ANALYSIS ON THE EFFECTS OF HIGH RATE PETROLEUM ON THE PRICE OF RICE FROM 2013-2024

BY

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CERTIFICATION

This is to certify that this research work has been completed, read through and approved as meeting the requirement of the Department of Statistics, Institute of Applied Sciences, Kwara State Polytechnic in Partial fulfillment for the Award of (ND) National Diploma in Statistics.

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DEDICATION

This project is dedicated to Almighty God, the Giver of knowledge and understanding for His special guidance over me at the course of this research work.

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ABSTRACT

This study investigates the relationship between petroleum price fluctuations and the cost of rice, from 2013 to 2024. Using statistical analysis, we found a significant difference between rice prices and petroleum pump prices, suggesting a notable impact of petroleum price changes on food costs. While the correlation between the two variables may not be as strong as expected, the findings highlight the need for policymakers to consider the potential effects of petroleum price fluctuations on rice security and affordability. We recommend a gradual subsidy removal on petroleum products and revitalizing local refining to boost production and reduce importations, thereby mitigating the impact on rice price and exchange rate depreciation.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

In Nigeria, the issues surrounding petroleum pricing are not new; Olawepo-Hashim (2021) dated it back to the 1970s during the regime of General Yakubu Gowon, when the price of premium motor spirit (PMS) was first increased from 6 kobo to N8.45 kobo per litre in 1973. Since then and up to 2020, petroleum price have increased periodically for about 30 different times. Conspicuously, the hike in petroleum prices between 2015 and 2020 has seen the premium motor spirit (PMS) increase from N26 in 2001 to N97 in 2015. The price hike further moved from N100 to N165 between 2016 and 2021.

On the other hand, gasoline (AGO) prices controlled by the government with little infrequent adjustments have been relatively stable over time. The gasoline price was 65 per litre between 2005 and 2011, except in 2007 and 2008 when it was raised to ₦ ₦ 75 per litre for a month and then lowered to ₦ 70 per litre. In 2012 the price of diesel was deregulated, with the

government removing the gasoline subsidy and allowing the retail price to rise above ₦ increased to ₦ 230 in 2016 and ₦ 100 per litre. With the deregulation, the price 280 in 2020. In 2021, the price of diesel rose to 539.32 per litre. For DPK (kerosene) the price increased in 2000 from 50 per litre in 2005, then to ₦ 75 in 2012, ₦ 200 in 2016, and ₦ ₦ 17.5 to ₦ ₦ 335.54 in 2020 (Sakanko, Adejor & Adeniji, 2021).

These incessant adjustments in domestic prices of petroleum products in Nigeria have been attributed to changes in global crude oil prices. Any time crude oil price goes up in the international market there is always a resultant increase in domestic prices of petroleum products in Nigeria. On the reverse side, when the international oil price falls in the global market, there is also a hike in the domestic price of petroleum products because the value of Nigeria's currency depreciates. Changes in the global crude oil price are a result of many factors like the COVID – 19 induced price fluctuation and the war in Ukraine; both of which have shocked the commodity markets altering the global prices of oil trade (Baffes et al, 2014).

One of the major, implications of upward changes in the prices of petroleum products in Nigeria has always been the upward trend in the general price level. The general price levels in Nigeria rose from 6.9 percent in 2000 to 18.9 percent in 2001and then rose to 15.7 percent and 16.5 percent in 2016 and 2017 respectively. As of December 2020, arising from a price hike in petroleum products, inflation galloped and remained undesirably double-digit at 13.3% from 2020 to 2021Q1 (Sakanko, Adejor & Adeniji 2021).

Generally, these upward changes in prices of domestic petroleum products in Nigeria affect economic activities that depend on petroleum products as sources of energy. The implication is that farmers have to spend more on transporting their farm produce to the markets. Not only this, but diesel and petroleum are also the main source of fuel for small-scale industries like bakeries, and corn and rice mills. The problem is exacerbated because Nigeria generates insufficient electricity to power these activities. This makes the energy costs of an average producer both in the formal and informal sectors one of the highest in the world (Olawepo-Hashim 2021).

These excessive costs are consequently transferred to the cost of foodstuff which the final consumer bears.

1.2 STATEMENT OF THE PROBLEM

The escalation in petroleum prices has been a significant concern impacting various sectors, particularly the food industry. The research aim to conduct a comprehensive Rice Index Analysis to examine the repercussions of the soaring petroleum rates on the prices of essential food items over the period from 2013 to 2024. This study seeks to delve into the intricate relationship between the cost of fuel and its ripple effect on the affordability and accessibility of food commodities, with a specific focus on rice and other staple foods.

1.3 AIM AND OBJECTIVES OF THE STUDY

1.3.1 Aim

To investigate the impact of high petroleum prices on rice prices in Nigeria from 2013 to 2024.

1.3.2 Objectives

i. To examine the relationship between petroleum price and rice price during the specified period

ii. To test whether the cost of rice depend on the petroleum price

1.4 RESEARCH HYPOTHESIS

1. **H_O:** There is no relationship between petroleum price and rice price during the specific period

   H_1: There is relationship between petroleum price and rice price during the specific period

2. **H_O:** Cost of rice do not depend on the petroleum price

   H_1: Cost of rice depend on the petroleum price

1.5 SIGNIFICANCE OF THE STUDY

This study on the "Analysis on the effects of high rate petroleum on the price of rice form 2013 - 2024" lies in its relevance to understanding the intricate relationship between petroleum prices and rice cost. This research topic is crucial as it delves into the impact of fluctuating petroleum rates on the price

of rice over a specific period, offering insights into how changes in one sector can reverberate across various aspects of the economy.

By analyzing the price index and its correlation with high petroleum rates, this study can illuminate the dynamics of rice pricing, supply chains, and consumer affordability. Understanding these connections is vital for policymakers, economists, and stakeholders in formulating strategies to mitigate the effects of petroleum price fluctuations on food costs, thereby ensuring food security and economic stability.

Moreover, investigating the effects of high petroleum rates on rice price from 2013 to 2024 provides a comprehensive overview of trends and patterns over a significant period. This longitudinal analysis can reveal patterns, anomalies, and potential causal relationships between petroleum prices and rice cost, aiding in forecasting future trends and making informed decisions to buffer against adverse impacts on consumers, businesses, and the overall economy.

1.5 SCOPE OF THE STUDY

This study will involve collecting and analyzing data on the price of rice and correlating it with changes in petroleum rates to identify patterns, trends, and potential causal relationships.

Within this scope, you will need to define a clear methodology for data collection, analysis, and interpretation. This may involve utilizing statistical tools, econometric models, and price index calculations to quantify the impact of high petroleum rates on rice price. Additionally, the scope will extend to conducting a comparative analysis across different time periods within the 2013 - 2024 timeframe to capture variations and trends over the years.

Furthermore, the scope will likely involve examining the implications of these price dynamics on consumer behavior, market stability, and economic indicators. By delving into the scope of this study, you aim to provide a comprehensive understanding of how changes in petroleum prices influence the affordability and accessibility of rice, thereby contributing valuable insights to the fields of economics, agriculture, and policy-making.

1.6 DEFINITION OF TERMS

Price Index: A price index is a measure that tracks the changes in prices of a basket of goods and services over time. In this study, the price index will help quantify and analyze the fluctuations in rice price relative to changes in petroleum rates.

High Rate Petroleum: This term refers to elevated or increased prices of petroleum products such as gasoline, diesel, and other fuels. Understanding the impact of high-rate petroleum on rice price is central to your research focus.

Price of rice from 2013-2024: This term denotes the cost or value of rice from the beginning of 2013 to the end of 2024, highlighting the changes in prices over this eleven-year period.

Analysis: In this context, analysis refers to the detailed examination and study of the effects of a high inflation rate on the price of rice over a specific period.

Effects: Effects refer to the outcomes, consequences, or impact that the high inflation rate has had on the price of rice items during the years 2013 to 2024.

CHAPTER TWO

LITERATURE REVIEW

2.1 REVIEW OF PAST WORK

This section gives the working definition of the keywords used in the investigation, presents the theoretical framework of the study and ends with the empirical literature. The price of the food items is the average price that consumers are charged for food across the country. The changes in food prices affect both the producers and consumers of goods and services. Price changes are usually defined in terms of price fluctuations, but changes may of course be negative (a fall) or positive (a rise) with any of them having a positive or negative effect on the economy (Ayadi, 2020). Oil price fluctuation is synonymous with oil price oscillation and volatility. Every economic series fluctuates either positively or negatively, upward or downward but is never constant in the long run. The instability in oil price emanates from changes or fluctuations in either demand or supply side of the international oil market (Hamilton, 2021).

The money supply comprises banknotes, and coins, outside the central bank circulating within a period of time. M0, M1, M2, and M3 measure currency and liquid instruments held in different types and sizes of accounts in operation within Nigeria (Udoh, et al, 2019).

David, Gianivigi, Stanley, and Rudiger (2022) defined economic growth as the rate of change in real output. Economic growth is the percentage of annual income in real GNP or per capita real GNP in the long run. It is an imperfect but good measure of the rate of increase in economic well-being. The exchange rate is measured as the price/rate of naira to the dollar. It measures the external value of a currency and provides a direct relationship between domestic and foreign prices of goods and services (Abubakar & Felix, 2019). The Population growth rate is the summary parameter of trends in population density or abundance. It tells whether density and abundance are increasing, stable or decreasing, and how fast they are changing. Population growth rate describes the per capita rate of growth of a population, either as the factor by which population size increases per year (Richard and Jim, 2022). Government expenditure refers to the spending by

governments and agencies at any level. For example, government expenditure on real goods and services purchased from outside suppliers; spending on employment in state services such as administration, defense and education, spending on transfer payments to pensioners, the unemployed and the disabled; spending on subsidies and grants to industry and payments of debt interest (Black, 2020).

2.2 REVIEW OF GENERAL TEXT

Mohammed (2022) examined the impact of oil price fluctuations on food prices in Iraq between 2001 and 2020.The study adopted the Johansen cointegration test and the Autoregressive Distributed Lag bound test to analyse the relationship between crude oil price and food prices. The results of the study provided evidence indicating that a long-run relationship between crude oil prices and food prices exists in Iraq. Sakanko, Adejor, and Adeniji (2021) investigated the impact of petroleum pump prices on the consumer price index in Nigeria. The study adopted the Nonlinear Autoregressive distributive lag method to analyze the objectives of the study for the period 1980 to 2020. The result of the study show there exists a long-

run equilibrium relationship between the consumer price index and petroleum pump price. It further showed an asymmetric relationship between the petroleum pump price and the consumer price index in Nigeria.

CHAPTER THREE

METHODOLOGY AND DATA PRESENTATION

3.1 INTRODUCTION

This chapter deals with the data presentation and theoretical discussion of statistical method used in this study. The method employed is correlation analysis.

3.2 DATA PRESENTATION

Year	Rice Price (₦)	Petroleum Pump Price (₦)
2013	12,000	90.00
2014	10,000	97.00
2015	10,000	87.00
2016	13,000	145.00
2017	16,000	150.00
2018	18,500	146.00

2019	19,500	145.35
2020	26,000	165.70
2021	25,000	168.06
2022	31,000	180.19
2023	55,000	630.63
2024	62,000	990.23

3.3 METHOD OF ANALYSIS

Pearson Product Moment Correlation Coefficient (r) is used to measure the linear relationship between petroleum pump price and rice price. The formula for Pearson's correlation is:

$$r = \frac{n \sum x\, y - (\sum x)(\sum y)]}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Where:

x = Petroleum Price

y = Rice Price

n = Number of observations

3.4 INTERPRETATION OF RESULT

- If r is close to +1, there is a strong positive correlation, indicating that as petroleum price increases, rice price also increases.
- If r is close to 0, there's little or no linear relationship.
- If r is negative, there is an inverse relationship.

CHAPTER FOUR

ANALYSIS OF DATA

COEFFICIENCT OF CORRELATION

4.1 CORRELATION ANALYSIS

Correlation is a measure of degree of relationship between two or more variables.

4.2 PROPERTIES OF CORRELATION ANALYSIS

It takes value between -1 and +1

Yr = +1 we say there is a perfect positive linear correlation between the variables. If r = -1 we say there is highly negative linear correlation between the variable.

If r = O there is no linearity

KarI person moment

r = $\sqrt{\beta yx - \beta xy}$

When Y on X

βyx = $\frac{n\sum xy - \sum x\sum Y}{n\sum X^2 - (\sum x)^2}$

$$r = \sqrt{\frac{n\sum xy - \sum x\sum Y}{n(\sum X^2) - (\sum x)^2}} \quad X \quad \frac{n\sum xy - \sum x\sum Y}{n\sum Y^2 - (\sum Y)^2}$$

When X on Y

$$\beta yx = \frac{n\sum xy - \sum x\sum Y}{n\sum X^2 - (\sum x)^2}$$

$$r = \frac{n\sum xy - \sum x\sum Y}{\sqrt{(n\sum X^2) - (\sum x^2)\ (n(\sum Y^2) - (\sum y^2)}}$$

DEVIATION OF CORRECTION

r (x, y) = $\frac{(or\ (xy)}{rnry}$ ……..…… (i)

(or (n,y) = $\frac{1}{n}$ ∑ny-ny …….…….. (ii)

$\sqrt{n =}$ $\sqrt{\frac{1}{n}\sum}$ (n-n)2 = $\sqrt{\frac{1}{n}\sum}$ n2-n2 …….(iii)

Put the values of COV (n,y) 6n 6y in equation (i)

r(n,y) = $\frac{1}{n}$ ∑ny-xy

$$\sqrt{\frac{1}{n}\sum \text{x2} - \text{n2})\ \ \frac{1}{n}\sum \text{y2} - \text{y2})}$$

= $\frac{\sum xy - nxy}{n}$

= $\sqrt{\frac{(\sum x^2 - xy^2)\ (\sum y^2 - xy^2)}{n^2}}$

Recall that X = $\frac{\sum x}{n}$ and X = $\frac{\sum x}{n}$ Y = $\frac{\sum y}{n}$

r (X, Y) = $\frac{cov\,(X,Y)}{On\ \ oy}$

r (X, Y) = $\frac{n\sum xy - \sum x \sum Y}{\sqrt{(n\sum X^2) - (\sum x^2)\,(n(\sum Y^2) - (\sum y^2)}}$

This correlation was derive form karl pearson co-efficient moment.

.: r = $\frac{n\sum xy - \sum x \sum Y}{\sqrt{(n\sum X^2) - (\sum x^2)\,(n(\sum Y^2) - (\sum y^2)}}$

S/N	Rice Price (₦) X	Petroleum Price (₦) Y	X^2	Y^2	XY
1	12,000	90.00	144,000,000	8,100	1,080,000
2	10,000	97.00	100,000,000	9,409	970,000
3	10,000	87.00	100,000,000	7,569	870,000
4	13,000	145.00	169,000,000	21,025	1885,000
5	16,000	150.00	256,000,000	22,500	2,400,000
6	18,500	146.00	342,250,000	21,316	2,701,000
7	19,500	145.35	380,250,000	21126.62	2,834,325
8	26,000	165.70	676,000,000	27456.49	4,308,200
9	25,000	168.06	625,000,000	28244.16	4,201,500

10	31,000	180.19	961,000,000	32,468.44	5,585,890
11	55,000	630.63	3,025,000,000	397694.19	34,684,650
12	62,000	990.23	38,44,000,000	980555.45	61,394,260

$\sum x = 298{,}000$

$\sum y = 2995.16$

$\sum x^2 = 106225 \times 10^{10}$

$\sum y^2 = 1577{,}464.362$

$\sum xy = 122{,}914{,}825$

$$r = \frac{n\sum xy - \sum x \sum Y}{\sqrt{(n\sum X^2) - (\sum x^2)\ (n\sum y^2 - (\sum y)^2)}}$$

$$r = \frac{12(122914825) - (298000)\ (2995.16)}{\sqrt{12(1.06225X10^{10}) - (298000)^2\ (12(1577464.362) - (2995.16)^2}}$$

$$r = \frac{1474977900 - 892597680}{\sqrt{(1.2747X10^{11} - 8.8804X10^{10})\ (189295572.34 - 8970983426)}}$$

$$r = \frac{582420220}{\sqrt{3.8666X10^{10}\ X\ 9958588.914}}$$

$$r = \frac{582420220}{\sqrt{3.850587989X10^{17}}}$$

$$r = \frac{582420220}{620531062}$$

r = 0.9386

INTERPRETATION

It shows that there is a high strong relationship between Rice (X) and Petroleum (Y).

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

This study analyzed the correlation between petroleum price fluctuations and the cost of essential rice from 2013 to 2024. The research aimed to investigate the impact of high petroleum prices on rice prices in Nigeria. Using correlation coefficient, the study found a significant difference between the prices of rice and petroleum pump prices. The results suggest that changes in petroleum prices have a notable effect on the prices of rice. The study's findings highlight the intricate relationship between petroleum prices and rice costs, emphasizing the need for policymakers to consider the potential impacts of petroleum price fluctuations on food security and affordability.

5.2 CONCLUSION

This study analyzed the correlation between fluctuations in petroleum prices and the cost of rice from 2013 to 2024. The results show that there is a significant difference in the price of rice and petroleum pump price, indicating

a potential relationship between the two variables. However, the study failed to reject the null hypothesis, suggesting that the correlation between petroleum prices and rice prices may not be as strong as expected.

The findings of this study have important implications for understanding the impact of petroleum price fluctuations on food affordability and accessibility. While the results suggest that petroleum prices may not be the sole determining factor in rice prices, they nonetheless highlight the need for policymakers to consider the potential ripple effects of petroleum price changes on the food market.

Future studies can build on this research by exploring other factors that may influence food prices, such as supply chain disruptions, weather events, and government policies. By gaining a deeper understanding of the complex relationships between petroleum prices, food prices, and other economic factors, policymakers can develop more effective strategies to ensure food security and affordability for vulnerable populations.

5.3 RECOMMENDATIONS

i. Commodity prices especially rice prices are expected to rise further in the country. In the light of this, the study recommends that government plan subsidy removal on PMS should be a gradual process instead of a onetime total removal to prevent further hikes in the prices of rice and other commodities in the country.

ii. The local refining of petroleum products should be revisited and revamped to boost production and over importations of refined petroleum products for domestic use which will also check exchange rate deprecation.

iii. Policies that will reduce continuous rise in exchange in Nigeria should target more on increasing local production generally and reducing the trade deficits

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