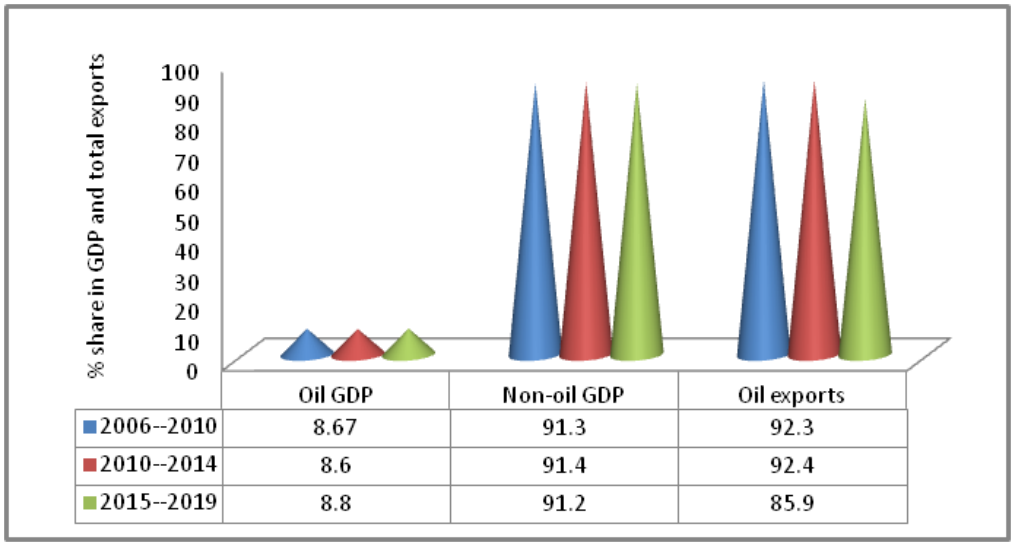
Source: CBN (2019) Statistical Database Online.

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



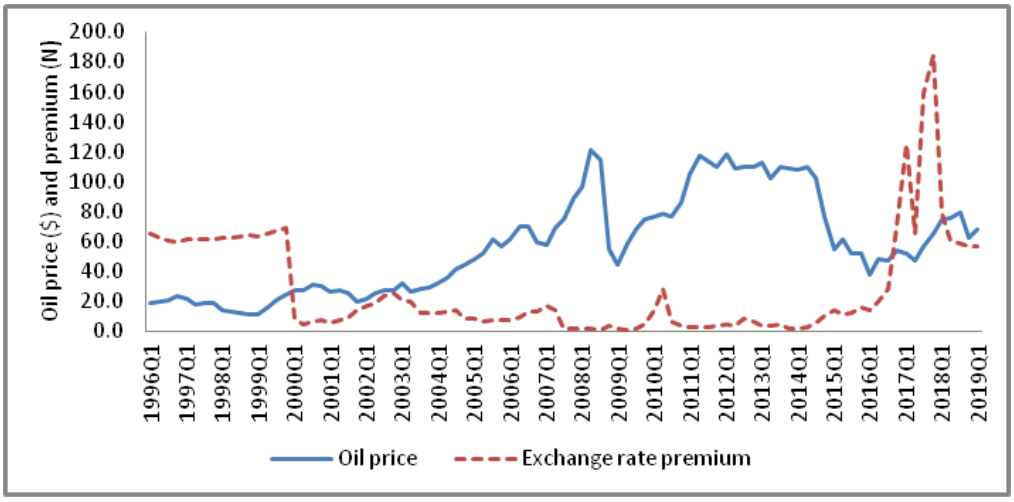
	Oil GDP	Non-oil GDP	Oil exports
2006--2010	8.67	91.3	92.3
2010--2014	8.6	91.4	92.4
2015--2019	8.8	91.2	85.9

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.

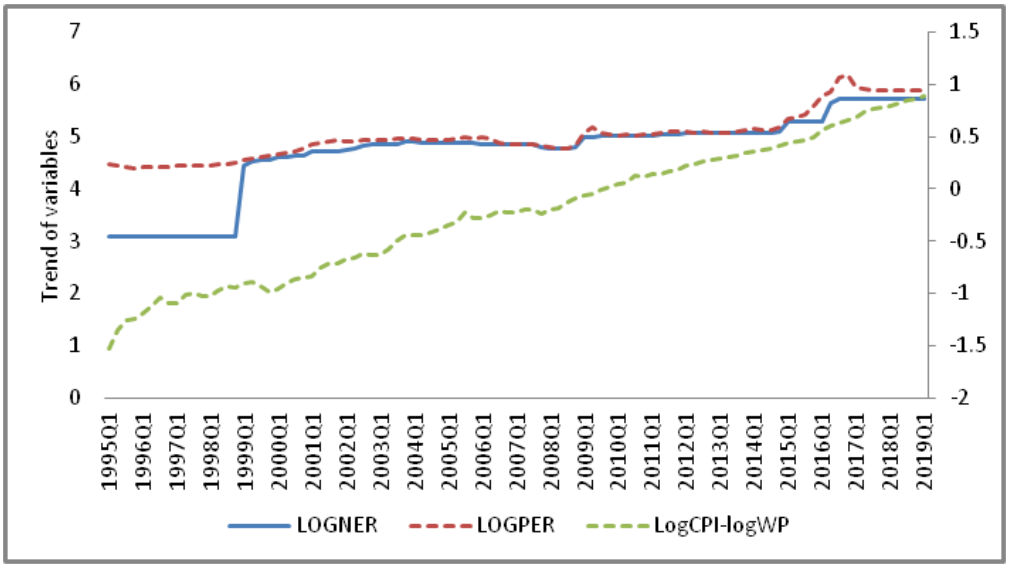
For example, between 1996 and 1999, the premium was significant when the oil price was around US$20 per barrel, but this was reversed as soon as the oil price trended positively from 2004–2008. When there was a sudden decline in 2008/2009, it was reflected in the exchange rate premium in 2009 as the 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 2: Oil price and exchange rate premium



Source: CBN (2019) online database.

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 might 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'Çonnel (1995) and Kaufmann and O'Çonnell (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.

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.

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