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Dynamic Competitiveness of Foreign and Domestic Price: Evidence from an Autoregressive Dynamic Model

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ABSTRACT

Nigeria, as an import-dependent economy, has seen its inflation rate rise over the years, which might be ascribed to structural causes and imported consumer products. The Autoregressive distributed lag model was used to determine the competitiveness of domestic and foreign prices. In the short run, domestic and international pricing complement each other, but in the long run, they may achieve some level of competitiveness. The currency rate has a considerable and beneficial impact on consumer spending. The result could also be explained by customers' high desire for foreign items.

KEYWORDS

Inflation Rate; Import; Domestic Prices; Foreign Prices; Currency Rate

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1. Introduction

Stable domestic pricing is a key macroeconomic goal for all economies, whether advanced or emerging, due to its impact on other economic aspects. This has led many economies, especially advanced ones, to adopt inflation targeting to achieve single-digit inflation levels. Inflation can erode the value of the domestic currency thereby reducing the purchasing power of the Naira. Nigeria has struggled to maintain stable inflation, aiming for single digits, but has only succeeded between 2013 and 2015 (see Figure 1). However, from 2010 to 2021, Nigeria's inflation had an average monthly change of 0.4%[1], indicating a persistent challenge in the management of inflationary pressure.

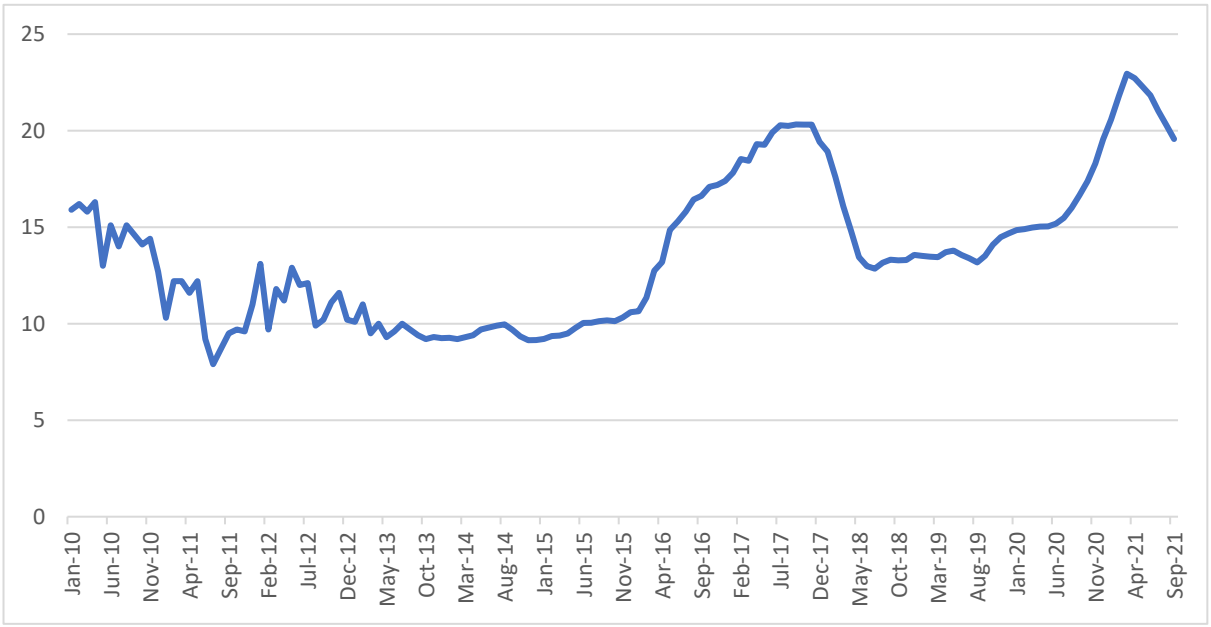

Figure 1. Trend behaviour of inflation rate in Nigeria.

According to Keynesian theory, changes in price levels are often driven by national income changes rather than the money supply, suggesting limited control of monetary authorities on inflation. In line with this, Nigeria's monetary policy authority further notes that structural and external factors, such as energy and import prices, rather than money supply, drive inflationary pressure in Nigeria, consequently making inflation forecasts challenging.

Nigeria's import dependence makes it vulnerable to external shocks, meaning changes in foreign commodity prices can affect its domestic prices. More so, given the consumers' preference for foreign goods and insufficient local production, foreign commodity prices significantly impact consumer's spending more than domestic prices. This could be further explained by the rational choice theory which suggests competitive market pricing, especially for substitute goods. For instance, if seller A raises prices, demand for their goods will drop while demand for seller B's goods will rise.

2. Literature review

Empirical studies on the competitive pricing of domestic and foreign goods are limited and often overlooked in existing studies. For instance, Abaidoo (2016), D'Acunto et al. (2015), and Hakim & Bustaram (2019) examine the impact of inflation expectations on consumer spending. In terms of the effects of inflation expectation, Inoue et al. (2009) argue that expectation measures have predictive value for the consumer price index (CPI) inflation,

[1] Estimate computed using data from Central Bank of Nigeria (CBN) Statistical database.

proposing an alternative strategy to enhance households' inflation expectations through their consumption expenditures. D'Acunto et al. (2015) found that households with higher inflation expectations are more likely to spend on durable goods. On the other hand, Hakim and Bustaram (2019) discovered that inflation expectations did not influence consumer expenditure during their study period, suggesting that these expectations should not be used to regulate public consumption. On the other hand, Abaidoo (2016) also highlights that policy uncertainty, unlike inflation expectations, tends to restrain consumption expenditures at all micro levels, with significant variations in spending.

On the macroeconomic effects of inflation, Manasseh et al. (2018) identify inflation rates amongst other variables such as per capita income, indirect tax, and savings as major predictors of personal consumption expenditures (PCE) in Nigeria, using a modified consumer spending model. In a global database analysis, Ha et al. (2023) observes that global inflation has significantly declined since the early 1980s, driven by a mix of domestic and external factors. The study notes that common factors account for a large share of the variation in headline, core, and producer price inflation, especially in advanced economies and emerging markets with flexible exchange rate regimes. Akinsola and Odhiambo (2017) find that the impact of inflation on economic growth varies by country and over time, depending on specific characteristics, data sets, and methodologies. The study further lends support to the negative relationship between inflation and growth, particularly in developed economies. Lastly, Dua and Goel (2021) examine inflation persistence in India using monthly data from 1996 to 2019. The study observed that headline CPI inflation in India is highly persistent, mainly driven by food and fuel inflation. Furthermore, inflation persistence has declined since the Reserve Bank of India adopted an inflation targeting framework in 2016.

3. Methodology

3.1. Data

This study utilized annual time series data from 1981 to 2019 due to the availability of data. The foreign inflation is proxied by the U.S producers price index which was converted to annual data taking yearly averages. Others are Household final consumption expenditure per capita, Consumers' price index which serves as a proxy for domestic inflation, and Exchange rate. Their respective sources are indicated in Table 1.

Table 1. Data.

Variable	Source
Consumer Price Index (CPI)	World Bank, World Development Indicator
Exchange rate (Exch)	World Bank, World Development Indicator
Consumption expenditure per capita (CEpc)	World Bank, World Development Indicator
Producers' Price Index (PPI)	St Louis Fed data

Sources of Data: World Bank, World Development Indicator online.

3.2. Model and Estimation technique

The study adopts and modifies the Autoregressive Distributed lag model of (Pesaran & Shin, 1999) to determine both the short-run and long-run relationships of the variables. These were also subjected to a stationarity test to ensure conformity to the condition of the technique. The ARDL long run and short-run models are stated in equations 1 and 2 as;

$$Conpt_t = \alpha_1 + \sum_{i=1}^{p} \beta_i \, Conpt_{t-i} + \sum_{k=0}^{q} \gamma_k \, PPI_{t-k} + \sum_{k=0}^{q} \theta_k \, CPI_{t-k} + \sum_{k=0}^{q} \rho_k \, Exch_{t-k} + \varepsilon_t \quad (1)$$

$$\Delta Conpt_t = \alpha_0 + \sum_{k=1}^{p} \beta_0 \Delta Conpt_{t-k} + \sum_{i=0}^{q} \delta_m \Delta PPI_{t-i} + \sum_{i=0}^{q} \theta_m \Delta CPI_{t-i} + \sum_{i=0}^{q} \pi_m \Delta Exch_{t-i} + \gamma_0 Conpt_{t-1} + \gamma_1 PPI_{t-1} + \gamma_2 CPI_{t-1} + \gamma_3 Exch_{t-1} + \mu_t \quad (2)$$

To determine the stationarity of the variables, the Kwiatkowski–Phillips–Schmidt–Shin (KPSS) unit root test. The KPSS was selected due to its ability to test stationarity given a short shock.

4. Result and Discussion

The descriptive statistics are summarized in Table 2a where it is observed that all variables except for CPI are fairly distributed around their mean. But CPI shows variability from the mean value. The summary also reveals that all the variables except for CPI are not normally distributed using the Jarque-Bera test of normality.

Table 2a. Descriptive statistics.

Statistics	Consumption per capita	CPI	Exchange rate	PPI
Mean	1102.02	61.44	94.14	144.57
Median	1072.93	29.60	101.70	131.10
Maximum	1658.77	267.51	306.92	205.30
Minimum	653.95	0.49	0.62	98.00
Std. Dev.	343.93	73.00	92.82	37.83
Skewness	0.18	1.30	0.81	0.40
Kurtosis	1.41	3.78	2.85	1.60
Jarque-Bera	4.29	11.99	4.30	4.24
Observations	39	39	39	39

Table 3a presents the Unit root test using the KPSS test revealing that all the variables except for CPI are stationary at levels. This satisfies one of the conditions for using the ARDL model.

Table 3a. Unit root test.

Variables	KPSS Stat	Order
Consumption	0.13***	I(0)
PPI	0.14***	I(0)
CPI	0.18***	I(1)
Exchange rate	0.14***	I(0)

According to the ECM estimate (Table 2b), both domestic (CPI) and foreign (PPI) prices have a negative short-run relationship with consumption, which is consistent with the fundamental theory of price, which states that an increase in the price of goods (for example, normal and essential items) leads to a relative decrease in their consumption. This could imply that, in the near run, both international and domestic pricing are complimentary. Given that a developing economy such as Nigeria is not self-sufficient and has sub-optimal production capacity, we may need to import things to match local productivity. Because a rise in the exchange rate implies a depreciation of the home currency, the exchange rate was used as a control variable, indicating that an increase in the exchange rate in the near run affects consumption patterns. This can be explained by the fact that a shock depreciation in the domestic currency makes foreign items more expensive, and because foreign items serve as complementary items to domestic items, an increase in their price reduces their demand.

Table 2b. Short-run model.

ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CPI)	-0.007886	0.005964	-1.322351	0.1996
D(CPI(-1))	-0.000274	0.007827	-0.035029	0.9724
D(CPI(-2))	-0.007660	0.009802	-0.781415	0.4429
D(CPI(-3))	-0.020776	0.008816	-2.356661	0.0278
D(PPI)	-0.002950	0.001696	-1.738767	0.0961
D(PPI(-1))	-0.006916	0.002549	-2.712956	0.0127
D(EXCH)	-0.000475	0.001223	-0.388643	0.7013
D(EXCH(-1))	-0.004551	0.001184	-3.845159	0.0009
CointEq(-1)*	-0.912431	0.118812	-7.679628	0.0000
R-squared	0.721499	Mean dependent var		0.018858
Adjusted R-squared	0.635806	S.D. dependent var		0.135142
S.E. of regression	0.081556	Akaike info criterion		-1.958010
Sum squared resid	0.172938	Schwarz criterion		-1.558063
Log-likelihood	43.26517	Hannan-Quinn criter.		-1.819948
Durbin-Watson stat	2.136531			

However, in the long run (levels model), a different result emerges (see Table 3b). Domestic prices, for example, have a negative effect, whereas PPI has a positive impact. In the long run, this could indicate price competitiveness. That is, when the price of local things rises, individuals tend to substitute foreign items in the long run, suggesting a positive relationship between international pricing and consumption. The psychological aspect may play a role in the demand for foreign goods. That is, the average Nigerian prefers foreign goods over indigenous goods, which may result in a switch to foreign goods due to quality or an inferiority mentality. This indirectly aligns with the findings of Dua and Goel (2021), which show that inflation components like food and energy prices (both import-driven in our case) are highly persistent and could drive inflationary pressure. Our study also reveals the competitiveness between foreign and domestic prices, highlighting the strong impact and dominance of foreign commodity prices on domestic consumption and the stickiness of these prices. But the exchange rate has a positive and considerable impact on consumption, since an increase in the exchange rate (depreciation) boosts consumption, which may be fueled by strong demand for foreign goods.

Table 3b. Levels equation (long-run model).

Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	-0.002227	0.002592	-0.859404	0.3994
PPI	0.007153	0.001583	4.518046	0.0002
EXCH	0.005275	0.000851	6.196249	0.0000
C	5.879122	0.189147	31.08232	0.0000
EC = LOG(CONPC) - (-0.0022*CPI + 0.0072*PPI + 0.0053*EXCH + 5.8791)				

At a 1% level of significance, the F-Bounds test (see Table 4) suggests that there is a level of association between the variables. They are cointegrated and have a long-term relationship. Despite the modest divergence in the CUSUMSQ, the CUSUM (see Figure 2) and CUSUMSQ (see Figure 3) tests show that the parameters in the model are reasonably stable and unaffected by structural influences.

Table 4. Bounds Test.

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	9.980671	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
Actual Sample Size	35		Finite Sample: n=35	
		10%	2.618	3.532
		5%	3.164	4.194
		1%	4.428	5.816

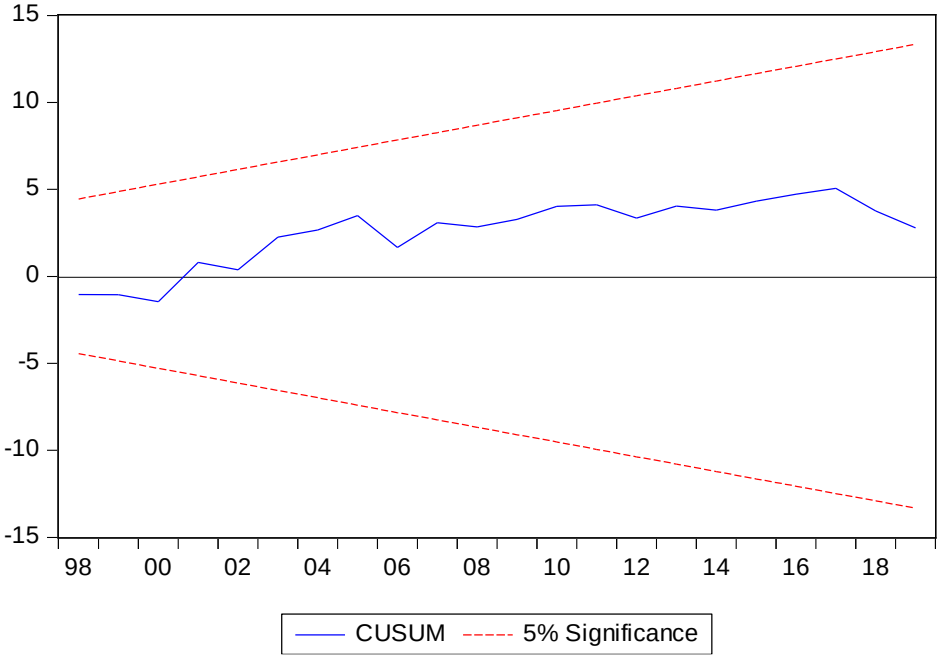

Figure 2. CUSUM Test.

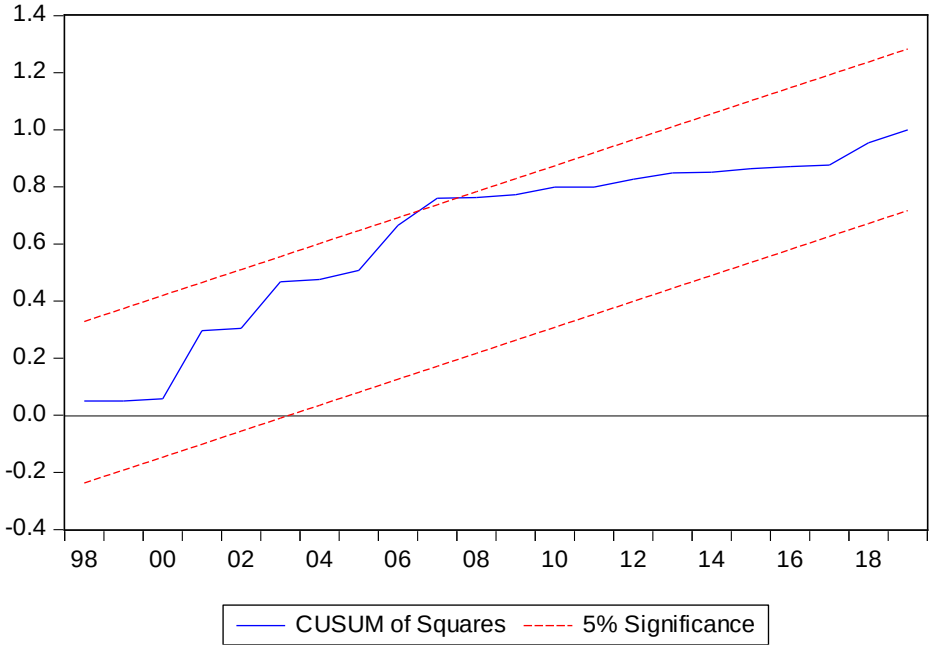

Figure 3. CUSUMSQ Test.

5. Conclusion

Following the primary objective of this study which seeks to determine the competitiveness of domestic and foreign prices in Nigeria, the study employed the ARDL model with annual data from 1981 to 2019. The empirical findings reveal that first, in the short run, both domestic (CPI) and foreign (PPI) prices negatively impact consumption, indicating that price increases in essential goods lead to reduced consumption. This highlights consumers' sensitivity to price changes. Secondly, in the long run, domestic prices continue to negatively impact consumption, while foreign prices have a positive effect. This suggests that over time consumers may substitute domestic goods with foreign goods due to perceived quality or psychological preferences. In line with this, the study recommends that first, there could be a reduced dependency on imports to mitigate the negative impact of foreign price increases, with policies targeted at boosting domestic production capacity. This can be achieved by investing in and promoting local industries. Secondly, there could be implementation of regular monitoring and control of domestic prices to prevent significant increases that could drive consumers towards foreign goods. This can be done through price controls or subsidies for essential goods. Lastly, there should be promotion and encouragement of consumption of locally produced goods through awareness campaigns that highlight their quality and benefits. This can help shift consumer preferences away from foreign goods.

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Conflict of interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

Author contributions

Conceptualization: Mustapha M. Abdullahi, Mansur Abdullahi; Investigation: Mansur Abdullahi; Methodology: Maryam Bala Adamu; Formal analysis: Maryam Bala Adamu; Writing – original draft: Mustapha M. Abdullahi; Writing – review & editing: Maryam Bala Adamu, Mansur Abdullahi

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