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## Exchange Rate Pass-Through to Consumer Prices in Nigeria

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*The increasing overdependence of Nigerian economy on imports has necessitated the need to continually examine the effect of exchange rate shocks in consumer prices. The paper adopts a Structural Vector autoregressive to estimate the pass-through effect of exchange rate changes to consumer prices. Using the Variance Decomposition analyses, the study found a substantially large exchange rate pass-through to inflation in Nigeria. Finding shows that exchange rate has been more important in explaining Nigeria's rising inflation phenomenon than the actual money supply. Therefore, it is recommended that Nigerian economy focuses on policies that ensure exchange rate stability and sound monetary surveillance.*

**Keywords:** Exchange rate pass-through, Inflation, Co-integration, Vector Error Correction

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### Introduction

A consumer purchasing power largely depends upon wealth and prices of goods and services. Domestic purchasing power is mainly affected by the inflation rate of individual countries. High (low) inflation decreases (increases) the purchasing power of an individual (Jian, 2008). In season of high exchange rate, the value of country's currency drops, the implication of this to Jian is that increase in the exchange rate has been passed to the consumer. The rate of exchange pass through to consumers depends among others on the quality of the imported good, price elasticity of demand, openness, and the monetary policy of the central bank and Stock market volatility (Charles, Simon & Daniel 2008).

Inflation is quite relevant in determining exchange rate pass through to consumer. Rising level of inflation induced from exchange rate increases raises price level of home and foreign goods (Paral Aaron, Ben and Alass, 1998). An understanding of the degree and timing of exchange rate pass-

through is very important in assessing its effect on different economies; pass-through could be complete where consumer/import prices respond absolutely to exchange rate movements, conversely a partial induce response of exchange rate on consumer prices is termed an incomplete pass-through (An, Akofio-sowah A.N 2009)

Furthermore, Olive (2002), and Campa and Goldbery (2005) maintained that when exchange rate changes, foreign firms can choose to pass-exchange rate changes fully to their selling prices in export markets i.e. complete pass-through to bear exchange rate changes to keep selling prices unchanged. Goldberg and Knetter (1997) discovered that only about 60 percent of exchange rate changes are passed on to import prices in the United States. One major reason responsible for incomplete pass-through is that most exporters and importers choose to hold their prices fixed and just decrease or increase the mark-up on prices, anytime there is a change in exchange rate. Dornbush (1987) discovered incomplete pass-

through arises from firms that operate in a market characterized by imperfect competition and adjust their mark-up together with prices in response to exchange rate shock.

Like all other developing countries, the study of the exchange rate pass-through on consumers of consumable and capital goods cannot be over emphasized. Firstly, the Nigerian economy is external sector driven and shocks from global commodity market have several implications on consumers. For example, an increase in price of foreign raw materials or scarcity of key foreign import of the production sector will immediately reflect in the exchange rate pass-through to the manufacturer. Similarly, distortions in supply of consumer goods particularly stable food items or household items in the foreign market are a signal of high exchange rate pass-through to the country's consumers.

Secondly, the need to stabilize Naira and make it formidable so as to compete with other currencies in the international markets is a pointer to the need for the study. Thirdly inflation in Nigerian is becoming endemic, there is need to look into the foreign exchange rate and see the extent of its contribution to the country's high inflation rate.

In addition, there is need to make the external sector of the economy competitive through appropriate exchange rate adjustment and this can only be achieved with detailed study of effect of exchange rate pass-through on prices. The monetary authority needs guided policies on stabilization of exchange rate, both the producers for exporters, wholesale exporters, and importers need to constantly aware particularly in advance of the effect of exchange rate on their business. The consumer of foreign goods also needs to factor in the effect of foreign exchange rate in their choices and demand. Hence, the study on foreign exchange will continue to be relevant.

## Theoretical Literature Review

The need for appropriate adjustment to structural unbalances in many developed countries especially after the Great depression

of 1929-1933, culminated in extensive researches on exchange rate pass-through (ERPT) with the primary objective of determining a nominal anchor for inflation and inflation expectations (Aliyu S., Yakubu M., Sanni G., Duke O, 2008). The impact of exchange rate movements on prices would help to implement the appropriate monetary policy response to currency movement. The increase in the export dependence of most developing African countries and incidence of large fluctuations in nominal exchange rates have led to a need for better understanding of the determinants of the transmission of exchange rate changes into import prices.

The recent heated debates on pass through have been having a broad implication for the conduct of monetary policy, for macroeconomic stability, international transmission of shocks and efforts to contain large imbalances in trade and international capital flow. It hinges on the issue of the prevalence of producer-currency pricing versus local currency pricing of imports and on whether exchange rate pass-through rates are endogenous to a country's monetary performance or not. Low import price pass-through means that nominal exchange rate fluctuations may lead to lower expenditure scotching effects of domestic's monetary policy (Jose and Lindu 2004). According to Jose M and Lindu G (2004) countries with low exchange rate and inflation variability are likely to have lower rates of pass-through of exchange rates into import prices.

Taylor (2001), Goldfajin and Werlang (2000) among others, argued that pass-through rates may have been declining over time. The Brazilian experience of late 1990's is often referred to. In this experience, consumer prices responded very little to large home currency depreciation, in sharp contrast with past depreciation episodes. The issues posted in these and related studies is whether this decline in pass-through and a purported move toward general decline in pass-through rates are related to improved macro-economic conditions in the importing countries.

Yet, another issue is relationship between exchange rate fluctuation and

inflation. Taylor (2000) put forward the hypothesis that responsiveness of prices to exchange rate fluctuations depend positively on inflation. Also, we found out that much existing research focuses on the relationship between movements of in nominal exchange rates and import prices. A smaller but equally important strand of literature concentrates on the macro-economic exchange rate pass-through to aggregate price indices. Studies have also shown that degree of pass-through varies significantly across different countries. The main factor according to Aliyu et al (2008) that influences the level of pass-through across countries are the size and openness of the individual economies. They further reports that pass-through relationships have remained largely stable over time. Different results for countries come primary from the use of different methodologies.

Lafleche (1996) showed a schematic view of the direct and the indirect channels of exchange rate pass-through. The direct channel, which works through import price affects price of imported intermediate goods. The indirect channel works through high demand for substitute goods or making export more competitive. At the end, exchange rate pass-through is expected to be incomplete in the short term and complete in the long term as both import and consumer prices adjust to exchange rate depreciation.

### Empirical Literature Review

Various empirical studies on the impact of exchange rate pass-through to consumer prices have been carried out with far reaching results. Mc Carthe (2000) presents a comprehension study of exchange rate pass-through on the aggregate level for a member of industrialized countries. He estimates a vector auto-regression (VAR) model of import, producer and consumer price from 1776 up till 1998. In most of the countries analyzed, the exchange rate pass-through to consumer prices is found to be modest. The rate of pass-through was found to be positively correlated to the openness of the country and negatively correlated with the volatility of the exchange rate; likewise Kim

(1998) investigated exchange rate pass-through in the United States using frame work of multivariate co-integration. This study relates to changes in producer prices to changes in the trade weighted nominal effective change rate, money supply, aggregate income and interest rates. The exchange rate is found to contribute significantly to the producer prices.

Ricon (2000) in his study of pass-through exchange rate in Colombia used the Johansen framework to estimate the pass-through effect. He used monthly data for the period 1980 to 1988 and found exchange rate pass-through to be in complete. The estimated long-term elasticity's of import and export prices to a change in the exchange rate are approximately 0.84 and 0.61 respectively. The direct long-term effect of the exchange rate on the consumer prices is found to be 0.84.

The degree of exchange rate pass-through to import and consumer prices in Nigeria between 1986 Q1 and 2007 Q4 was investigated by Aliyu et al (2008) on the basis of vector error correction methodology. They found that exchange rate pass-through in Nigeria during the period, though slightly higher in the import than in the consumer prices, is significant and persistent. A one percent shock to exchange rate, for example, results in 14.3 and 10.5 percent pass-through effect to import and consumer prices four quarter ahead, respectively. These results among other things, suggest that exchange rate pass-through in Nigeria declines along the price chain and partly overturns the conventional wisdom in the literature that ERPT is always considerably higher in developing economies than developed economies. Adetiloye (2010) also looked into exchange rate and Consumer price index (CPI) in Nigeria. He adopted the techniques of correlation and Granger causality to find the significance of the relationship between the consumer index and the exchange rate. It was found that there is high positive correlation between the ratio of imports and the index than exists between the parallel and the official rates. The co-efficient between autonomous exchange rate and the CPI is less significant than official rate, while the import ratio in the economy was found to show a near

two-way balance causality with consumer price Index. The more significant one is causality is that import ratio granger causes CPI.

## Econometric Methodology

The basic approach in estimating pass-through is through using a restrictive VAR (McCarthy, 1999). The approach tends to estimates the effect of exchange rate shocks using cholesky decomposition. The recognized drawback of the recursive VAR is that cholesky decomposition imposes restrictions on the residual variance-covariance matrix. This drawback renders the result of the impulse response function and Variance decomposition (VD) highly sensitive to the ordering of variables in the VAR. Due to this, we attempted the recent trend in literature using SVAR approach. (Sanusi, 2010)

This section presents the SVAR framework and the identification method used to recover the structural shocks from the forecast errors of the estimated VAR

### Structural Var Framework

The structural VAR tries to adopt econometric theory rather than the cholesky decomposition to recover structural innovations from residual of a reduced form VAR.

A bivariate VAR model in which each variable has contemporaneous effect on the other is being considered.

$$\begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix} \begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix} \quad (1)$$

which can be written in compressed form as

$$BX_t = \Gamma_0 + \Gamma_1 X_{t-1} + \varepsilon_t \quad (2)$$

Where

$$B = \begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix} X_t = \begin{bmatrix} y_t \\ z_t \end{bmatrix} \Gamma_0 = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix} \Gamma_1 = \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix} \varepsilon_t = \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix} \quad (3)$$

The reduced form of the structural or primitive form 1 can be written as

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} a_{10} \\ a_{20} \end{bmatrix} + \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} e_{yt} \\ e_{zt} \end{bmatrix} \quad \text{or} \\ X_t = A_0 + A_1 X_{t-1} + e_t \quad (4)$$

Where

$$A_0 = \begin{bmatrix} a_{10} \\ a_{20} \end{bmatrix} A_1 = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} e_t = \begin{bmatrix} e_{yt} \\ e_{zt} \end{bmatrix}$$

Comparison of 2 and 4 above suggests that the error in the reduced form VAR  $e_{yt}$  and  $e_{zt}$  are indeed composites of the underlying structural shocks  $\varepsilon_{yt}$  and  $\varepsilon_{zt}$  since:

$$A_0 = B^{-1}\Gamma_0; A_1 = B^{-1}\Gamma_1; e_t = B^{-1}\varepsilon_t \quad (5)$$

So that

$$\begin{bmatrix} e_{yt} \\ e_{zt} \end{bmatrix} = \begin{bmatrix} 1 \\ 1-b_{12}b_{21} \end{bmatrix} \begin{bmatrix} 1 & -b_{12} \\ b_{21} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix} \quad (6)$$

here,  $e_t$  is forecast errors in  $X_t$  without any structural interpretation,  $\varepsilon_t$  is the autonomous changes in  $X_t$  in model 2. In order to obtain the impulse response functions (IRF) or variance decomposition (VD), the use of structural shocks  $\varepsilon_t$  and not the error  $e_t$  is necessary.

### The Empirical Model of Exchange Rate Pass-Through

To analyze the monetary policy framework used in Nigeria, we modified our model to include foreign exchange inflows and the monetary supply as a policy variable. The model used is a multivariate system of the economy, consisting of the foreign exchange stock ( $f_t$ ), money supply ( $m_t$ ), nominal exchange rate ( $s_t$ ), and domestic prices ( $p_t$ )

The money supply is used to capture monetary policy effects on the price level. Foreign exchange is used to capture the impact of aid and other capital inflows as well as export earnings on inflation and the exchange rate (Sanusi, 2010)

The inflation forecast error is  $e_{\pi t} = \delta\varepsilon_{ft} + \chi\varepsilon_{mt} + \phi\varepsilon_{st} + \varepsilon_{\pi t}$ . The inflation forecast errors are caused by exchange rate shocks and other shocks in the system. Therefore, the complete

system, with no particular ordering assumed is given as

$$\begin{bmatrix} e_{ft} \\ e_{mt} \\ e_{st} \\ e_{\pi t} \end{bmatrix} = \begin{bmatrix} 1 & \theta_1 & \theta_2 & \theta_3 \\ \alpha & 1 & \theta_4 & \theta_5 \\ \beta & \gamma & 1 & \theta_6 \\ \delta & X & \varphi & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{ft} \\ \varepsilon_{mt} \\ \varepsilon_{st} \\ \varepsilon_{\pi t} \end{bmatrix} \quad (7)$$

$$\text{where the matrix } B^{-1} = \begin{bmatrix} 1 & \theta_1 & \theta_2 & \theta_3 \\ \alpha & 1 & \theta_4 & \theta_5 \\ \beta & \gamma & 1 & \theta_6 \\ \delta & X & \varphi & 1 \end{bmatrix}$$

To determine the role of exchange rate changes in causing movements in consumer prices, we need to estimate the effect of exogenous shock to the exchange rate,  $e_{st}$ , on the shock,  $e_{\pi t}$ , by estimating 7. However 7 is not identified in the sense that as long as  $\beta$ ,  $\gamma$  and  $\theta_6$  are not each equal zero, the observed innovation in the variable  $s_t$  will depend on both the shock to the exchange rate and on the shocks  $e_{ft}$ ,  $e_{\pi t}$ ,  $e_{mt}$ . Other restrictions need to be imposed on matrix  $B^{-1}$  to extract  $\varepsilon_{st}$  from other innovations. Based on the works of Sanusi (2010), Sims (1986) and Bernanke (1986), SVAR approach is used to impose contemporaneous structural restrictions that are consistent with a priori theoretical expectations as well as our prior knowledge of the Nigerian economy in order to identify the impacts of the various shocks. This way, the theory-consistent restrictions on the matrix  $B^{-1}$  gives economic meaning to the derived shocks.

In the work of Sanusi (2010), to be able to identify the effect of the exchange rate shock on the shocks  $e_{\pi t}$ , we need to impose some restrictions on matrix  $B$ . First, we assume that foreign exchange inflows (forex) are exogenous. As it is mostly influenced by exogenous factors such as changes in foreign aid inflows,

commodity prices as well as adverse weather condition leading to poor cocoa harvest, internationally commodity prices shocks. Forex is modeled as independent of shocks to other variable. This implies imposing zero on the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> element of its first row. That is  $e_{ft} = \varepsilon_{ft}$

## Data and Data Sources

All the data are obtained from the Nigerian Central Bank Statistical Bulletin; the precise definitions of the variables are as follows. The NEER measures the nominal effective exchange rate (increase indicates Naira appreciation,). FOREX is the real official foreign exchange rate The money supply is measured by M2 which is the M1 plus quasi money. The price level is measured by the consumer price index, CPI.

## Empirical Results: Unit Root Tests

In determining the order of integration of the variables, both Augmented Dickey Fuller (ADF) and Phillip-Perron (PP) tests for unit roots were conducted. With the exception of the foreign exchange and money supply, both tests indicate that all the variables are  $I(1)$ . For Forex and M2, while PP suggests that the first difference has a unit root, ADF strongly suggests otherwise. Given the low power of the ADF, we assume that Forex and M2 is  $I(1)$  as suggested by the PP test. The finding that the levels of all the variables have a unit root implies that, unless they are co-integrated, it is appropriate to estimate the unrestricted VAR in first difference.

Table 1: Unit Root Test

Variable	LEVEL		FIRST DIFFERENCE		COMMENT
	ADF	PP	ADF	PP	
CPI	-2.1818	-2.1899	-4.3327*	-4.3382*	I(1)
FOREX	-2.1412	-2.2353	-4.7992*	-4.7935*	I(1)
M2	-3.7422	-3.7363	-8.2897*	-8.2897*	I(1)
NEER	-1.4039	-1.4948	-5.6966*	-5.6845*	I(1)

Source: Analysed by author using Eviews

Co-Integration

In determining the co-integration among the observed variable price level, exchange rate, money supply and foreign exchange, using the Johansen Maximum likelihood approach suggests an evidence of co-integration. This is true from both the trace statistics while maximum eigenvalue statistics suggest otherwise, and whether or not trend is included in the co-integrating equation.

The presence of co-integration between the exchange rate and the price level is found

consistent with the PPP theory, this puzzle is well documented in the literature. Though, the co-integration test here was not conducted at providing evidence on PPP, but rather at deciding whether a co-integrating VAR (or VECM) will provide a better alternative to the SVAR in estimating the exchange rate pass-through. Given presence of co-integration, it would be inappropriate to proceed with estimating the SVAR in first difference, since information about the long-run behavior among the variables can be lost in the process.

Table 2

Trace ( $\lambda$ trace)				
No. of CE(s)	None	At most 1	At most 2	At most 3
Eigenvalue	0.7233	0.3908	0.1837	0.0281
$\lambda$ trace statistics	62.3684	22.5407	7.1766	0.8834
Critical value	47.8561	29.7971	15.4947	3.8415
Maximum Eigenvalue ( $\lambda$ max)				
Eigenvalue	0.7233	0.3908	0.1837	0.0281
$\lambda$ max statistics	39.8277	15.3641	6.2932	0.8834
Critical value	27.5843	21.1316	14.2646	3.8415
Normalized Co-integration Coefficient				
CPI	FOREX	M2	NEER	
	0.1059	0.8263	-0.1464	
	(0.0563)	(0.0581)	(0.0143)	

Source: Analysed by author using Eviews

The normalized co-integration estimates adopted from the Johansen approach shows a presence of exchange rate pass-through in the long-run. The contemporaneous relationship among the variables in the system seems to be captured fairly well. Of specific interest is the coefficient of the exchange rate in

the model. It is significant and correctly signed. It suggests that an appreciation of naira is associated with an immediate decrease in inflation. The full impact of exchange rate changes on the price level, given by the accumulated IRFs.

Table 3 Vecm Estimation

	D(LOGCPI)	D(LOGFOREX)	D(LOGM2)	D(LOGNEER)
Ect(1-)	-0.6333	0.0313	-0.4346	-3.2178
Standard error	(0.1586)	(0.3431)	(0.2787)	(1.1059)
t-stat.	[-3.9917]	[0.0915]	[-1.5390]	[-2.9095]
VECM ESTIMATION AFTER IMPOSING RESTRICTION ON M2 AND NEER				
	D(LOGCPI)			
Ect(1-)	-0.1378			
Standard error	(0.06142)			
t-stat.	[-2.2429]			

## VECM ESTIMATION AFTER IMPOSING RESTRICTION ON FOREX AND NEER

	D(LOGCPI)
Ect(1-)	-0.1581
Standard error	(0.0750)
t-stat.	[-2.1074]

Source: Analysed by author using Eviews 6.0

Since there is co-integration among variables and its fundamentals, an error correction model has to be estimated by incorporating the lagged error correction term in the set of repressors. The error correction term is the residual from the static long run regression and it joins the set of differenced non-stationary variables to be estimated to capture both short and long run dynamics (see Table 3).

Here, we imposed restrictions on other variables in the model in order to effectively capture the effect of long run error correction and adjustment of Foreign exchange and money supply to consumer prices.

The VECM analysis shows that the model has a negative sign, the magnitude of the coefficient of error correction term lies between zero and one. This shows that 13 per cent and 15 per cent of the short run disequilibrium adjusts to the long run equilibrium each year for foreign exchange and money supply respectively; and also the significance of the error correction term indicate that the speed of growth model to converge to the long run equilibrium point exist and moderate. This implies that foreign exchange and money supply have a long-run pass through relationship with consumer prices; the extent of such pass-through is been considered using the Impulse response functions (IRF) and variance decompositions (VD).

## Exchange Rate Pass-Through

Impulse response functions (IRF) and variance decompositions (VD) from a VECM

are used to assess the pass-through from exchange rate to domestic prices. The IRF traces out the effect over time on prices of a structural one standard deviation shock to the exchange rate equation. The variance decompositions break down the forecast variance of domestic price inflation into components that can be attributed to each of the various shocks to the system. It allows us, therefore, to examine the relative importance of the various shocks for fluctuations in domestic prices. The pass-through to domestic prices over T periods is defined as the accumulated effect of a structural one standard deviation shock to the exchange rate in period t on domestic prices in period T. (Sanusi, 2010)

## Estimation Results

The Table below shows the accumulated response of price to a structural one standard deviation shock to each of the variables. It shows the response of the price level to a one standard deviation shock to the exchange rate. It is clear from the plot that there is an evidence of pass through effect of an exchange rate shock on domestic prices, which the ten period chosen to examine the impact, an increase in the period would have presented a more clear evidence of the effect. According to the table, the immediate effect of a shock to the exchange rate at a period, say period 8 for instance is about 0.83 (or 83percent) increase in the price level. The full effect of this shock can be realized as the period increases.

Table 4 Accumulated response of CPI

Period	CPI	FOREX	M2	NEER
1	0.159446	0.000000	0.000000	0.000000
2	0.318878	-0.011707	0.051999	-0.075189
3	0.470138	0.069487	0.156099	-0.173493

4	0.604372	0.197504	0.237634	-0.275856
5	0.743527	0.332578	0.343875	-0.371274
6	0.875242	0.463184	0.412717	-0.465386
7	1.017521	0.586435	0.518292	-0.556190
8	1.149651	0.709818	0.581396	-0.649972
9	1.293773	0.831041	0.693039	-0.741070
10	1.424288	0.955409	0.750583	-0.835775

Source: Analysed by author using Eviews 6.0

These results suggest that exchange rate pass-through in Nigeria is fairly large. This finding is consistent with those found in most developing countries. For instance, McFarlane 2002, Ito et al 2005, Zorzi et al 2007 and Sanusi 2010 found substantially large pass-through elasticity's for several countries. Zorzi et al found a pass-through elasticity of 0.77 for Czech and China republic, 0.56 for Poland, 0.91 for Hungary and 1.39 for Mexico. A similar study by

Ito et al 2005 also found the pass-through to CPI in Indonesia to be completed in four months with elasticity of 1.4 after one year.

Money supply shocks also have a significant effect on domestic prices. The immediate effect of a shock would lead to about 69 percent increase in price level, suggesting that the effect of money supply shocks is less than fully transmitted to prices even in the long-run.

Period	S.E	CPI	FOREX	M2	NEER
1	0.159446	100.0000	0.000000	0.000000	0.000000
2	0.243590	85.68424	0.230964	4.556993	9.527798
3	0.330618	67.44341	6.156346	12.38757	14.01267
4	0.401051	57.03739	14.37309	12.55186	16.03766
5	0.467806	50.76897	18.90073	14.38284	15.94746
6	0.516571	48.13754	21.89306	13.57154	16.39786
7	0.567160	46.22619	22.88408	14.72345	16.16629
8	0.605912	45.25768	24.19712	13.98501	16.56019
9	0.650661	44.15298	24.45440	15.07169	16.32093
10	0.684208	43.56803	25.41911	14.33728	16.67558

Source: Analysed by author using Eviews 6.0

As earlier discussed, we can use the variance decompositions to explore the relative contribution of the structural shocks in explaining changes in inflation. Consistent with the IRFs discussed above, the variance decomposition reveal that foreign exchange shocks contribute relatively more to inflation than money supply shocks.

Specifically, while money supply changes account for only 4 to 15 percent of the variations of the price level, exchange rate shocks account for about 6 to 25 percent at the same horizon respectively. This suggests that Nigerian inflation process is basically influenced by exchange rate changes; and that there is need for solid monetary surveillance.

## Conclusions

The paper investigated the exchange rate pass-through to consumer prices for Nigeria using the VECM approach. The approach addresses specific features of the Nigeria economy, especially the import dependence nature and the role of foreign exchange inflows in the conduct of monetary policy. The degree of exchange rate pass-through was estimated by means of IRFs from the VECM.

Evidence from the analysis, covering the period 1970 through to 2008, reveals that exchange rate pass-through to consumer prices in Nigeria is substantial. This supported most



works in developing countries. For instance, Sanusi (2010) found a large exchange pass-through in Ghana. The evident large pass-through found here can be attributed to the continuous depreciation of the Naira over the whole sample observed. Firms and importers are therefore likely to perceive any increase in costs due to exchange rate depreciation as persisting and therefore, pass on to consumers most of the resultant increases in costs. Other theoretical reasons for high exchange rate pass-through include the high and persistent inflation during the period under review as well as the high share of imports in the Nigeria consumption basket.

Variance decomposition analysis indicates foreign exchange changes generally dominate exchange rate shocks in explaining Nigeria inflation. This provides some support to

the claim in the literature that exchange rate pass-through has been the major cause of inflation in the import dependence developing economies.

The likely drawback of the work is the inability to divide the sample observed into periods of pegged exchange rate and floating exchange in order to properly sieve the effects of pass-through under the various exchange control regime Nigeria has gone through.

Nevertheless, the large exchange rate pass-through to domestic inflation implies that the response of trade balance to exchange rate changes would be large and significant. As proposed by Saunsi (2010) in the case of Ghanaian economy, Nigerian authorities must remain vigilant in managing aid, outflows and stable exchange rate, as incessant fluctuations of Naira would endanger its external balance.

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