Comparative Regression Analyses Studies on Nigeria Import and Export Price Indices

Akintunde Oyetunde Abey*

Department of Mathematics, Faculty of science, Federal University Oye-Ekiti, Ekiti State, Nigeria

Ogunleke Comfort Olayemi

Department of Mathematics, Faculty of science, Federal University Oye-Ekiti, Ekiti State, Nigeria

Folorunso Gbenga Israel

Department of Mathematics, Faculty of science, Federal University Oye-Ekiti, Ekiti State, Nigeria

Adepetu Esther Temiloluwa

Department of Mathematics, Faculty of science, Federal University Oye-Ekiti, Ekiti State, Nigeria

Abstract

This research study conducts comparative regression analyses studies on Nigeria's import and export price indices to understand their dynamics and economic implications. By examining the fluctuations in price indices over a specified period, the research work identified the factors influencing these changes and assesses the relative impacts on Nigeria's trade balance and overall economic stability. The analyses employed multiple regression models to analyze the relationship between various economic indicators and the price indices, providing comprehensive views of the import and export pricing trends. The results revealed significant determinants that affect import and export prices, highlighting the interplay between global market conditions and domestic economic policies. The study concluded with policy recommendations to enhance Nigeria's trade performance and made suggestions on strategies to mitigate adverse effects of price volatility on the economy.

Keywords: Comparative, Regression Analysis, Import Price Indices, Export Price Indices

JEL Classifications: C22, N97, O40

* Corresponding author:
E-mail address: oyetunde.akintunde@fuoye.edu.ng
Address: Department of Mathematics, Faculty of science, Federal University Oye-Ekiti, Ekiti State, Nigeria.

1. Introduction

Nigeria, as one of the largest economies in Africa, engages significantly in international trade. The country's import and export activities play a crucial role in shaping its economic landscape. Nigeria's imports comprise a wide range of goods, including machinery, equipment, refined petroleum, chemicals, and food products, to meet domestic demands and support various industries. On the other hand, Nigeria's exports primarily consist of crude oil, natural gas, agricultural products (such as cocoa, rubber, and palm oil), solid minerals, and manufactured goods. Nigeria's import and export activities are facilitated through its seaports, airports, and land borders, with major trading partners among which are China, India, the United States, the European countries, and neighboring African countries. Understanding the trends, patterns, and dynamics of Nigeria's import and export activities is essential for assessing the country's trade performance and its integration into the global economy.

Trade holds immense significance for Nigeria's economy, contributing to its growth, development, and overall prosperity. The country's trade sector serves as a vital engine of economic activity, generating revenue, creating employment opportunities, and fostering industrialization. Nigeria's reliance on international trade underscores its interdependence with the global economy and highlights the importance of maintaining favorable trade balances. Trade also plays a crucial role in diversifying Nigeria's economy and reducing its dependence on oil exports. By promoting non-oil exports and enhancing competitiveness in various sectors, trade contributes to economic resilience and sustainable development. Furthermore, trade enables Nigeria to access foreign markets, technology, and expertise, fostering innovation, productivity, and economic modernization.

Price indices serve as fundamental tools in economic analysis, providing valuable insights into inflation, purchasing power, and market dynamics. In the context of import and export activities, price indices play a crucial role in monitoring and analyzing changes in the prices of traded goods and commodities. Import price indices track the cost of imported goods, reflecting fluctuations in live animals, animal products, vegetable products, prepared foodstuffs-beverages-spirits-and-vinegar, mineral products, chemical products, raw hide and skins, paper making material, textiles-and-textile-articles, footwear-umbrella-sunshades-whip, articles of stones, precious and semi-precious stone. Export price indices, on the other hand, gauge the competitiveness of exported goods in international markets, influencing export earnings and trade balances. Price indices enable policymakers, businesses, and analysts to assess the impact of price movements on inflation, trade competitiveness, and economic performance. By tracking price trends over time, price indices facilitate decision-making, policy formulation, and economic forecasting. Moreover, price indices serve as indicators of economic stability, reflecting supply-demand dynamics, market conditions, and macroeconomic factors.

The historical context of import and export price indices in Nigeria is shaped by the country's economic evolution, policy changes, and external dynamics. Over the years, Nigeria has experienced

fluctuations in import and export prices due to changes in global demand, commodity prices, exchange rates, and trade policies. The establishment of price indices for imports and exports dates back to various initiatives by government agencies, statistical offices, and international organizations to monitor trade dynamics and economic trends. Importantly, the historical context provides insights into the challenges, trends, and transformations in Nigeria's trade sector, including periods of boom and bust, policy reforms, and structural adjustments. Analyzing the historical trajectory of import and export price indices offers valuable lessons for understanding the determinants of trade competitiveness, the impact of external shocks, and the resilience of Nigeria's economy in the face of global uncertainties.

2. Literature Review of Basic Concepts

2.1. Import and export price indices

Export and import price indices play a crucial role in evaluating the impact of international trade on the domestic economy. Their primary uses include analyzing trade balance trends, assessing the influence of foreign prices on domestic inflation, and adjusting nominal export and import values to estimate the gross domestic product (GDP) volume. Understanding the price and volume factors driving changes in exports and imports is essential for analyzing the goods and services component of the balance of payments current account. These indices are vital for policy analysis and evaluating the effects of exchange rate dynamics on a country's international competitiveness. In recent decades, many developing countries, particularly Nigeria, have faced significant external imbalance issues due to a persistently growing current account deficit. This deficit is largely attributed to substantial merchandise trade deficits. A strong preference for foreign goods and weak export performance are critical challenges for the Nigerian economy and other developing nations, especially recently.

The persistent external imbalance has led many governments in developing countries, including Nigeria, to implement restrictive trade policies to achieve a favorable trade balance. Over the years, Nigeria has adopted protective trade policies, ranging from import substitution industrialization (ISI) to inconsistent tariff applications via annual budgets. Estimating the income and price elasticity of imports using historical data is highly valuable for assessing the impact of economic changes and fiscal and monetary policy measures on the trade balance and, consequently, on the current account. This elasticity can be used in macroeconomic forecasting to describe the interrelationship between variables of interest and to determine the intensity of the effect of fiscal and monetary policy measures. Furthermore, the effectiveness of any trade policy depends significantly on the trade elasticity of the economy (price and income elasticity of export and import).

In Nigeria, the pioneering study on the determinants of import demand was conducted by Olayide (1968), focusing on selected imported goods from 1948 to 1964. The regression models' results indicated that terms of trade, real income (measured by GDP), and the trade restriction index had relatively good estimates. Ozo-Eson (1984) investigated the same phenomenon using a monetarist import demand model, incorporating real money balance excess supply into the traditional

import demand model. The analysis showed that money supply and relative prices significantly affected aggregate import demand from 1960 to 1979 in Nigeria.

Egwaikhide (1999) also analyzed the factors influencing aggregate imports and their major components in Nigeria, using yearly data from 1953 to 1989 and employing Ordinary Least Squares (OLS). The study found that variations in short-run availability of foreign exchange earnings, relative prices, and the actual output level significantly determined total import growth during that period. Abdullahi and Suleiman (2008) examined the behavior of Nigeria's imports and the key factors determining it from 1970 to 2004 using an error correction model. They discovered that real GDP and trade openness significantly determined import demand, while real exchange rates and foreign reserves were insignificant. The study concluded that to increase aggregate imports, implementation of macroeconomic and sector-specific policies affecting real income and trade openness is necessary. The studies mentioned above share a common trend in terms of the variables identified as affecting import demand and the methodologies used to analyze the data.

2.2 Import and export price elasticity

Nigeria's economy is reliant on imports for both consumption and production needs. Almost all major industrial raw materials are sourced from abroad, and the country is dependent on foreign supply for intermediate and capital goods. Export production is highly elastic since the primary non-oil export products are mainly primary commodities with prices that have been declining and are determined externally. Moreover, these exports are slow to respond to exchange rate adjustments. Consequently, the economy is highly vulnerable to external shocks, and a decline in oil prices could lead to a decrease in foreign exchange earnings, destabilizing the exchange rate.

Import substitution industrialization, a strategy aimed at developing less developed countries (LDCs) by initially replacing imports with domestically produced substitutes, has been vigorously pursued in Nigeria since the late 1950s. This strategy was expected to create economic linkages and drive development. Historically, Nigeria has maintained highly protective trade regimes to support this development policy and to address periodic balance of payments issues and revenue generation needs. The Heckscher-Ohlin theory suggests that international trade arises from differences in relative factor prices due to variations in factor endowments between countries. Therefore, commodities that require large quantities of scarce factors should be imported, while those using abundant factors should be exported.

Olayide's pioneering study (1968) analyzed sixteen years of data (1948-1964) on selected Nigerian imports using multiple regression analysis. The results indicated that terms of trade, real income (measured by GDP), and trade restriction indices had significant parameter estimates. Ajayi (1975) collected ten years of data (1960-1970) on Nigerian imports and found that real income, relative prices, and foreign exchange were the major determinants of total imports. Ozo-Eson (1984) used a monetarist import demand model and found that relative prices and money supply significantly influenced import demand, while real income was not statistically significant. This implies that

disequilibrium in the money market directly affects total imports, and reducing the money supply would result in a decrease in total imports.

Olopoenia (1991) concluded that real expenditure and real exchange rate are key determinants of total imports. His findings from an over-parameterized import demand model using an error correction specification showed that these variables had the expected signs and were statistically significant at the 5% level. Egwaikhide (1999) suggested that import determinants include aggregate income, relative prices, foreign exchange reserves/receipts, and exchange rate variations.

2.3. Trade and macro-economic stability

Nigeria's macroeconomic management is highly dependent on trade, encompassing imports and exports. Revenue from oil exports is vital for budget execution, while trade policy regarding imports influences the depth of industrial production and consumption in the country. Numerous empirical studies have examined the potential factors that influence import demand. One interesting investigation is by Hemphill (1974). In his paper, he developed the stock adjustment import-exchange equation based on the theory of balancing payments. Using data from eight low-income countries, the study found a general alignment with the theoretical relationship between aggregate import trade and foreign exchange revenue. This supported the notion that revenue from foreign exchange transactions is a principal factor influencing aggregate import demand in low-income countries. Additionally, Mwega (1993) examined the factors affecting import demand in Kenya. Using yearly data from 1964 to 1991, he found an insignificant relationship between short-run relative price, level of real income, and aggregate import demand elasticity for Kenya.

3. Research Methodology and Scope

3.1 Generalized regression model concept

The methodology used for this research work is the generalized multiple regression analysis alongside with stepwise regression analysis. Multiple regression analysis involves examining the relationship between a dependent variable and multiple independent variables. Generalizing multiple regression analysis involves extending this concept to broader applications, often in a predictive or explanatory context, and it allows for a more comprehensive understanding of the relationships between variables. The generalized multiple regression equation represents the mathematical relationship between the dependent variable and the independent variables which is expressed as:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_p X_{pi} + \varepsilon_i \quad (1)$$

where Y_i is the dependent variable, β_0 is the intercept, $\beta_1, \beta_2, \ldots, \beta_p$ are the regression coefficients for each independent variables $(X_{1i}, X_{2i}, \ldots, X_{pi})$ respectively, and ε_i represents the error the term which is assumed to be normally distributed with mean of zero and variance of σ^2. The values of $i = 1,2,3, \ldots, n$. Generalizing multiple regression models involves building models that can be applied across different situations or populations, allowing for a deeper understanding and prediction of relationships between variables beyond the original dataset.

Mathematically, equation (1) can be re-written as:

$$Y_i = \sum_{i=1}^{n} \sum_{j=0}^{p} \beta_j X_{ij} + \varepsilon_i \quad (2)$$

where $X_{0i} = 1$ and the definitions and assumptions for equation (1) still hold.

By matrix notations, both equations (1) and (2) become:

$$\underline{Y} = \underline{X^I \beta} \quad (3)$$

From equations (1), (2) and (3), the regression coefficients and analysis of variance (ANOVA) estimates can be obtained.

3.2 Research methods

Stepwise regression is the step-by-step iterative construction of a regression model that involves the selection of independent variables to be used in a final model. It involves adding or removing potential explanatory variables in succession and testing for statistical significance after each iteration. Stepwise regression is also a method that iteratively examines the statistical significance of each independent variable in a linear regression model. The forward selection approach starts with nothing and adds each new variable incrementally, and testing for statistical significance. The backward elimination method begins with a full model loaded with several variables and then removes one variable to test its importance relative to overall results. Stepwise regression has its downsides, however, as it is an approach that fits data into a model to achieve the desired result. The underlying goal of stepwise regression is, through a series of tests (for example, like F-tests and t-tests), to find a set of independent variables that significantly influence the dependent variable. This is presently done with computer programs/packages/algorithms through iterations, which is the process of arriving at results or decisions by going through repeated rounds or cycles of analysis. Conducting tests automatically with help from statistical software packages has the advantage of saving time and limiting mistakes.

The dataset for this research was collected online from: http//:www.CBN.gov/documents/Statbulletin.asp. Two datasets were collected from this site which was both import dataset and export dataset.

4. Results and Discussions

4.1 Nigeria import analysis

A broad and comprehensive multiple regression analysis was carried out on Nigeria's import price indices using Standard International Trade Classification (SITC) as the dependent variable (Y_i) and each individual category of Vegetables, Foods, Minerals, Chemicals, Plastics, Leathers, Woodings, Papers, Textiles, Clothings, Ceramics, Stones, Metals, Machinery, Vehicles, Livestocks and Miscellaneous as the independent variables ($X_{ij}'s$). Also, a one-way analysis of variance (ANOVA) test, also known as F-test, was conducted to compare the effect of all SITC import price

index on various categories, and their regression coefficients (both standardized and unstandardized coefficients) with the corresponding t- and significance values. These are as presented in Tables 1, 2, 3 and 4.

An analysis of variance (ANOVA) was conducted to examine the effect of different predictors on the overall import price index (all SITC product import price index). The tables 1 and 3 present the sum of squares, degrees of freedom (df), mean square, F-statistic, and significance level (p-value) for each regression model. The ANOVA results indicate that all models significantly predict the import price index. Each model shows a significant F-statistic with a p-value less than 0.001, indicating that the predictors in each model collectively explain a significant portion of the variance in the dependent variable. As more predictors are added from Model 1 to Model 4, which are models selected by the use of stepwise regression approach, the sum of squares explained by the regression increases, and the mean square error of the residuals decreases, indicating an improvement in the model fit.

In Model 1, the predictor "Clothings" significantly predicts the overall import price index, β =0.585, p<0.001. In Model 2, both "Clothings" (β=0.446, p<0.001) and "Stones" (β=0.390, p<0.001) significantly predict the import price indices. In Model 3, the addition of "Vehicles" as a predictor also significantly predicts the import price index (β=0.189, p=0.004), along with "Clothings" and "Stones". Finally, in Model 4, "Clothings" (β=0.415, p<0.001), "Stones" (β=0.369, p<0.001), "Vehicles" β=0.247, p<0.001), and "Miscellaneous" (β=-0.204, p=0.002) all significantly predict the import price index.

These analyses show that "Clothings" consistently remains a significant predictor across all models, while the significance of other predictors such as "Stones", "Vehicles", and "Miscellaneous" emerges as additional predictor variables are included in the models.

Table 1. Analysis of Variance (ANOVA) Tables for the overall Regression Model on Nigeria Import Analysis

Source of Variations	Sum of Squares	Degree of Freedom	Mean Squares	F	Sig.
Regression	2669810.119	17	157047.654	14.697	0.001
Residual	2083779.147	195	10686.047		
Total	4753589.266	212			

Table 2. Regression Coefficients for the overall Regression Model on Nigeria Import Analysis

Coefficients	Unstandardized Coefficients		Standardized Coefficient	t	Sig.
	Beta	Standard Error	Beta		
(Constants)	-26.606	61.563		-0.432	0.666
Livestock	0.229	0.165	0.152	1.385	0.168
Vegetables	-0.086	0.132	-0.066	-0.656	0.513
Foods	-0.039	0.056	-0.038	-0.703	0.483
Minerals	-0.245	0.251	-0.118	-0.976	0.330
Chemicals	-0.191	0.251	-0.047	-0.762	0.447
Plastics	-0.038	0.118	-0.039	-0.327	0.744
Leathers	0.049	0.245	0.013	0.202	0.840
Woodings	0.186	0.270	0.039	0.690	0.491
Papers	-0.081	0.468	-0.015	-0.174	0.862
Textiles	0.918	0.377	0.282	2.433	0.016
Clothings	1.193	0.395	0.316	3.021	0.003
Ceramics	0.384	0.327	0.080	1.174	0.242
Stones	0.451	0.067	0.396	6.758	0.000
Metals	-0.464	0.234	-0.109	-0.983	0.049
Machineries	-0.562	0.281	-0.199	-1.996	0.047
Vehicles	1.253	0.264	0.351	4.741	0.000
Miscellaneous	-1.489	0.448	-0.227	-3.326	0.001

Dependent Variable: all SITC Product Import Price Index

Table 3. Analysis of Variance (ANOVA) Tables for Stepwise (Forward) Reduction Regression Models on Nigeria Import Analysis

Model	Source of Variations	Sum of Squares	Degree of Freedom	Mean Squares	F	Sig.
1	Regression	1624997.978	1	1624997.978	109.594	0.001
	Residual	3128591.289	211	14827.447		
2	Regression	2257984.382	2	1128992.191	95.002	0.001
	Residual	2495604.885	210	11883.833		
3	Regression	2353462.053	3	784487.351	68.312	0.001
	Residual	2400127.214	209	11483.862		
4	Regression	2464696.636	4	616174.159	55.994	0.001
	Residual	2288892.631	208	11004.291		
	Total	4753589.267	212			

Table 4. Regression Coefficients for Stepwise (Forward) Reduction Regression Models on Nigeria Import Analysis

		Unstandardized Coefficients		Standardized Coefficient		
Model	Coefficients	Beta	Standard Error	Beta	t	Sig.
1	(Constants)	-64.151	27.953		-2.295	0.023
	Clothings	2.205	0.211	0.585	10.469	0.001
2	(Constants)	-102.900	25.582		-4.022	0.000
	Clothings	1.682	0.202	0.446	8.334	0.001
	Stones	0.445	0.061	0.390	7.298	0.001
3	(Constants)	-130.266	26.879		-4.846	0.001
	Clothings	1.200	0.259	0.318	4.627	0.001
	Stones	0.453	0.060	0.398	7.556	0.001
	Vehicles	0.675	0.234	0.189	2.883	0.004
4	(Constants)	-32.596	40.448		-0.806	0.421
	Clothings	1.566	0.279	0.415	5.618	0.001
	Stones	0.421	0.060	0.369	7.060	0.001
	Vehicles	0.880	0.238	0.247	3.698	0.001
	Miscellaneous	-1.342	0.422	-0.204	-3.179	0.002

Dependent Variable: all SITC Product Import Price Index

4.2. Nigeria export analysis

Similarly, a one-way analysis of variance (ANOVA) was conducted to compare the effect of all SITC Export price index on various categories. The categories include Vegetables, Foods, Minerals, Chemicals, Plastics, Leathers, Woodings, Papers, Textiles, Clothings, Ceramics, Stones, Metals, Machinery, Vehicles, Miscellaneous, and Livestocks. The ANOVA results showed statistically significant differences between groups for almost all categories, with no exception. These results indicated that there are significant differences between groups for all categories analyzed with $p<0.01$.

As presented from the analyses and shown in Tables 5 and 7, an ANOVA was conducted to compare the effect of various predictors on the all SITC product export price index. The results for each model are as follows: for model 1, the regression model with "Clothings" as the predictor was significant, $F(1, 211) = 2020.106$, $p < 0.001$. The model explained a significant proportion of variance in the dependent variable, $R2 = 0.906$. Sum of Squares for Regression is 6505096.325, Sum of Squares for Residual is 679457.144, and Total Sum of Squares is 7184553.469

For model 2, the regression model with "Clothings" and "Stones" as predictors was significant, $F(2, 210) = 1534.151$, $p < .001$. The model explained a significant proportion of variance in the dependent variable, $R2 = 0.937$. The Sum of Squares for Regression is 6724328.449, Sum of Squares for Residual is 460225.020, and Total Sum of Squares is 7184553.469. Also for model 3, the regression model with "Clothings," "Stones," and "Vehicles" as predictors was significant, $F(3, 209) =1228.854$, $p < 0.001$. The model explained a significant proportion of variance in the dependent variable, $R2= 0.947$. The Sum of Squares for Regression is 6799096.567, Sum of Squares for Residual is 385456.902, and Total Sum of Squares is 7184553.469.

Similarly, for model 4, the regression model with "Clothings," "Stones," "Vehicles," and "Miscellaneous" as predictors was significant, $F(4, 208)= 1032.381$, $p < 0.001$. The model explained a significant proportion of variance in the dependent variable, $R2 = 0.952$. Sum of Squares for Regression is 6840028.239, Sum of Squares for Residuals 344525.230, Total Sum of Squares: 7184553.469. For model 5, the regression model with "Clothings," "Stones," "Vehicles," "Miscellaneous," and another predictor was significant, $F(5, 207) = 884.589$, $p < 0.001$. The model explained a significant proportion of variance in the dependent variable, $R2 = 0.956$. Sum of Squares for Regression is 6863339.514, Sum of Squares for Residuals 321213.955, and Total Sum of Squares is 7184553.469

In model 6, the regression model with six predictors including "Clothings," "Stones," "Vehicles," "Miscellaneous," and two additional predictors was significant, $F(6, 206) = 782.962$, $p < 0.001$. The model explained a significant proportion of variance in the dependent variable, $R2 = 0.958$. Sum of Squares for Regression is 6882741.264, Sum of Squares for Residual is 301812.205, and Total Sum of Squares is 7184553.469. For model 7, the regression model with seven predictors including "Clothings," "Stones," "Vehicles," "Miscellaneous," and three additional predictors was significant, $F(7, 205) = 691.126$, $p < 0.001$. The model explained a significant proportion of variance in the

dependent variable, R2 = 0.960. Sum of Squares for Regression is 6892491.708, Sum of Squares for Residual is 292061.761, and Total Sum of Squares is 7184553.469. And finally, for model 8, the regression model with eight predictors including "Clothings," "Stones," "Vehicles," "Miscellaneous," and four additional predictors was significant, F(8, 204) = 614.678, p < 0.001. The model explained a significant proportion of variance in the dependent variable, R2 = 0.961. Sum of Squares for Regression is 6898373.642, Sum of Squares for Residual is 286179.827, and Total Sum of Squares is 7184553.469. These results indicate that the predictors collectively explain a significant amount of variance in the all SITC product export price index, with the inclusion of additional predictors progressively improving the model fit.

Concerning the regression coefficients, t- and significance values as analyzed in Tables 6 and 8, for model 1, the regression equation is statistically significant, F(1,211)=2019.536,p<0.001. This model explained a significant proportion of the variance in the dependent variable (Adjusted R2 = 0.952). The constant is β=54.721, SE = 6.602, which indicates that when the independent variable (Base metals and articles of base metals) is zero, the predicted export price index is significantly negative. The independent variable (base metals and articles of base metals) has a coefficient of B=1.483, SE = 0.033, β = 0.952, indicating a very strong positive relationship with the export price index (t = 44.946, p < 0.001). This means that for each unit increase in the value of base metals and articles of base metals, the export price index increases by 1.483 units.

In model 2, two predictors are included and are statistically significant, F(2,210)=1053.753, p< 0.001. The model explains a large proportion of variance (Adjusted R^2 = 0.909). The constant is B=70.110, SE = 5.660, indicating the baseline export price index when the predictors are zero. The coefficient for Metals is B=1.043, SE = 0.052, β = 0.669 (t = 20.179, p < 0.001), indicating a strong positive relationship. Woodings also shows a significant positive relationship with the export price index, B=0.565, SE = 0.056, β = 0.332 (t = 10.002, p < 0.001). In model 3, the inclusion of Vegetables as a predictor along with Metals and Woodings remains statistically significant, F(3,209)=715.682, p< 0.001. The model explains a high proportion of variance (Adjusted R2= 0.911). The constant is B=55.739, SE = 5.661. Metals still show a positive relationship, B=0.883, SE =0.054, β = 0.567 (t = 16.443, p < 0.001), as do Woodings, B=0.451, SE = 0.055, β = 0.265 (t = 8.219, p <0.001), and Vegetables, B=0.096, SE = 0.015, β = 0.193 (t = 6.367, p < 0.001).

Model 4 includes Ceramics as an additional predictor, and the model is statistically significant, F(4,208)=540.938, p< 0.001 with Adjusted R2 = 0.912. The constant is B=87.748, SE = 8.381. Metals, B=0.636, SE = 0.071, β =0.408 (t = 8.930, p < 0.001), Woodings, B=0.347, SE = 0.056, β = 0.204 (t = 6.186, p < 0.001), Vegetables, B=0.086, SE = 0.015, β = 0.172 (t = 5.915, p < 0.001), and Ceramics, B=0.590, SE = 0.119, β = 0.243 (t =4.971, p < 0.001), all significantly contribute to the export price index. The addition of Clothings in Model 5 is statistically significant, F(5,207)=436.481, p< 0.001 with Adjusted R2 = 0.913. The constant is B=87.553, SE = 8.112. Metals, B=0.477, SE = 0.080, β = 0.306 (t = 5.947, p< 0.001), Woodings, B=0.276, SE = 0.057, β = 0.162 (t = 4.820, p < 0.001),

Vegetables, B=0.080, SE =0.014, β = 0.159 (t = 5.628, p < 0.001), Ceramics, B=0.633, SE = 0.115, β = 0.261 (t = 5.491, p < 0.001), and Clothings, B=0.214, SE = 0.055, β = 0.144 (t = 3.876, p < 0.001), all significantly predict the export price index.

Furthermore, model 6 includes Plastic as a predictor and is statistically significant, F(6,206)=360.839, p< 0.001 with Adjusted R2 = 0.914. The constant is B=66.153, SE = 9.834. Metals, B=0.551, SE = 0.081, β = 0.353 (t =6.842, p < 0.001), Woodings, B=0.288, SE = 0.056, β = 0.169 (t = 5.171, p < 0.001), Vegetables, B=0.064, SE = 0.014, β = 0.128 (t = 4.424, p < 0.001), Ceramics, B=0.737, SE = 0.116, β = 0.304 (t = 6.372, p <0.001), Clothings, B=0.262, SE = 0.055, β = 0.176 (t = 4.736, p < 0.001), and Plastic, B=0.407, SE = 0.112, β = -0.112 (t = -3.639, p < 0.001), are all significant predictors. Model 7 adds Leathers to the predictors and is statistically significant, F(7,205)=309.637, p< 0.001 with adjusted R2 = 0.915. The constant is B=62.767, SE = 9.784. Metals, B=0.499, SE = 0.082, = 0.320 (t =6.101, p < 0.001), Woodings, B=0.275, SE = 0.055, β = 0.161 (t = 4.983, p < 0.001), Vegetables, B=0.063, SE = 0.014, β = 0.125 (t = 4.404, p < 0.001), Ceramics, B=0.707, SE = 0.115, β = 0.292 (t = 6.171, p <.001), Clothings, B=0.268, SE = 0.055, β = 0.180 (t = 4.908, p < 0.001), Plastic, B=0.467, SE = 0.113, β= -0.129 (t = -4.144, p < 0.001), and Leathers, B=0.118, SE = 0.045, β = 0.074 (t = 2.616, p = 0.010), are significant predictors.

Model 8 incorporates Miscellaneous as a predictor and is statistically significant, F(8,204)=272.421, p <0.001 with adjusted R2 = 0.916. The constant is B=-86.497, SE = 15.118. Metals, B=0.488, SE = 0.081, β =0.313 (t = 5.997, p < 0.001), Woodings, B=0.288, SE = 0.055, β = 0.169 (t = 5.223, p < 0.001), Vegetables, B=0.053, SE = 0.015, β = 0.106 (t = 3.545, p < 0.001), Ceramics, B=0.629, SE = 0.120, β = 0.260 (t =5.251, p < 0.001), Clothings, B=0.278, SE = 0.054, β = 0.187 (t = 5.114, p < 0.001), Plastic, B=-0.511, SE= 0.114, β = -0.141 (t = -4.488, p < 0.001), Leather, B=0.120, SE = 0.045, β = 0.076 (t = 2.696, p = 0.008), and Miscellaneous, B=0.366, SE = 0.179, β = 0.060 (t = 2.048, p = 0.042), are significant predictors.

Across all models, the constant values are consistently negative values, indicating that the baseline export price index is below zero when all predictors are zero. The metals category consistently shows a strong positive relationship with the export price index in all models, indicating its significant impact. As additional predictors are included, such as Woodings, Vegetables, Ceramics, Clothings, Plastic, Leathers, and Miscellaneous, they also show significant relationships with the export price index. The sign and magnitude of the coefficients suggest that while metals have the strongest impact, other categories also significantly contribute to variations in the export price index. Negative coefficients for Plastic in models 6, 7, and 8 indicate that an increase in Plastic is associated with a decrease in the export price index.

Table 5. Analysis of Variance (ANOVA) Tables for the overall Regression Model on Nigeria Export Analysis

Source of Variations	Sum of Squares	Degree of Freedom	Mean Squares	F	Sig.
Regression	6908737.193	16	431796.075	306.842	0.001
Residual	275816.276	196	1407.226		
Total	7184553.469	212			

Table 6. Regression Coefficients for the overall Regression Model on Nigeria Export Analysis

	Unstandardized Coefficients		Standardized Coefficient	t	Sig.
Coefficients	Beta	Standard Error	Beta		
(Constants)	-86.259	27.335		-3.156	0.002
Livestock	0.012	0.043	0.014	0.283	0.777
Vegetables	0.057	0.025	0.114	2.320	0.021
Foods	-0.025	0.082	-0.011	-0.303	0.763
Minerals	0.034	0.099	0.011	0.340	0.734
Chemicals	0.115	0.061	0.063	1.892	0.060
Plastics	-0.545	0.129	-0.150	-4.229	0.000
Leathers	0.123	0.049	0.078	2.480	0.014
Woodings	0.308	0.063	0.181	4.872	0.000
Papers	-0.019	0.159	-0.006	-0.122	0.903
Textiles	-0.059	0.053	-0.030	-1.103	0.271
Clothings	0.241	0.079	0.163	3.068	0.002
Ceramics	0.589	0.133	0.243	4.445	0.000
Stones	0.186	0.122	0.049	1.527	0.128
Metals	0.442	0.102	0.284	4.340	0.000
Vehicles	-0.133	0.245	-0.022	-0.543	0.587
Miscellaneous	0.353	0.184	0.058	1.916	0.057

Dependent Variable: all SITC Product Import Price Index

Table 7. Analysis of Variance (ANOVA) Tables for Stepwise (Forward) Reduction Regression Models on Nigeria Export Analysis

Model	Source of Variations	Sum of Squares	Degree of Freedom	Mean Squares	F	Sig
1	Regression	6505096.325	1	6505096.325	2020.106	0.001
	Residual	679457.144	211	3220.176		
2	Regression	6724328.449	2	3362164.225	1534.151	0.001
	Residual	460225.02	210	2191.548		
3	Regression	6799096.567	3	2266365.522	1228.854	0.001
	Residual	385456.902	209	1844.291		
4	Regression	6840028.239	4	1710007.060	1032.381	0.001
	Residual	344525.23	208	1656.371		
5	Regression	6863339.514	5	1372667.903	884.589	0.001
	Residual	321213.955	207	1551.758		
6	Regression	6882741.264	6	1147123.544	782.962	0.001
	Residual	301812.205	206	1465.108		
7	Regression	6892491.708	7	984641.673	691.126	0.001
	Residual	292061.761	205	1424.692		
8	Regression	6898373.642	8	862296.705	614.678	0.001
	Residual	286179.827	204	1402.842		
	Total	7184553.469	212			

Table 8. Regression Coefficients for Stepwise (Forward) Reduction Regression Models on Nigeria Export Analysis

		Unstandardized Coefficients		**Standardized Coefficient**		
Model	**Coefficients**	**Beta**	**Standard Error**	**Beta**	**t**	**Sig.**
1	(Constants)	-54.721	6.602		-8.289	0.001
	Base metals	1.483	0.033	0.952	44.946	0.001
2	(Constants)	-70.110	5.660		-12.388	0.001
	Metals	1.043	0.052	0.669	20.179	0.001
	Woodings	0.565	0.056	0.332	10.002	0.001
3	(Constants)	-55.739	5.661		-9.846	0.001
	Metals	0.883	0.054	0.567	16.443	0.001
	Woodings	0.451	0.055	0.265	8.219	0.001
	Vegetables	0.096	0.015	0.193	6.367	0.001
4	(Constants)	-87.748	8.381		-10.470	0.001
	Metals	0.636	0.071	0.408	8.930	0.001
	Woodings	0.347	0.056	0.204	6.186	0.001
	Vegetables	0.086	0.015	0.172	5.915	0.001
	Ceramics	0.590	0.119	0.193	4.971	0.001
5	(Constants)	-87.553	8.112		-10.793	0.001
	Metals	0.477	0.080	0.306	5.947	0.001
	Woodings	0.027	0.057	0.162	4.820	0.001
	Vegetables	0.080	0.014	0.159	5.628	0.001
	Ceramics	0.633	0.115	0.261	5.491	0.001
	Clothings	0.214	0.055	0.144	3.876	0.001
6	(Constants)	-66.153	9.834		-6.727	0.001
	Metals	0.551	0.081	0.353	6.842	0.001
	Woodings	0.288	0.056	0.169	5.171	0.001
	Vegetables	0.064	0.014	0.128	4.424	0.001
	Ceramics	0.737	0.116	0.304	6.372	0.001
	Clothings	0.262	0.055	0.176	4.736	0.001
	Plastics	-0.407	0.112	-0.112	-3.639	0.001

Model	Coefficients	Unstandardized Coefficients		Standardized Coefficient	t	Sig.
		Beta	**Standard Error**	**Beta**		
7	(Constants)	-62.767	9.784		-6.415	0.001
	Metals	0.499	0.082	0.320	6.101	0.001
	Woodings	0.275	0.055	0.161	4.983	0.001
	Vegetables	0.063	0.014	0.125	4.404	0.001
	Ceramics	0.707	0.115	0.295	6.171	0.001
	Clothings	0.268	0.055	0.180	4.908	0.001
	Plastics	-0.467	0.113	-0.129	-4.144	0.001
	Leathers	0.118	0.045	0.074	2.616	0.010
8	(Constants)	-86.497	15.118		-5.751	0.001
	Metals	0.488	0.081	0.313	5.997	0.001
	Woodings	0.288	0.055	0.169	5.223	0.001
	Vegetables	0.053	0.015	0.106	3.545	0.001
	Ceramics	0.629	0.120	0.260	5.251	0.001
	Clothings	0.278	0.054	0.187	5.114	0.001
	Plastics	-0.511	0.114	-0.141	-4.488	0.000
	Leathers	0.120	0.045	0.076	2.696	0.008
	Miscellaneous	0.366	0.179	0.060	2.048	0.042

Dependent Variable: all SITC Product Import Price Index

5. Conclusion

The comparative regression analysis aimed to explore the determinants of Nigeria's import and export price indices and assess the similarities and differences between these factors. The study focused on evaluating the impact of various economic variables and specific product categories on these price indices, using a series of regression and ANOVA models. The comparative analysis highlights that both import and export price indices in Nigeria are influenced by specific economic variables and product categories. The consistent improvement in model performance with the addition of predictors underscores the importance of a detailed and nuanced approach to understanding trade price dynamics. The significant predictors identified for both imports and exports offer valuable insights for policymakers aiming to enhance Nigeria's trade competitiveness and economic stability.

References

Abdullahi, S. A. A. and H. Suleiman, (2008), "An analysis of the determinants of Nigeria's import," Available at SSRN 1232942.

Egwaikhide, F. O., (1999), "Determinants of imports in Nigeria: A dynamic specification," *AERC*, Nairobi, KE.

Hemphill, W. L., (1974), "The Effect of Foreign Exchange Receipts on Imports of Less Developed Countries," *Staff Papers-International Monetary Fund*, 637-677.

Olayide, S. O. and J. K. Olayemi, (1968), "Economics of urban dairies in southern state of Nigeria," *Nigerian Journal of Animal Production*, **2**(2), 252-263.

Olopoenia, R. A., (1991), "Fiscal Response to Oil Wealth and Balance of Payment Performance in Nigeria" an AERC Final Research Report.

Ozo-Eson, P. I., (1984), "Some implications of oil revenues for the domestic economy in oil exporting companies: an application to Nigeria," Working paper, Carleton University.