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**Article**

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# Revisiting Exchange Rate Pass-Through to Consumer Price Inflation in Nigeria: A Cointegrated Vector Autoregressive Approach

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***Abstract*** *This study revisits the extent of Exchange Rate Pass-Through (ERPT) in Nigeria based on a Cointegrated Autoregressive Model proposed by Johansen (1988, 1995). Using the annual data from 1960 to 2015, it is found that exchange rate has a positive and significant effect on consumer price inflation, captured by CPI both in the short- and long-run dynamics. The findings also show that import price index and trade openness index have positive and significant effects on consumer price inflation; although the effect of import price index is statistically flawed in the short-run. The implication of this study, therefore, is that exchange rate, import price index and trade openness index are the major determinants of consumer price inflation in the long-run but in the short-run the effect of import price index is blunted.*

***Key words*** Exchange Rate Pass-Through, Consumer Price Index, Cointegrated Autoregressive Model, Nigeria

**JEL Codes**: E31, F31, F42



## 1. Introduction

One of the main issues in macroeconomics in the recent times is the pass-through of exchange rate to domestic prices. This issue has posed a serious challenge to the governments and policymakers in all over the economies of the world especially after the adoption of floating exchange rate system and increased in the policy of trade openness, which resulted to a large fluctuation of exchange rates, particularly in the developing countries. As empirically shown, the size of a change in exchange rate is not the same with a change in domestic prices. This implies that the Purchasing Power Parity, a branch of the Law of One Price is far from reality (See Mann 1986; Ohno 1989; Marston 1990; Goldberg and Knetter 1997; Xu and Bernhofen 1999; Compa *et al*. 2004; Gagnon and Ihrig, 2004).

The empirical literature on exchange rate pass-through (ERPT) began in Nigeria with the pioneering scholarly works of Oladepo, (2007); Aliyu *et al.,* (2009); Omisakin, (2009); Oyinlola and Babatunde, (2009); Poloamina *et al*. (2009); Oyinlola and Egwaikhide, (2011); Zubair *et al.* (2013). The results from these studies provide that the pass-through of exchange rate in Nigeria is incomplete and partial, especially in the short to medium term. However, with the exception of few, most studies in Nigeria applied a Standard and Restricted Vector Autoregressive (VAR) model, which is only capable of analyzing the short-run dynamics of exchange rate pass-through. Therefore, this paper uses a Cointegrated VAR model proposed by Johansen (1988, 1995), considering its underlying assumptions, to revisit the ERPT to consumer price inflation in Nigeria, both in the short- and long-run. Our analysis covers a large period, from 1960 to 2015. This period is informed by the presence of all major economic episodes or policy regimes in Nigeria.

## 2. Literature review

The empirical results of the pass-through of exchange rate both in the long-run and short run indicate that its degree and size is different among the countries. However, most of the studies show that the pass-through is less than unity in the short to medium terms. For example, Aliyu *et al.* (2009) using VECM, report that the pass-through of exchange rate to import and consumer prices in Nigeria between 1986Q1 and 2007Q4 is incomplete. Ocran (2010) estimated 13% pass-through of exchange rate to CPI and 20% to producer prices in South African economy using monthly data covering the period 2000M1 to 2009M5. Oyinlola and Egwaikhide (2011) in their study based on Vector Autoregressive Model, reveal that the long run relationship exists between exchange rate and domestic price level in Nigeria but the pass-through is incomplete. The short-run variation in exchange rate is not indefinably evident, hence the variation in exchange rate might be anticipated and its impact would be dampened in the short-run. On the contrary, Omisakin (2009) finding shows no evidence of exchange rate volatility induced inflation and growth both in the short- and long-run. Essien (2005) and

Adeyemi and Samuel (2013) equally find incomplete pass-through of exchange rate - small and non-significant in the short-run, but increasing over the long-run. This contradicts with the finding of Zubair *et al.* (2013) that the pass-through is as small as about 0.2 in the long-run. On the basis of panel evidence, Razafimahefa (2012) estimates ERPT in all Sub-Saharan African countries (SSA). The results suggest incomplete and asymmetric pass-through with large ERPT during depreciation than appreciation; while Nguyen *et al.* (2015) results suggest that the pass-through of exchange rate to domestic inflation in SSA is low. Their results also reveal that the inflation is driven by domestic factors especially supply shocks.

Another exposition of the literature is that the degree of pass-through is unequivocally determined by the direct and indirect channels through some factors (Lafleche, 1996). The direct channel is transmitted through the effect of exchange rate volatility on import price to prices of producer and consumer goods. The indirect channel occurs due to the high demand for substitute goods which makes exports more competitive. In this case, McCarthy (2000) concludes that the pass-through is positively correlated with the openness of the country to trade. This conclusion, however, deviates from the earlier finding of Romer (1993) who opines that the openness is negatively correlated with inflation. Generally, the standpoint of the ERPT literature is that, since the pass-through of exchange rate by direct and indirect channels occurs in opposite direction, it therefore means that the ERPT occasioned by the degree of openness could be positive or negative. This general conclusion takes into consideration the Tylor's hypothesis, proposed by Tylor (2000) which submits a positive relationship between ERPT and domestic inflation.

## 3. Methodology of research

### 3.1. Data description

The data for this paper are obtained from the World Bank (World Development Indicator) and the Central Bank of Nigeria Statistical Bulletins. The sample consists of the log of four economic variables, namely; Consumer price index, nominal exchange rate, import price index and trade openness index. The study covers the period from 1960 to 2015. The choice of this period is to cover the period of economic regulation and deregulation policies in Nigeria.

### 3.2. Unit Root Tests

In this study, Augmented Dickey–Fuller (ADF) and Phillips– Perron (PP) unit root tests are used to check the stochastic properties of the data. In these tests, the hypothesis of non-stationarity or unit root is tested against the alternative, which states that the series is stationary or has no unit root. The reason for the inclusion of PP test is that it uses nonparametric statistical method to account for the serial correlation in the error term without necessarily adding the lagged difference terms as in the case of ADF. The Schwarz Information Criteria (SIC) is chosen to determine the appropriate lags for ADF test and Newey-West Bandwidth for PP test.

### 3.3. Cointegrated VAR Model

In this paper, a Cointegrated Vector Autoregressive Model proposed by Johansen (1988, 1995) is applied. This technique helps to identify the long-run and associated short-run relationship between economic variables. This model is based on the Data Generation Process (DGP). If we assume that the deterministic term in DGP is a linear trend term, then $z_t$ becomes a VAR(p) process, commonly expressed as:

$$z_t = \delta_1 z_{t-1} + \delta_2 z_{t-2} + \ldots + \delta_p z_{t-p} + \varepsilon_t \quad (1)$$

Where $z_t$ is a (k x 1) random vector of time series variables. The representation of VAR(p) expressed in Vector Error Correction Model is as follows:

$$\Delta z_t = \alpha_o + \alpha\beta' z_{t-1} + \sum_{j=1}^{p-1} \Gamma_j \Delta z_{t-j} + \mu_t, \quad t = 1, \ldots, T \quad (2)$$

Where $\Delta$ represents the first difference lag operator, $\alpha_0$ denotes the deterministic term (constant, trend, seasonable etc.), $\alpha\beta' = \Pi$ where $\beta$ represents the matrix of cointegrating vectors which contains information on the long-term relationships among the variables. $\alpha$ is the matrix which shows the speed of the adjustment to the equilibrium whenever the system is out of equilibrium condition. $\Gamma_j$ is the matrix of coefficients. $\mu_t$ is a vector white noise process with $\mu_t \sim(0,\Sigma_\mu)$. This is discussed extensively in Johansen and Juselius (1990), Johansen, (1995) and Juselius (2006) and Chiawa *et al*. (2013).

To test for the number of cointegration relations, Johansen (1988, 1995) in his approach, provides two closely related test statistics, namely; the trace statistic and maximum eigenvalue test. The null hypothesis ($H_o$) under trace statistic is that,

rank Π=r against the alternative $H_1$: rank (Π) ≥r +1. If $\lambda_{trace}$ (r) is statistically significant, then the null hypothesis is rejected. For maximum eigenvalue test, the null hypothesis states that there are 'r' cointegrating vectors against the alternative of r +1 cointegrating vectors. However, where the results of the two tests are conflicting, the maximum eigenvalue test will prevail. The main reason as discussed in the literature is that maximum eigenvalue improves the power of the test by limiting the alternative to a cointegration rank which is just one more than under the null hypothesis (See Feridun, 2004).

3.4. Measurement of variables in the Model

The fundamental economic variables used in estimating the pass-through of exchange rate in Nigeria are measured as follows:

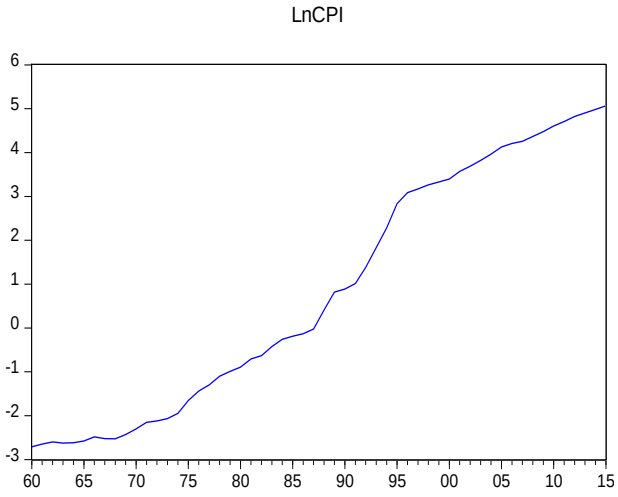


*Figure1*. The time plot of the log of CPI

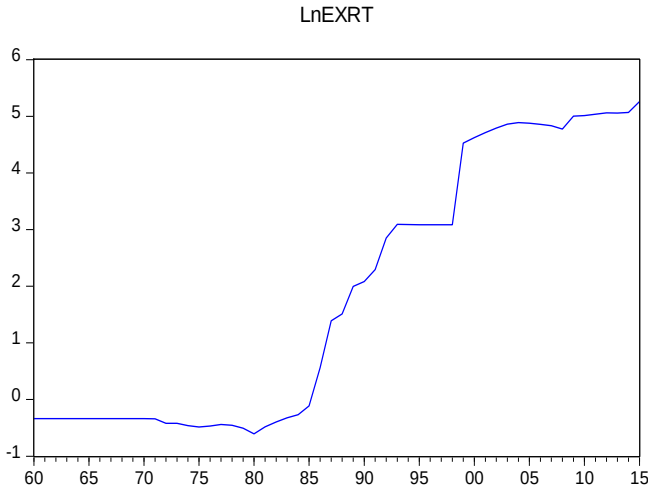


*Figure 2*. The time plot of the log of EXRT

The annual data on Nigeria's consumer price index and exchange rate are obtained from the World Development Indicator through their website link: data.worldbank.org. Exchange rate is measured in nominal value in terms of Nigerian naira to the United States dollar. Figure 1 and figure 2 present the graphs of the log of these time series from 1960 to 2015.

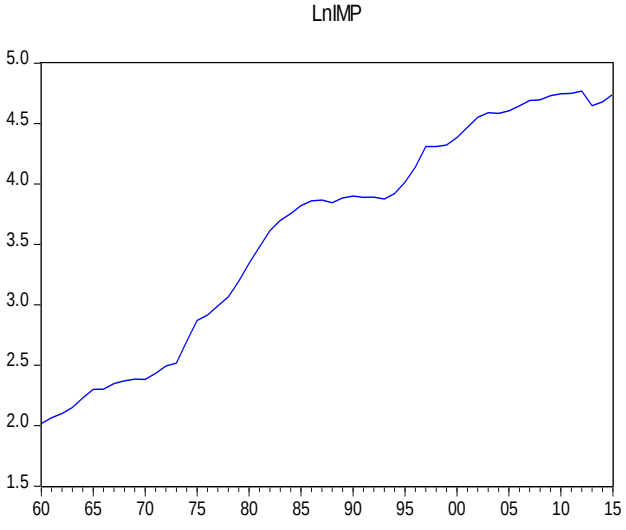


*Figure. 3*. The time plot of the log of IMP

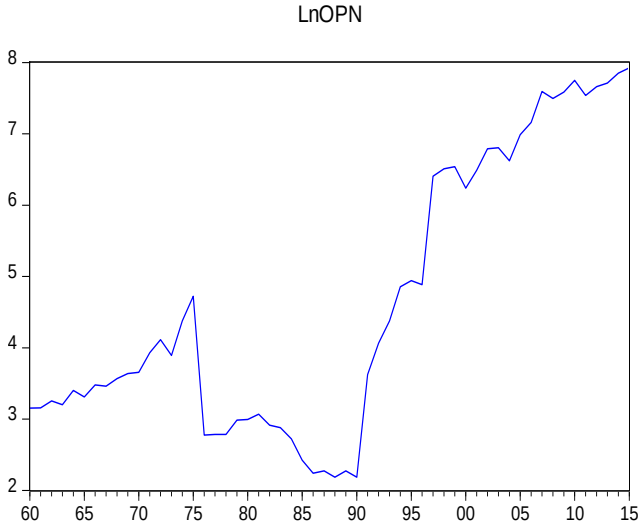


*Figure 4*. The time plot of the log of OPN

Figure 3 shows the graph of the annual time series of the log of import price index for Nigeria from 1960 to 2015. This data is obtained from World Development Indicator through their website link: data.worldbank.org. Following Aliyu *et al.* (2009), import price index is measured in this study as the United States Wholesale Price Index. This is because US is the major trade partner with Nigeria. Figure 4 presents the log of the openness index variable for Nigeria. This data is measured by the sum of total trade i.e. imports and exports divided by GDP. It is obtained from the various issues of Statistical Bulletin published by the Central Bank of Nigeria on annual basis.

## 4. Empirical results and discussions

Following the methodology discussed in section three above, this section presents the empirical results of this study.

### 4.1. Results of the Unit Root Tests

Tables 1 and 2 present the results of the Augmented Dickey-Fuller (ADF) and Phillips– Perron (PP) tests. The results of these tests indicate that all the variables included are not stationary in their levels both with intercept and trend and intercept. However, after their first differences, it is clear that the variables are all statistically significant both with intercept and trend and intercept. This implies that they are all integrated of order one, I(1).

*Table 1.* ADF Unit Root Test Results

| Variables | Level | | First Difference | |
|---|---|---|---|---|
| | Intercept | Trend and Intercept | Intercept | Trend and Intercept |
| | t-Stat [Prob.*] | t-Stat [Prob.*] | t-Stat [Prob.*] | t-Stat [Prob.*] |
| LnCPI | -0.074 [0.95] | -2.484 [0.33] | -3.431 [0.01]* | -3.889 [0.02]** |
| LnEXRT | -0.372 [0.98] | 0.852 [0.67] | -5.799 [0.00]* | -5.840 [0.00]* |
| LnIMP | -1.526 [0.51] | -1.047 [0.93] | -4.170 [0.00]* | -4.313 [0.01]* |
| LnOPN | -0.103 [0.94] | -1.476 [0.83] | -7.288 [0.00]* | -7.349 [0.00]* |

Note: * and ** denote rejection of the null hypothesis at 1% and 5% level of significance respectively based on the MacKinnon critical values.

*Table 2.* Philips-Perron Unit Root Test Results

| Variables | Level | | First Difference | |
|---|---|---|---|---|
| | Intercept | Trend and Intercept | Intercept | Trend and Intercept |
| | t-Stat [Prob.*] | t-Stat [Prob.*] | t-Stat [Prob.*] | t-Stat [Prob.*] |
| LnCPI | 0.410 [0.98] | -2.223 [0.46] | -3.306 [0.02]* | -3.288 [0.08]*** |
| LnEXRT | 0.144 [0.97] | -1944 [0.46] | -5.509 [0.00]* | -5.853 [0.00]* |
| LnIMP | -1.160 [0.69] | -1.043 [0.93] | -4.079 [0.00]* | -4.310[0.01]* |
| LnOPN | -0.081[0.95] | -1.471 [0.83] | -7.288[0.00]* | -7.349[0.00]* |

Source: Author's computation from regression output using Eview 9.

Note: * and *** denote rejection of the null hypothesis at 1% and 10% level of significance respectively based on the MacKinnon critical values.

### 4.2. Results of the Johansen Cointegration Test

The test for cointegration among the variables is conducted at lag 2 using AIC and SIC with intercept restricted to the cointegration space. The likelihood ratio cointegration test by Johansen (1988, 1995) requires that all the variables must be integrated or order one I(1). Since the results of the unit root have satisfied this condition, it therefore means that using this test is justifiable.

Table 3 shows the empirical result of Johansen cointegration test. The standard statistics used in the interpretation of the test are the likelihood ratio trace statistic and the maximum eigenvalue statistic discussed extensively in Johansen (1988, 1995). The trace statistic indicates two cointegrating equations at 1% and 5% level of significance. While the maximum eigenvalue statistic shows one cointegrating equation at 1% level of significance. Therefore, the null hypothesis of zero cointegraion rank in both test statistics are clearly rejected. On this basis, a long run equilibrium relationship exists among the fundamental variables of interest in the model. More so, as earlier stated, the maximum eigenvalue test is most accurate if the two test statistics results are contradictory. This is because of the improvement in its test power.

*Table 3.* Johansen Cointegration Test Results

Unrestricted Cointegration Rank Test (Trace)

| Hypothesized No. of CE(S) | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|
| r = 0 * | 69.94119 | 47.85613 | 0.0001 |
| r = ≤ 1* | 32.91008 | 29.79707 | 0.0212 |
| r ≤ 2 | 12.06210 | 15.49471 | 0.1540 |
| r ≤ 3 | 1.807732 | 3.841466 | 0.1788 |

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

| Hypothesized No. of CE(S) | Max-Eigen Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|
| r = 0 * | 37.03111 | 27.58432 | 0.0014 |
| r = ≤ 1* | 20.84798 | 21.13162 | 0.0968 |
| r ≤ 2 | 10.25437 | 14.26460 | 0.1573 |
| r ≤ 3 | 1.807732 | 3.841466 | 0.1788 |

Source: Author's computation from regression output using Eview 9.
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

*Table 4.* Normalized Cointegrating Eigenvalue β

| *Cointegrating Equation* | Coint Eq.1 |
|---|---|
| LnCPI (-1) | 1.000000 |
| LnEXRT (-1) | 0.327372* |
| | (0.068103) |
| | [5.36430] |
| LnIMP (-1) | 1.898095* |
| | (0.11672) |
| | [16.26181] |
| LnOPN (-1) | 0.497026* |
| | (0.05829) |
| | [8.52621] |
| C | 9.409634 |

*Table 5.* Alpha adjustment coefficients

| *Cointegrating Equation* | Coint Eq.1 |
|---|---|
| LnCPI (-1) | -0.581407* |
| | (0.05645) |
| | [-10.2905] |
| LnEXRT (-1) | 0.587164* |
| | (0.13671) |
| LnIMP (-1) | -0.033596 |
| | (0.02951) |
| | [-1.13844] |
| LnOPN (-1) | 0.615050* |
| | (0.24900) |
| | [2.47013] |

(*) denotes rejection of hypothesis at 1% level

( ) and [ ] denote Standard Errors and T-rarios

Table 4 presents the estimated value of the vector normalized on critical value. In other words, the results from Table 4 show the long-run cointegration relation with restricted constant. Therefore, the long-run equation is given by the following:

$$CPI = 9.409 + 0.327 * \text{exrt} + 1.898 * i\,\text{m}\,p + 0.497 * opn \quad (3)$$

Where (*) denotes that the coefficient is statistically significant at 1 percent level. The results indicate that all the variables included are correctly signed and statistically significant. From equation (3.1), a care must be taken in the interpretation of the variables included in the model. As specified by economic theory, a rise in the value of bilateral nominal exchange rate implies depreciation; hence exchange rate is correctly signed in the estimated equation. The coefficient of exchange rate shows that a positive with consumer price inflation measured by CPI, and it is statistically significant at 1 percent level. This result concurs with the empirical findings in McCarthy (2000), Aliyu *et al.* (2009), Oyinlola and Egwaikhide (2011) which indicate that the pass-through of exchange rate to domestic prices is incomplete in the long run. The results also reveal that the effect of import price index on consumer price inflation is positive and very high. This result is beyond the conventional acceptable level. However, it is not surprising, as it echoes the findings of Oyinlola and Babatunde (2009); Poloamina *et al.* (2009) and Oyinlola and Egwaikhide (2011) on the ERPT in Nigeria. The sign of trade openness index indicates a positive and significant effect on consumer price inflation in Nigeria. The plausible reason for this result is that, the more a country is open to international trade, the more the country is faced with the challenge of exchange rate shocks, which transmit into price inflation. Therefore, our result supports McCarthy (2000) and Aliyu *et al.* (2009) that the pass-through of exchange rate occurs more in an open economy through the direct and indirect transmissions of import and producer prices on CPI.

Table 5 presents the result of alpha adjustment coefficient (α) of the model. As earlier defined, alpha is the speed of adjustment parameter which stabilizes the long run equilibrium condition. The result is quite interesting. It shows that about 58 percent of disequilibrium in the dependent variable i.e. consumer price inflation is corrected every year. The result further suggests that whenever the system experiences disequilibrium, exchange rate and trade openness variables are the main variables that adjust the system back to the long-run equilibrium condition. The error correction term for LnIMP is statistically defective; hence no meaningful economic interpretation could be derived.

*Table 6.* Short-run Vector Error Correction model

| Variables | Coefficients |
|---|---|
| | (SE ( ) and T-ratio [ ]) |
| D(LnEXPT(-1)) | 0.070699<br>(0.05076)<br>[1.39270] |
| D(LnEXPT(-2)) | 0.185771*<br>(0.05220)<br>[3.55860] |
| D(LnIMP(-1)) | -0.001025<br>(0.33254)<br>[-0.00308] |
| D(LnIMP(-2)) | 0.116819<br>(0.33881)<br>[0.34479] |
| D(LnOPN(-1)) | 0.054673*<br>(0.02844)<br>[1.92210] |
| D(LnOPN(-2)) | 0.004190<br>(0.02901)<br>[0.14445] |
| C | 0.020703<br>(0.02565)<br>[0.80705] |
| R-squared<br>Adj. R-squared<br>Sum sq. resids<br>F-statistic<br>Log likelihood<br>Akaike AIC<br>Schwarz SC | 0.609745<br>0.528064<br>0.321980<br>7.464931<br>60.04055<br>-1.888323<br>-1.516569 |

(*) denotes rejection of hypothesis at 1% level

Table 6 presents the short-run error correction results. The result suggests a lower ERPT in the short-run compared to the long-run. This finding concurs with the major findings of Xu and Bernhofen (1999), Compa *et al.* (2004), Aliyu *et al.* (2009) that in short to medium terms, the relationship between exchange rate movement and inflation is less than unity.

Furthermore, the result of the import price index and the degree of openness has positive relationship with consumer price inflation. However, it is only the variations in exchange rate and trade openness that are statistically significant in explaining consumer price inflation in Nigeria.

The finding on this basis disagrees with the conclusion of Omisakin (2009), and echoes the finding in Oyinlola and Babatunde, (2009) and Oyinlola and Egwaikhide, (2011). Omisakin's finding holds that exchange rate induced inflation does not hold in Nigeria both in the short and long run over the period captured in his study, while Oyinlola and Babatunde (2009) and Oyinlola and Egwaihide (2011) opine that in the short-run the variation in exchange rate might be anticipated and hence, the impact would be dampened.

The results of AIC, -1.888323 and SBIC -1.516569 indicate that the lag selection is adequate. F-Statistic is highly significant and easily passes the significant test of 1%. More so, R-squared explains about 60% of the systematic variations in consumer price inflation in Nigeria.

4.3. VECM Granger Causality/Block Exogeneity Wald Tests

The block Granger causality test in the context of VECM is based on a Wald test which follows a $x^2$ distribution. This test is used to determine whether the past information in the exogenous variable could predict the changes in the dependent variable. The null hypothesis for this test is "no Granger causality". The result of this test as shown in table 7 indicates that a causality runs from CPI to exchange rate and trade openness index. Another importance of this result is the fact that it shows that the past information in CPI could determine the change in exchange rate and openness of the economy.

*Table 7.* Results from VECM Granger Causality/Block Exogeneity Wald Tests

| Dependent Variable | | | | Block Exogeneity | |
|---|---|---|---|---|---|
| Excluded Variable | LnCPI | LnEXRT | LnIMP | LnOPN | ALL |
| LnCPI | | **15.83016**<br>**(0.0004)** | 0.123496<br>(0.9401) | 3.694506<br>(0.1577) | **19.18462**<br>**(0.0039)** |
| LnEXRT | **15.92817**<br>**(0.0003)** | | 2.850653<br>(0.2404) | **9.621403**<br>**(0.0081)** | **25.69732**<br>**(0.003)** |
| LnIMP | 0.531478<br>(0.7666) | 0.942517<br>(0.6242) | | 0.680471<br>(0.7116) | 2.032987<br>(0.9166) |
| LnOPN | **8.079527**<br>**(0.0176)** | 1.787592<br>(0.4091) | 1.158738<br>(0.5603) | | **11.03231**<br>**(0.0874)** |

"All" refers to the exclusion of all the endogenous variables from the VECM other than the lags of the dependent variable. Significant test statistics (at 5 percent or better level) are in bold. P-values are in parenthesis.

*Table 8.* Residual Tests of VECM

| | Multivariate tests | T-Stat | P-value | Decision ruled |
|---|---|---|---|---|
| Serial Corr. | Portmanteau Test VAR (1) | 2.12482 | NA* | |
| Serial Corr. | Portmanteau Test (VAR (10) | 108.0276 | 0.9793 | Accept |
| Residual Corr. | LM Test (VAR (1) | 10.52972 | 0.8375 | Accept |
| Residual Corr. | LM Test (VAR (10) | 21.515774 | 0.1574 | Accept |
| Normality Test | Lutkepohl | | | |
| | • Joint Skewness | 27.19763 | 0.0000 | Reject |
| | • Joint Kurtosis | 42.16292 | 0.0000 | Reject |
| | • Joint Jarque-Bera | 69.36036 | 0.0000 | Reject |
| Residual Hetroskedasticity | Test | 226.5263 | 0.0107 | Reject |
| Residual Hetroskedasticity | Test B-P-G | 0.529427 | 0.6641 | Accept |

Table 8 presents the residual tests of VECM. These tests check for the adequacy of the model estimated in this study. From the result of Portmanteau Test, it is clear that the null hypothesis of no residual autocorrelation from lag 1 to 10 could not be rejected as probability of Q-Statistic is not statistically significant. The LM Test of residual correlation also shows no serial correlation in the model. The result of the residual normality test proposed by Lutkepohl (2005) indicates that the joint skewness test, the joint kurtosis test well as the joint Jarque-Bera test are statistically significant hence, we reject the null hypothesis that the residual are multivariate normal. Furthermore, the residual hetroskedasticity test is conducted on the variables included in the model. The result reject the null hypothesis of no cross terms (only levels and squares). Finally, Breusch-Pagan-Godfry tes for hetroskedasticity is carried out on the residual of the model, and the result accepts the null hypothesis of no hetroskedasticity.

Figure 4 presents test for stability of the model using CUSUM test. The result shows that the parameters are stable since they lie within the 5 percent significance level band.

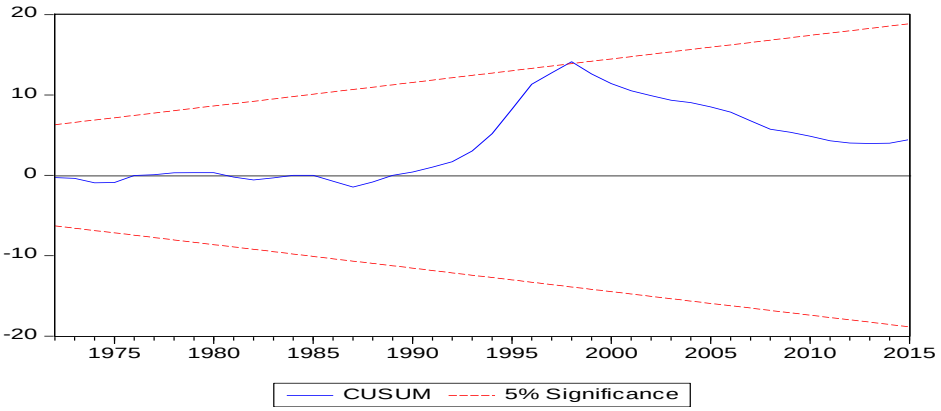


*Figure 4*. Test for stability of the model using CUSUM test

## 4. Conclusions

In this study, a model of Cointegrated VAR proposed by Johansen (1988, 1995) is employed to revisit the degree and size of exchange rate pass-through to consumer price inflation in Nigeria from 1960 to 2015. The choice of this period is to cover the period of economic regulation and deregulation policies in Nigeria. The results of the normalized long run equation indicate that exchange rate has a positive and significant effect on consumer price inflation, captured by CPI in both the long-run and the associated short-term dynamics. The results further show that Import price index and trade openness index have positive and significant effects on consumer price inflation; although the effect of import price index is statistically insignificant in the short-run. The implication of this study therefore is that exchange rate, import price index and trade openness index are major determinants of consumer price inflation in the long-run but in the short-run the effect of import prices is diminished.

## References

Adeyemi, O. A., and Samuel, E. (2013). Exchange Rate Pass-Through to Consumer Prices in Nigeria, *Journal of Business Management and Applied Economics,*3(4): 1-10.

Aliyu, S.U.R., Yakub, M.U., Sanni, G.K., and Duke O.O., (2009). "Exchange Rate Pass-through in Nigeria: Evidence from a Vector Error Correction Model", Online at https://mpra.ub.uni-muenchen.de/25053/ MPRA Paper No. 25053, posted 16. September 2010 12:01 UTC

Campa, J., Goldberg, L.S and González-Mínguez, J., (2004). "Exchange Rate Pass-Through into Imports Prices Euro area", *Federal Reserve Bank of New York Staff Reports* No. 219.

Central Bank of Nigeria (2015). Statistical bulletin (various issues), December, Abuja-Nigeria, www.cenbank.org

Chiawa, M. A., Asare, B. K. and Dauran, N. S. (2013). "A Cointegrated Vector Autoregressive Model of Determinants of Balance of Payment Fluctuations in Nigeria", *American Journal of Science and Industrial Research,* 4(6): 512-531.

Enders Walter, (2015). Applied Econometric Time Series. Fourth Edition; Wiley: USA.

Essien, E. A. (2005). "Exchange Rate Pass-Through to Inflation in Nigeria", *West African Journal of Monetary and Economic Integration,* 5(1), 89-103.

Feridun, M. (2004). "Foreign Direct Investment and Economic Growth: A Causality analysis for Cyprus, 1976-2002". *Journal of Applied Sciences,* 4(4): 654-657.

Gagnon, J., and Ihrig, J., (2004). "Monetary Policy and Exchange Rate Pass-Through", *International Journal of Finance and Economics*, 9, 315-338.

Goldberg, P.K., and Knetter, M.M., (1997). "Goods Pricesand Exchange Rates: What Have We Learned?", *Journal of Economic Literature*, 35(3):1243-1272.

Johansen, S. (1995). *Likelihood-based Inference in Cointegrated Vector Autoregressive Models*, Oxford University Press, Oxford.

Johansen, S. (1988). "Statistical Analysis of Cointegrated Vectors". *Journal of economic Dynamics and Control*, 12:231-251.

Johansen Soren, and Juselius, Katarina (1990), "Maximum Likelihood Estimation and Inferences on Cointegration – With Application to the Demand for Money", *Oxford Bulletin of Economics and Statistics,* (52) 2: 169-210.

Juselius, K. (2006). *The Cointegrated VAR Model: Methodology and Applications*, Advanced Texts in Econometrics, Oxford University Press.

Laflechel, T. (1996). "The Impact of Exchange Rate Movements on Consumer Prices", *Bank of Canada Review*, Winter, 1996-1997: 21-32.

Lutkepohl, H. (2005). New Introduction to Multiple Time Series Analysis, Springer-Verlag Berlin Heldelberg.

Mann, C.L., (1986). "Prices, profit margins and exchange rates", *Federal Reserve Bulletin*, 72(6):366-379.

Marston, R.C. (1990). "Pricing to market in Japanese manufacturing", *Journal of International Economics*", 29(3-4): 217-236.

McCarthy, J. (2000). "Pass-Through of Exchange Rates and Import Prices to Domestic Inflation in Some Industrialized Economies", *Working Paper No. 79*, Bank for International Settlements, Basel.

Nguyen, A. D., Dridi, J., Unsal, F. D., & Williams, O. H. (2015). "On the Drivers of Inflation in Sub-Saharan Africa", *Working Paper No. WP/15/189*, International Monetary Fund.

Ocran, M.K. (2010). "Exchange rate pass-through to domestic prices: The case of South Africa. *Prague Economic Papers*, 4, 291-310, DOI: 10.18267/J.pep.378.

Oladipo, O., (2007). "Exchange Rate Pass-Through: A Case Study of a Small Open Economy," *Global Economy Journal*, 7(3):1524-5861.

Ohno, K., (1989). "Export Pricing Behaviour of Manufacturing: a US Japanese Comparison", *IMF Staff Paper,* 36: 550-579.

Omisakin, O. A., (2009). "Exchange rate pass-through to domestic price and output in Nigeria". *International Business Management,* 3(3):38-42.

Oyinlola, M.A., and Egwaikhide, F.O., (2011). "Exchange rate pass-through to domestic prices in Nigeria: A dynamic investigation", *Journal of Social Sciences*, 6:87-95.

Oyinlola, M. A., and Babatunde, M. (2009). "A Bound testing analysis of exchange rate pass-through to aggregate import prices in Nigeria", *Journal of Economic Development* 34(2): 97-209.

Poloamina, I.D., Babatunde, M., and Oyinlola, M.A. (2009). "Is exchange rate pass-through to import prices in Nigeria a short-run phenomenon? *Ibadan Journal of the Social Sciences,* 7(1): 36-48.

Razafimahefa, I.F. (2012). "Exchange Rate Pass-Through in Sub-Saharan African Economies and its Determinants", *Working Paper No. WP/12/141*, International Monetary Fund.

Romer, D. (1993). "Openness and inflation: Theory and Evidence, Quarterly Journal of Economics, 4: 869-903.

Taylor, J., (2000). "Low Inflation, Pass-Through and the Pricing Power of Firms", *European Economic Review*, 44: 1389-1408.

Xu, P., and Bernhofen, D. (1999). "Exchange Rates and Market Power: Evidence from the Petrochemical Industry", *Journal of international economics*, 52: 283-297.

Zubair, A., Okorie, G., and Sanusi, A.R. (2013). Exchange Rate Pass-Through to Domestic Prices in Nigeria: *An Empirical Investigation. Economic and Financial Review,* Central Bank of Nigeria, 51(1): 1-32.