Exchange Rate Pass-Through in Nigeria

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Abstract

Exchange rate pass-through is the phenomenon whereby changes in the value of foreign exchange are reflected in domestic price of imports. Thus, the paper examines exchange rate pass-through for Nigeria imports is by applying an econometric procedure which avoids the pit-falls in previous studies to aggregate data. We provide estimates of pass-through based on Johansen technique. We found incomplete pass-through for Nigeria.

JEL Classification Numbers: D41, E31, F41
Keywords: Pass-through, exchange rate, import prices
Exchange Rate Pass-Through in Nigeria

1. Introduction

The degree to which exchange rate movements are reflected in prices has long been a question of interest in international economics. Interest in this issue, however, was rekindled in the 1970s by a combination of rising inflation and the adoption of more flexible exchange rate regimes in many industrialized countries following the demise of the Bretton-Woods system of adjustable pegs. Also, fluctuations in the exchange rate have been prominent in developing countries with the adoption of the International Monetary Fund (IMF) and the World Bank adjustment programmes.1

As a result, a number of authors have been motivated to examine more closely the relationship between exchange rates and prices of internationally traded goods, refer to as ‘exchange rate pass-through’. The exchange rate pass-through is ‘the degree to which exchange rate changes are reflected in the destination currency prices of traded goods’, Menon (1996). As revealed from the exchange rate pass-through literature, most empirical studies on pass-through focused on large open economy such as the US, the UK, Japan, Germany, and France. In fact, about 55 percent of all pass-through studies until 1995 concentrated on the United States. Thus, little attention has been given to the effects of the movements of the exchanges rates on import and domestic prices in small open economies in developing countries, particularly in Africa.

First, this study tries to redress the imbalance in country study coverage by presenting estimates of the effects of changes in the exchange rate on domestic price of imports in Nigeria. Second, most researchers have ignored the time series properties of the data in conducting their estimation. Given the fact that the data used to estimate pass-through are usually trended, pass-through estimates from these studies may have been biased due to non-stationarity of the data, but in this study, an up-to-date econometric method is

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1 The effectiveness of the exchange rate policy depends crucially on the nature and timing of linkages between nominal exchange rate, prices and inflation.
used. Finally, we employed aggregate data to reveal the overall affect of movement in exchange rate on domestic prices of imports within the Nigerian economy.

In addition to this introductory part, this paper contains six other sections. The second section focuses on the theory of exchange rate pass-through. Section three contains the review of literature, while the empirical model, data construction and sources, and econometric procedure are laid out in section four. Section five contains the results while the last section contains concluding remarks.


In a perfectly competitive market there is no deviation between price and marginal cost. Therefore, when market structure deviates from perfect competition to imperfect competition, pricing will no longer be at marginal cost, and firms can charge a mark-up on costs to earn above normal profits even in the long run. However, the variation in mark-up over marginal cost will be determined by the degree of substitutability between domestic and imported goods, as determined by the degree of product differentiation and the degree of market integration or segregation.

A market is integrated when geographical or nationality does not have systematic effects on transaction prices for identical products\(^2\) while segregation refers to lack of integration. A product market is geographically segmented if the location of the buyers and sellers influences the terms of the transaction in a substantial way\(^3\). According to Pigou (1920) there exists third-degree price discrimination. This occurs when different groups of consumers pay different prices for identical goods.

However, a market that is integrated may not be perfectly competitive. A monopoly supplier may charge a price above marginal cost, but be incapable of price discrimination if buyers are well organised or the product is easily transported across markets.

\(^2\) Specifically, the market for Gold, the location of buyers and sellers is virtually irrelevant to the terms of transaction.

\(^3\) The market for Automobile is segmented. Automobiles purchase in foreign market may attract additional taxes at the border and may not comply with safety and environmental regulations in the home market. See Goldberg and Knetter (1997) for details.
Therefore, the lower the degree of substitutability between goods and the degree of market integration, then, the greater will be the market power of the sellers. Following from the above, most recent research work on pass-through has employed the mark-up approach\(^4\). Thus, in this paper, we employed mark-up model to derive the import price equation that is used to test for the effects of pass-through for domestic price of imports in Nigeria.

3. Literature Review

Our observation, based on the findings from the empirical literature on pass-through revealed that cases of incomplete pass-through are common phenomenon in most countries, but with exception of few\(^5\).

However, the degree of pass-through seems to be quite different across countries and products. Factors that may have influenced the degree of pass-through are the openness and the size of the country. A close observation revealed that different results for a country, especially for the United State, stem primarily from the use of different methodology, model specification and variable selection rather than from different time periods studied. For the small open economy, which is the focus of this study, findings from previous studies seem mixed − incomplete and complete exchange rate pass-through. Evidence of incomplete pass-through abounds in studies by Lattimore (1988), Phillips (1991), Menon (1993, 1995) for Australia; Moreno (1989) for Taiwan and Korea, Athukorala (1991) for Korea; Athukorala and Menon (1994) and Alexius (1997) for Sweden, while recent studies by Kenny and McGettigan (1996, 1998) for Ireland and Kikuchi and Sumner (2002) found almost complete pass-through.


\(^5\) Pass-through is complete when mark-ups of prices over cost are constant or marginal costs are constant. Of course, incomplete pass-through may be due to a pricing strategy often employed by exporting firms, a phenomenon termed as ‘pricing – to- market’. So, rather than constantly adjusting prices to exchange rate changes, an exporting firm may choose to hold the price constant and simply reduce or increase the mark-up on prices. This implies that exporting firms accept temporal losses in their revenue in order to avoid long run losses (in case of an appreciation of the own currency) of their market share.
4 The Empirical Model, Data Construction and Sources and Econometric Procedure

4.1 The Empirical Model

As earlier mentioned, most previous studies have employed import price equation derived within the mark-up framework to measure pass-through. Of course, manufactured goods are typically differentiated and traded in markets that are characterised by imperfect competition; thus, the mark-up model seems more appropriate for our study.

We assume that foreigners set their foreign currency export price, $PX$, as a mark-up, $\pi$, on their production cost in foreign currency, $CP$:

$$PX = \pi CP$$  \hspace{1cm} \text{Equation 1}

The domestic currency (i.e. the Nigerian naira) import price is, therefore, given by:

$$PM = PX \cdot ER = (\pi CP) \cdot ER$$  \hspace{1cm} \text{Equation 2}

where $ER$ is the exchange rate defined as the domestic currency price of one unit of foreign currency. The profit mark-up is hypothesized to depend on competitive pressures in the domestic market, and the exchange rate.

This competitive pressure is proxied by the gap between the price of import-competing goods, $PD$, and the exporter’s production cost. The influence of domestic demand condition on the import pricing decision is also captured by $PD$. Accordingly, the profit mark-up is thus modeled as:

$$\pi = \left( \frac{PD}{CP \cdot ER} \right)^{\alpha}$$  \hspace{1cm} \text{Equation 3}

Thus, substituting equation 3 into equation 2 we obtain:

$$PM = \left( \frac{PD}{CP \cdot ER} \right)^{\alpha} (CP \cdot ER)$$  \hspace{1cm} \text{Equation 4}

Therefore, taking natural logarithms of the variables, equation 4 can be reformulated as:

$$LPM = \alpha PD + (1-\alpha)CP + (1-\alpha)ER$$  \hspace{1cm} \text{Equation 5}

The model above implies a rate of pass-through that is equal in magnitude for changes in foreign costs and the exchange rate.

4.2 Data Construction and Sources

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6 The mark-up is equal to $1 + \lambda$, where $\lambda$ is the profit margin.

7 The coefficient of $pd$ which is $\alpha$, is the complement of the coefficient of both $cp$ and $er$. Thus, the cross-coefficient restrictions implied by the model suggest that $pd$ has no (full) effect in determining import prices if pass-through is complete (zero).
During the data collection, the author noticed that many countries, including Nigeria, with exception of few developed countries\(^8\), do not collect price data for imports and exports, therefore, import unit values are used\(^9\). The study relied on secondary data, basically, quarterly time series data from 1970:1 to 2001:4. This gives a sample size of 128 observations. The sample size is relatively large when compared with sample size in previous studies on pass-through, particularly for small open economies.

The import unit values for Nigeria imports were collected from the African Development Indicators, a publication of the World Bank and the Central Bank of Nigeria (CBN). Instead of constructing import unit values for Nigeria for imports from the United States, the United Kingdom, France, Germany, Italy, Netherlands, China and Japan, the major trading partners, we used the ‘total’ import unit values\(^10\). However, we are justified due to the fact that aggregate imports from these major trading partners constitute, on average, between 67 percent and 85 percent of Nigeria’s aggregate total import between 1970 and 2001\(^11\). Next, the domestic Nigeria competing price is the Producer Price Index (PPI), is obtained from the World Bank’s African Development Indicators and the CBN. This index is derived from price indices for both outputs of manufacturing and agricultural industries. Most previous studies employed a ‘world’ price variable (in the form of import-weighted export prices) to capture changes in competitiveness of export sales to destination markets. The problem with this index is that it represents the pricing decision on exports to all markets, it is particularly inappropriate for small countries and when pricing to market behaviour are common for manufactures.

Thus, to avoid these problems, we construct the foreign cost of production index that is unaffected by the ‘pricing to market’ problem. The foreign cost of production index is

\(^{8}\) These countries include the United States, the United Kingdom, Japan, and Germany.

\(^{9}\) By definition, the unit values are the values of imports or exports divided by the number of items shipped. However while the problem identify with import unit values as rightly posited by Alterman (1991) are recognised, the import unit values are considered to provide only and best source of data relevant for this study.

\(^{10}\) Though import unit values for Nigeria would have been constructed for the main trading partners but the author was unable to collect volume data for export into Nigeria, while the dollar values of exports are available in Direction of Trade Statistics, a publication of the IMF.

\(^{11}\) The author complied the import share of Nigeria trading partners from the Direction of Trade Statistics and OECD Statistics of Foreign Trade (series A).
constructed as an import share weighted-average of foreign costs in the eight major
import supplying countries mentioned above\(^{12}\). Finally, the data for the exchange rates
were obtained from the International Financial Statistics (IMF) CD-Rom for all Nigeria’s
trading partners and convert dollars values to naira, Nigeria’s local currency. Thus, we
construct the effective or trade weighted exchange rate for Nigeria. This is the weighted
average of nominal exchange rates (per foreign currency) of the eight main import
supplying countries. The weights used are import share of 1990\(^{13}\).

4.3 Econometric Procedure

In most conventional studies, Ordinary Least Square (OLS) is used. The literature on pass-
through revealed that different econometric approach has been used to estimate pass-
through with series of short-comings. However, in this study, we use the ‘Johansen
procedure’. This econometric approach appears most suitable for our estimation. This
procedure is a multivariate estimation technique that uncovers long-run stationary
relationships among sets of non-stationary data. The multivariate approach, with its
allowance for the potential endogeneity of all the variables of interest, eliminates the single-
equation bias, which would have been problematic for previous studies on pass-through.
Furthermore, the approach allows users to investigate the speed of adjustment to the long-
run equilibrium, along with any short-run relationships, which may exist.

The first stage of the Johansen procedure involves carrying out a unit root tests on all the
variables of interest. By definition, a time series is said to be stationary if its means,
variance and covariances are all invariant with respect to time\(^{14}\). There are several ways
of testing for the presence of a unit root but we employed Augmented Dickey Fuller
(ADF) and Phillip and Perron (1988) tests. However, the unit root tests suggested by

\(^{12}\) These include the unit labour costs in manufacturing obtained from organisation for economic co-
operation and development (OECD), Main Economic Indicators; OECD average import price of crude oil
obtained from OECD Economic Outlook; and the price index of minerals, ores and metals were obtained
from the International Energy Agency publications.

\(^{13}\) The countries are the United States, the United Kingdom, France, Germany, Italy, Japan, China, and
Netherlands and the weights (in percentages) are 11.09, 17.17, 9.16, 15.04, 4.51, 5.97, 3.32, and 4.81,
respectively.

\(^{14}\) This implies that a stationary series tends to return to its mean value and fluctuate around it within a more
or less constant range, while a non-stationary series has a different mean at different points in time and its
variance increases with the sample size.
Phillips and Perron have two main advantages over the corresponding ADF test. First, in contrast to ADF test, which includes more explanatory variables to deal with the autocorrelated residuals and reduces the effective number of observation, i.e. the degree of freedom, the Phillips and Perron tests overcomes the problem of autocorrelation by using non-parametric correction. Second, the Phillips and Perron test is valid under more general assumptions about the sequence of innovations, hence, allowing for all finite ARMA processes. On the other hand, one of the drawbacks of Phillips and Perron unit root test is that the number of autocovariances used for the Newey-West estimator of the error term variances is arbitrary. Thus, we investigate the stationarity of the variables using both Phillips-Perron and Augmented Dickey-Fuller tests.

Therefore, having found that our variables possess a single unit root, we test for co-integration. The number of co-integrating vector \( r \), which indicates the dimension of the co-integrating space, is determined by two tests statistics, maximal eigenvalue \( \lambda_{\text{max}} \) and trace:

\[
\lambda_{\text{max}} = -N \ln \left( 1 - \hat{\lambda}_{r+1} \right)
\]

and

\[
\text{Trace} = -N \sum_{i=r+1}^{m} \ln \left( 1 - \hat{\lambda}_i \right)
\]

where \( N \) is the number of observation and \( \hat{\lambda} \) the estimated eigenvalue.

5. The Estimation Results

As we can see in table 1, the results of unit root tests indicates that we cannot reject the null hypothesis of a unit root at 5% level of significant for the logarithms of the levels of import unit values, producers’ costs, domestic competing costs and the trade-weighted exchange rate. However, we can reject the null hypothesis of a unit root at 5% significant level for the first difference of all the variables. Thus, the fact that the levels have unit root and the first difference of the series is stationary provides evidence that all logarithms of the series are integrated of order one, i.e. \( I(1) \).\(^{15}\)

\(^{15}\) Note, with the exception of logarithms level of domestic competing costs.
### Table 1: Time Series Properties of the Data

<table>
<thead>
<tr>
<th>Variables</th>
<th>ADF</th>
<th>PP</th>
<th>Order of Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T, C</td>
<td>C</td>
<td>N</td>
</tr>
<tr>
<td>LPM</td>
<td>-2.05</td>
<td>-1.62</td>
<td>2.33</td>
</tr>
<tr>
<td>∆LPM</td>
<td>-5.52**</td>
<td>-5.34**</td>
<td>-4.56**</td>
</tr>
<tr>
<td>LPD</td>
<td>-2.26</td>
<td>0.09</td>
<td>2.03</td>
</tr>
<tr>
<td>∆LPD</td>
<td>-3.19*</td>
<td>-3.22**</td>
<td>-2.33**</td>
</tr>
<tr>
<td>LCP</td>
<td>-3.35*</td>
<td>-3.85**</td>
<td>1.57</td>
</tr>
<tr>
<td>LER</td>
<td>-1.51</td>
<td>-1.96</td>
<td>-0.63</td>
</tr>
<tr>
<td>∆LER</td>
<td>-5.40**</td>
<td>-5.44**</td>
<td>-5.38**</td>
</tr>
</tbody>
</table>

**Note:** ADF: Augmented Dickey-Fuller unit root test; PP: Phillips-Perron unit root test; T: Trend term included in the unit root test; C: Constant term included in the unit root test; N: No trend and constant terms are included in the unit root test; ∆: The first differenced variables; **: Variables stationary at 5%; *: Variables stationary at 10%; McKinnon critical values for rejection of hypothesis of a unit root for PP and ADF tests: 1% = -3.48, 5% = -2.88, 10% = -2.57 (with constant only); 1% = -4.03, 5% = -3.44, 10% = -3.14 (with constant and trend included) 1% = -2.58, 5% = -1.94, 10% = -1.61 (no trend and constant term). The results were obtained using 4 lags.

The lag for VAR is determined by using several criteria. The ultimate first step entails choosing a set of lag lengths for the VARs that produce mathematical stability, that is, the companion matrix has roots less than unity in absolute value, (or equal, under cointegration, to plus 1), the Akaike information criterion, misspecification tests such as autocorrelation, heteroscedasticity, no ARCH and normality. These diagnostic tests are also supplemented by the tests of graphic analysis which includes recursive graphics and stability tests to evaluate system (parameter) stability. The graphical analysis involves the actual and fitted values (to describe the fitted and actual values) of the equations over time, including the 1 step forecast, cross-plot of actual and fitted (to describe the cross plot of actual and fitted values) and residual density (to show histogram of the residual of the equations); while the recursive graphics analysis involves residual sums of squares, 1–step residuals with $0 \pm 2\sigma$ (this helps to reveal any model deficiencies by showing $v_t$ and twice equation standard error at each $t$ on other side of zero), loglikelihood/T at each $t$, break-point (N down) Chow tests (to test the stability of the equation).

Therefore, taking the information above into consideration, we employed 4 lags. Also, we included (impulse) dummy variables on the basis of economic rationale which
includes correction for the outliers and most especially to reflect the deregulation of the Nigerian economy, through the introduction of the structural adjustment programme (SAP) – exchange rate, interest rates, were effectively liberalised in 1986\(^{16}\). Perhaps, the addition of further dummy variables could have eliminated the normality problem but the robustness of Johansen procedure to many dummy variables is not known Cheung and Lai (1993) and Gonzalo (1994).

The results indicate that our VARs are mathematically stable. The roots of the companion matrix always less than 1 in absolute value, while the diagnostic tests such as the autocorrection, heteroscedasticity, and ARCH tests indicate that there is no autocorrection, heteroscedasticity and ARCH, as presented in Table 2:

**Table 4: Diagnostic Tests Results**

<table>
<thead>
<tr>
<th>Variables</th>
<th>AR AR 1-5 F(5, 98)</th>
<th>Normality Normality $\chi^2$ (2)</th>
<th>ARCH ARCH 4 F(4, 95)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPM</td>
<td>0.79554 [0.5554]</td>
<td>5.2849 [0.0712]</td>
<td>0.27715 [0.8921]</td>
</tr>
<tr>
<td>LPD</td>
<td>1.0705 [0.3815]</td>
<td>11.859 [0.0027] **</td>
<td>0.70307 [0.5918]</td>
</tr>
<tr>
<td>LCP</td>
<td>0.79918 [0.5529]</td>
<td>17.19 [0.0002] **</td>
<td>0.70281 [0.5919]</td>
</tr>
<tr>
<td>LER</td>
<td>0.62391 [0.6819]</td>
<td>0.49823 [0.7795]</td>
<td>1.35034 [0.1572]</td>
</tr>
</tbody>
</table>

From Table 2, we observed that the residuals are not normally distributed with the exception of LPM and LER.

In sum, given the graphic analysis, actual and fitted values, and the cross plot of actual and fitted as depicted in panel A and B and also the recursive analysis (one step residuals) as depicted in Panel C of Figure 1, though the data performed very well as revealed by our results (the results are good for all the variables where the series are all within the 5% band). Thus, not all our tests as presented in Figure 1 above indicate perfect results, (especially the normality of the residuals which are mainly due to the presence of excess kurtosis), but the key mathematical and statistical results are fulfilled by our VARs, therefore, we argue that our VARs are acceptable channel to investigate the presence of long run relationships.

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\(^{16}\) Though the adjustment is still on course, recent International Monetary Fund (IMF, 2001) reports on Nigeria observed that the policies are now gradually being relaxed.
Table 3 reports both the trace and maximum eigenvalue statistics for co-integration tests between import unit values, domestic PPI, Nigeria’s trading partners’ production costs and exchange rate. It is difficult to assume that the domestic Nigeria output or prices play a role in the determination of the production costs or the exchange rate but the opposite deterministic relationship is plausible\(^{17}\).

\(^{17}\) In the examination of pass-through for larger open economies such as the US, Japan, Germany, it may be plausible that the domestic exchange rate could affect the foreign cost structure. However, given the fact
Table 3: Multivariate Co-integration Test Results: Aggregate and SITC Sections
Aggregate: LPM, LPD, LCP and LER

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>λ-max Statistic</th>
<th>Crit. Val.95%</th>
<th>Trace Statistic</th>
<th>Crit. Val.95%</th>
</tr>
</thead>
<tbody>
<tr>
<td>r = 0</td>
<td>38.92**</td>
<td>31.50</td>
<td>72.07**</td>
<td>63.00</td>
</tr>
<tr>
<td>r = 1</td>
<td>18.27</td>
<td>25.50</td>
<td>33.15</td>
<td>42.40</td>
</tr>
<tr>
<td>r = 2</td>
<td>9.424</td>
<td>19.00</td>
<td>14.88</td>
<td>25.30</td>
</tr>
<tr>
<td>r = 3</td>
<td>5.457</td>
<td>12.30</td>
<td>5.457</td>
<td>12.30</td>
</tr>
</tbody>
</table>

Note: ** (*) indicates hypothesis acceptance at 1% (5%) confidence level. An unrestricted constant, a restricted trend and three seasonal dummies were included in the co-integration space.

According to results in table 3, evidence is found for one co-integrating relationship. From the recursively obtained eigenvalues, the estimates of the vectors for aggregate pass-through is constant.

Table 4: Estimate of Pass-Through

\[
LPM_{tot} = 1.00 LCP + 1.00 LER + 0 LPD - 0.0006t
\]

\(\chi^2(6) = 38.211 [0.00]\)

D denotes dummy variable while t denotes trend

In table 4, we presented the estimated co-integrating vectors. The tests of the restrictions on the co-integration vector was conducted jointly with a test of the hypothesis that LPD, LCP and LER are weakly exogenous\(^{18}\). The test is conducted by imposing row restrictions on \(\alpha\) to yield a new restricted model. Also, we test for cross coefficient restrictions to ascertain if the coefficient on Nigeria’s exporters production costs and the exchange rate are equal. The rejection of exclusion restriction implies that for aggregate import unit values, the hypothesis of full pass-through from Nigeria’s trading partners’ production costs and exchange rate changes cannot be accepted. The \(\chi^2\) statistics refer to the exclusion restrictions on domestic prices and weak exogeneity, where p-value is in bracket.

Furthermore, the dynamics to the long run equilibria was estimated (the result is presented in Table 5). This is of interest because it indicates the behaviour of the changes that Nigeria is a small open economy and the small share of Nigeria’s trade in the trading partners’ trade, such hypothesis is not appropriate in this study.

\(^{18}\) The tests for weak exogeneity was conducted to ensure that it is valid to condition on the LPD, LCP and LER variables and use single equation estimation of the dynamic relationship. Thus, the test for weak exogeneity for LPD, LCP, and LER requires restrictions to be placed on the weighting matrix, the standardized \(\alpha\) eigenvectors.
in import unit values over time, providing additional information on pass-through. The variables included were four lags of $\Delta LPM_i$, $\Delta LCP_i$, $\Delta LER_i$ and $\Delta LPD_i$.

Table 5: The Results FIML Estimates of the Adjustment to the Long Run Equilibrium Relationships

<table>
<thead>
<tr>
<th>Aggregate Pass-Through</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Equation for DLPM</td>
<td></td>
<td></td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>Variable</td>
<td>Coefficient</td>
<td>Std.Error</td>
<td>t-value</td>
<td>t-prob</td>
</tr>
<tr>
<td>DLPM_2</td>
<td>0.25904</td>
<td>0.083159</td>
<td>3.115</td>
<td>0.0023</td>
</tr>
<tr>
<td>DLPD_3</td>
<td>0.64788</td>
<td>0.271401</td>
<td>2.387</td>
<td>0.0186</td>
</tr>
<tr>
<td>DLCP_4</td>
<td>0.26906</td>
<td>0.13326</td>
<td>2.019</td>
<td>0.0460</td>
</tr>
<tr>
<td>DLER_2</td>
<td>0.86165</td>
<td>0.088409</td>
<td>9.746</td>
<td>0.0000</td>
</tr>
<tr>
<td>ECM_1</td>
<td>-0.15059</td>
<td>0.034721</td>
<td>-4.337</td>
<td>0.0000</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.023321</td>
<td>0.011003</td>
<td>-2.120</td>
<td>0.0362</td>
</tr>
<tr>
<td>Seasonal</td>
<td>0.026068</td>
<td>0.013528</td>
<td>1.927</td>
<td>0.0568</td>
</tr>
<tr>
<td>Seasonal_1</td>
<td>0.052167</td>
<td>0.014516</td>
<td>3.594</td>
<td>0.0000</td>
</tr>
<tr>
<td>Seasonal_2</td>
<td>0.037444</td>
<td>0.014366</td>
<td>2.606</td>
<td>0.0104</td>
</tr>
</tbody>
</table>

$\log lik = 1576.0209$  $\log |\Omega| = -25.6264$  $|\Omega| = 7.42361 e^{-012}$  $T = 123$

Single Equations Diagnostic Tests:

- Error auto-correlation: $F(5, 109) = 0.66838 [0.6482]$; Normality: $\chi^2 (2) = 15.507 [0.0004]$ **
- ARCH: $F(4, 106) = 0.074862 [0.5611]$; Heteroscedasticity: $F(10, 103) = 0.48968 [0.8934]$

Systems Tests

- Error auto-correlation: $F(80, 361) = 1.2389 [0.0987]$; Normality: $\chi^2 (8) = 38.419 [0.0000]$ **
- ARCH: $F(100, 684) = 0.90162 [0.7379]$; Heteroscedasticity: $F(200, 777) = 0.82721 [0.9492]$

The equilibrium correction term generated from the co-integration equations was included as an additional channel through which the speed of pass-through can be estimated (denoted as $ECM_i$). Parsimony was achieved by removing the insignificant regressors and testing the validity of the reduction by an $F$ test. The parsimonious vector error correction (VECM) was subjected to a number of diagnostic checks, including stability, within equation residual serial correction, heteroscedasticity, and normality tests.

Our results revealed that full pass-through from the exchange rate and trading partners cost of production could not be accepted. The long run relationship shows that a 1 percent change in the exchange rate and the exporters foreign cost of production leads to 0.86 percent and 0.26 percent increase in import prices respectively. The results suggest
that supplier pass on additional costs by selling their products at higher prices, all things being equal. Also, the speed of adjustment -0.15 implies that following shocks, the system takes a short period to adjust towards equilibrium.

6.1 Conclusion

In this paper we examine the degree of pass-through from producers’ costs and the exchange rate to the prices of Nigeria imports from her major trading partners using quarterly aggregate data. We used the mark-up model and our results revealed that full pass-through from the exchange rate and the major trading partners’ producer costs could not be accepted for the aggregate import unit values.

Our findings accord much more closely to the incomplete pass-through hypothesis. Also, to place our results in context, a comparison with the findings from small open economy would be in order. Studies mentioned above that focused on small open economy include Lattimore (1988), Moreno (1989), Phillips (1991) and Menon (1995) for Australia, and Menon and Athukorala (1994) for Korea. Our results of incomplete pass-through for both aggregate and sectors under consideration compare favourably with evidence available from small open economies most especially for Australia, Sweden and Korea.

References


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19 Common statistics such as $R^2$, $R^{-2}$ etc are not reported by this type of model estimation.


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