

The main explanation for incomplete pass-through is that many importing and exporting firms choose to hold their prices constant and simply reduce or increase the mark-up on prices when the exchange rate is changing. [12] justified incomplete pass-through as arising from firms that operate in a market characterized by imperfect competition and adjusts their mark-up (and not only prices) in response to an exchange rate shock. [13] instead emphasized the role of (non-traded) domestic inputs in the chain of distribution of tradable goods. Furthermore, [14] pointed out the measurement problems in CPI, which ignores the quality adjustment of tradable goods to large adjustment in the exchange rate. Another line of reasoning stresses the role that monetary and fiscal authorities play, by partly offsetting the impact of changes in the exchange rate on prices [15].

2. Methodology and Data

2.1 Model Specification

This study adopted the multi-linear regression model from [16] for United States, though with few modifications to achieve the study's objective.

However, the choice of the variables was informed by the review of relevant literature. MTP is monetary policy (RR is Nigeria's external reserve, OMO is open market operation (measured by total value of treasury certificates), INR is interest rate), INF is inflation rate, EXCH is exchange rate, DIP is domestic import price, CPI is consumer price index, GDP is gross domestic product, PPI is producer price index, OILP is oil price index.

2.1.1 Pre-estimation test: Unit Root Test

The assumption in the equations above is that all the variables exhibit a mean reversing property of stationarity. If the variables are not stationary at level, they shall be differenced by employing Augmented Dickey-Fuller (ADF) test to ensure that the variables attain stationarity. The study shall therefore estimate the following equation:

$$\Delta Y_t = (Y_t - Y_{t-1}) = \mu t \dots\dots\dots (1)$$

Where Y is a vector of all the variables and μt is a white noise error term.

2.1.2 Monetary Policy

$$\sum_{i=1}^n MTP_{it} = \pi_0 + \pi_1 \sum_{j=1}^n EXCH_{jt} + \pi_2 \sum_{k=1}^n DIP_{kt} + \pi_3 \sum_{g=1}^n PPI_{gt} + \pi_4 \sum_z CPI_{zt} + U_{it} \dots\dots\dots (2)$$

To obtain the rate of change, equation (2) is transformed as:

$$\ln \sum_{i=1}^n MTP_{it} = \pi_0 + \pi_1 \ln \sum_{j=1}^n EXCH_{jt} + \pi_2 \ln \sum_{k=1}^n DIP_{kt} + \pi_3 \ln \sum_{g=1}^n PPI_{gt} + \pi_4 \ln \sum_z CPI_{zt} + U_{it} \dots\dots\dots (3)$$

where i, j, k, g, z = 1, 2, 3. t is the time variable, π = parametric estimates, U_{it} = stochastic error term.

2.1.3 Price stability

$$INF_t = \alpha_0 + \alpha_1 EXCH_t + \alpha_2 DIP_t + \alpha_3 OILP_t + \alpha_4 PPI_t + \alpha_5 GDP_t + U_t \dots\dots\dots (4)$$

To obtain the rate of change, equation (4) then becomes:

$$\ln INF_t = \alpha_0 + \alpha_1 \ln EXCH_t + \alpha_2 \ln DIP_t + \alpha_3 \ln OILP_t + \alpha_4 \ln PPI_t + \alpha_5 \ln GDP_t + U_t \dots\dots\dots (5)$$

Where, U_t = stochastic error term, α_i = parametric estimates

2.2 Data Source

This study employed time series quarterly data from 1986Q1 to 2012Q4 on the Nigerian economy. Data were obtained from the CBN Statistical Bulletin and Annual Reports 2012.

3. Results and Discussion

3.1 Unit Root Test Result

The test was carried out to know whether the mean value and variances of the variables are time invariant, that is, constant over time. The unit root test for stationarity was applied using the Augmented Dickey Fuller (ADF) test.

Table 3.1: Unit root Integrated of order 1(1)

Variables	ADF Stat	Macki non Crit. Valu 1%	5%	10%	Con st ant	Tre nd	La g	No ne
INF	6.69738	3.4733	2.8800	2.5765	Yes	No	2	No
INR	7.20878	2.5795	1.9420	1.6168	No	No	2	Yes
LOG_O MO	9.14113	4.0208	3.4399	3.1441	Yes	Yes	2	No
LOG_EX CH	6.57106	4.0193	3.4392	3.1437	Yes	Yes	2	No
LOG_DI P	6.51614	4.0245	3.4417	3.1452	Yes	Yes	2	No
LOG_CP I	10.0112	4.0224	3.4407	3.1446	Yes	Yes	2	No
LOG_G DP	9.29265	4.0179	3.4385	3.1433	Yes	Yes	2	No
LOG_PP I	8.00069	2.5795	1.9420	1.6168	No	No	2	Yes
LOG_OI LP	6.32469	2.5828	1.9426	1.6171	No	No	2	Yes
LOG_RR	8.12974	4.0179	3.4385	3.1433	Yes	Yes	2	No

From table 3.1, it is observed that all the variables are stationary after taking their first difference. From the Augmented Dickey Fuller (ADF) test results, intercept is not included in interest rate, producer price index and oil price index because their line graphs started from origin. However, intercepts of inflation rate, open market operation, exchange rate and domestic price index are statistically insignificant

while intercepts of consumer price index (CPI), gross domestic product and external reserve are statistically significant at lag 1 while all the variables except CPI are statistically insignificant at lag 2.

price index. This finding is in tandem with the finding by [15].

From figure 3.2 below, it is observed that the variables drift together in the long-run toward one-to-one exchange rate pass-through with open market operation as the base variable.

Table 3.2: Exchange rate Pass-through with external reserve

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.830919	0.388336	2.139690	0.0340
LOG EXCH	0.960208	0.021566	44.52396	0.0000
LOG DIP	0.766793	0.059912	12.79870	0.0000
LOG CPI	0.376813	0.098688	3.818219	0.0002

From table 3.2, the study found that there is a complete exchange rate pass-through to external reserve since there is approximately one-to-one response from nominal exchange rate to external reserve. This implies that exchange rate has a significant effect on external reserve in Nigeria after controlling for domestic import prices and consumer price index. This contradicts the findings by [11].

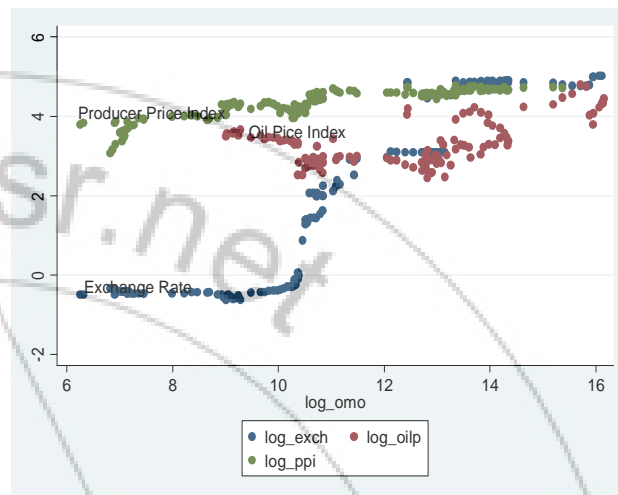


Figure 3.2: Scatter Plot of exchange rate with Open Market Operation



Figure 3.1: Scatter Plot of exchange rate with external reserve

Table 3.4: Exchange rate Pass-through with interest rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.648254	0.019647	236.5829	0.0000
LOG EXCH	0.016165	0.001091	14.81519	0.0000
LOG CPI	0.066123	0.004993	13.24314	0.0000
LOG DIP	-0.029157	0.003031	-9.618972	0.0000

From table 3.4, the study found incomplete exchange rate pass-through to interest rate since there is approximately one-to-zero response from nominal exchange rate interest rate in Nigeria after controlling for domestic import prices and consumer price index. This finding supports the findings by [11].

From the graph above (that is, figure 3.1), domestic import price drifts farther apart while exchange rate drifts towards converging with consumer price index toward effective exchange rate pass-through on external reserve (the base variable)

Table 3.3: Exchange rate Pass-through with open market operation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	17.05323	2.189088	7.790107	0.0000
LOG EXCH	0.955206	0.053519	17.84782	0.0000
LOG OILP	0.209974	0.113069	1.857042	0.0660
LOG PPI	-1.827458	0.516643	-3.537178	0.0006

From table 3.3, the study found complete exchange rate pass-through to open market operation since there is also approximately one-to-one response from nominal exchange rate to open market operation. This implies that exchange rate has a significant effect on open market operation in Nigeria after controlling for oil price index and producer

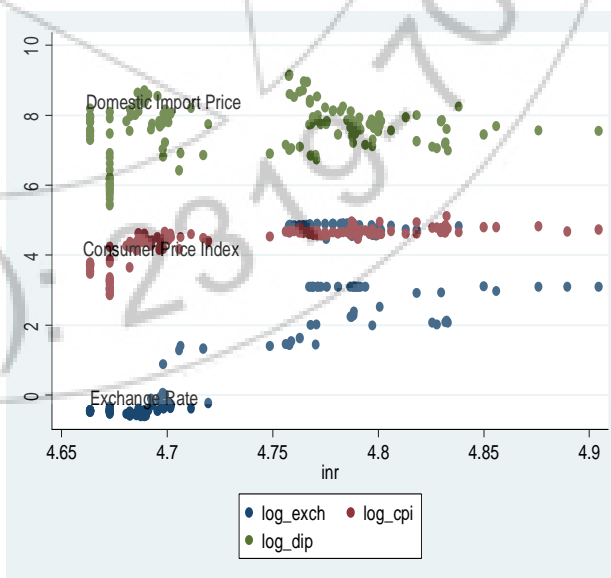


Figure 3.3: Scatter Plot of exchange rate with Interest Rate

From figure 3.3 above, the study observes that the variables initially drift apart from each other but consumer price index and exchange rate tend to converge later. Thereafter, they drift apart, this time with high degree of stability and predictability, diverging from interest rate (base variable).

Table 3.5: Exchange rate Pass-through with Price stability

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.004785	88.55728	0.067807	0.9461
LOG EXCH	0.155921	5.239403	0.029759	0.9763
LOG DIP	1.789582	6.262668	0.285754	0.7756
LOG OILP	-17.01026	6.597188	-2.578411	0.0113
LOG PPI	-59.19497	27.95182	-2.117750	0.0366
LOG GDP	2.680021	4.928373	0.543794	0.5877

From table 3.5, the study found incomplete exchange rate pass-through to domestic general prices since there is approximately one-to-zero response from nominal exchange rate interest rate in Nigeria after controlling for domestic import prices and consumer price index. This finding supports the findings by [7], [12].

4. Conclusion

The failure of any monetary policy to fulfill the objectives for which it was established is often the precondition that calls for questioning of the efficacy of the monetary policy. In order for people to feel at any particular moment in time the need to change its monetary policy, it is necessary that new ideas and needs have emerged in which the former policy/policies is/are no longer adequate. Such new ideas and needs can be internally induced, arising from within the monetary policy authorities themselves or they can be induced by external forces including economic, political, cultural factors from within the larger society.

The study examined the relationship between exchange rate pass-through, monetary policy and price stability in Nigeria. From our findings, it can be reasonably concluded that general price level is unstable vis a vis nominal exchange rate in Nigeria which inhibits one-to-one exchange rate pass-through. However, the general lesson that emerges from this study is that exchange rate pass-through and implementation capacity are important, especially for determining the effectiveness of exchange rate pass-through on monetary policy and price stability in Nigeria.

The study therefore recommends that monetary policy authorities should elect for appropriate exchange rate regime to be able to stabilize exchange rate, domestic import prices and consumer price index. Appreciation of the exchange rate would prove effective in improving Nigeria's external reserve.

5. Future Scope

This study is by no means an exhaustive treatment of exchange rate pass-through, monetary policy, and price stability in Nigeria, but it will serve as a prelude for promoting further taught of the topic. Further studies could as well attempt higher data frequency with more robust models.

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