

## Efficient Exchange Rate Determination Model: Is the Nigeria Currency not undervalued?

Over time the exchange rate of developing nation (e.g. Nigeria) has been a varying issue of concept versus real value. Most apply by developing nation like Nigeria is the market value model(MVM) based on the forces of Demand and supply of foreign currency especially dollar. The market value system is not without its enduring issues of denomination on a single currency.it is rather a fait-accompli model. It is none-explanatory in nature as to the interaction of other forces of value rather than basket of fiat money (paper money). The denomination of the MVM is rather historical in nature than estimation of accurate basket of goods measurement. It is a product of human and personal influence than interaction of basic value; it has over time been detached from the original basic value estimation. the purchasing power parity model is one based on the basket of goods denominated in their money value, it is a total and most reliable means of currency valuation, the method adopted in this research is the modify purchasing power parity model (MPPP) developed for this purpose using the weighted average model developed by the study. The result shows that the Nigeria exchange rate is rather poor and none realistic, it also revealed that the exchange rate is not realistic and value-expensive. The naira has been grossly undervaluing by the current exchange regime. it is rather not a true expressing of the real growth stage of the Nigerian economy. It is retrogressive and dull in it predictive capacity, the MPPP rather produces the best estimate and the true value of the Nigerian currency. The MPPP exchange rate conform with the efficiency frontier assumption. The study recommended a change from the MVM to the MPPP model. The study also recommended the rebasing of the naira using the MPPP model. The study further recommended the adoption of the MPPP for Nigeria exchange rate determination to enhance inflow of foreign investment and to grow the real sector of the economy. The study also recommended the efficiency frontier model in exchange rate efficient determination.

**Keywords:** purchasing power parity theory(PPP), Efficiency Frontier, exchange rate, commodity price, moving average.

### Introduction

The need to have a strong and realistic exchange rate permeates the mind of every nations and the international world. The need to determine exchange rate for trade holds supreme at every level of trade. No nation can stay in autarky, hence the need for trade. The justification for basket of goods and the amount and rate for which such can be exchanged remain pivotal to any attempt at trade.

At the inception of trade, the idea of barter holds. Barter was not without its rudimentary problems and slow trade adjudication. The Barter system thus gave ways to the Gold standard era. The Gold standard functioned effectively well until events of the first world war and the second world war came, after which the Gold standard operated well (1876-1913). It was after the first world war that it became

1 difficult to adjudicate trade effort using the Gold standard. Much gold was not  
2 available for trade, the scarcity of gold made exchange cumbersome. This was the  
3 scenario till the era of the second world war in 1944. The post-war era yield series  
4 of agreement at the Bretton Wood negotiations. The Bretton Woods Agreement  
5 estimated US dollar- based international monetary exchange system. It also  
6 provided for two new Institution, namely; the International Monetary Fund (IMF)  
7 and the World Bank (WB).

8 The result of the Bretton Wood's agreement necessitated currency exchange  
9 system. The dollar became the sole exchange denominations. It was from this era  
10 the need to have realistic and effective exchange rate system became obvious and  
11 of a crucial need. Several attempts were made to have adequate exchange rate  
12 system. There was the experimentation with the fixed exchange rate system, and  
13 floating exchange rate system (Marc, 2004). At the bottom of this fixation is the  
14 need for method and model for determination of actual exchange rate.

15 The purchasing power parity theory was evolved at this time. The purchasing  
16 power parity theory (PPP) is a priced-based exchange rate model unlike the  
17 Bretton wood style of Gold based exchange rate model. The purchasing power  
18 parity theory (PPP) applied the price of basket of good. It was the inadequacy of  
19 the gold standard exchange rate system that yielded room for the PPP. There is  
20 also the interest rate parity theory (IRP), based on the previous interest rates of the  
21 two nations. The balance of trade parity theory (BTP) is another model while also  
22 the balance of payment parity theory (BPP) are also used. All of these were  
23 attempts necessitated by inadequacy of the Gold-standard exchange rate model of  
24 the Bretton Wood agreement. The problem of exchange rate determination  
25 remains prevalent till date and by many nations. The problem today is the  
26 unrealistic method of exchange rate determination. Most of the methods used have  
27 inherent weaknesses of demand and supply inelastic problem. What constitutes the  
28 demand and how the supply is netted is another issue. The dollar/pounce exchange  
29 rate system dominates international scene but the fundamental remains an issue yet  
30 unresolved. How can a nation with a GDP higher than another nation has  
31 exchange rate set at a lower rate than the other nation? This is the problem of the  
32 mono-culture dollar/pounce exchange rate(ER) in application by most WB  
33 nations. This also brings to fore the weakness in the demand and supply  
34 equilibrium frontier for determination of exchange rate, which whittles down self-  
35 determination power of each nation to determine her exchange rate vis-à-vis other  
36 trading nations, The Breton wood agreement rather rested such benevolence on  
37 dollar as the pivot exchange rate determining currency for all nations within the  
38 world bank membership. The Breton wood agreement rely on the forecast of  
39 demand and supply which is extraneously determined. The weaknesses inherent in  
40 the above as stated necessitated this study. The goal of this study therefore is to  
41 create and present a modified model of the price-to-price determination of  
42 exchange rate i.e. a Modified-Purchasing-Power-Parity-Theory (MPPP). The  
43 study also has it as goal, to present the MPPP as the most realistic exchange rate  
44 model that generate an Efficient-Exchange-Rate (EER). It will also attempt to  
45 generate more realistic and elastic exchange rate for Nigeria. The modified  
46 purchasing power parity theory will be adopted.

1 **Objectives of the Study**

2  
3 The following objectives form the thrusts of this study:

- 4  
5 i. To present a model that have eliminated inherent weakness in other  
6 methods of exchange rate determination.  
7 ii. To present the modify purchasing power parity theory (MPPP) as the  
8 model that generate an efficient exchange rate(EER) determination and  
9 currency valuation.  
10 iii. To determine the real exchange rate of naira to dollar and other currency of  
11 the world using the MPPP.

12  
13  
14 **Research Hypotheses**

15  
16 Based on the above objectives, the following hypotheses are formulated and  
17 tested:

18  
19 **Hypothesis 1**

20  
21 *The modified-purchasing-power-parity-exchange-rate determination do not generate*  
22 *an Efficient Exchange Rate (EER).*

23  
24 **Hypothesis 2**

25  
26 *The modified-purchasing-power-parity-exchange-rate model cannot be used to*  
27 *determine commodity price among two nations.*

28  
29 **Hypothesis3**

30  
31 *The real exchange rate of naira to dollar and other currency of the world cannot be*  
32 *determined by the MPPP*

33  
34  
35 **Conceptual Review**

36  
37 *Relative Country Study of PPP*

38  
39 Hussein (2015) studied the long run movement between Canadian dollar and  
40 US dollar exchange rates in two nation approach . The study used monthly data for  
41 the period 1995 to 2008. The study result suggests that the absolute purchasing  
42 power parity (PPP) does not exist, noting that no long run relationship between the  
43 actual exchange rate and PPP generated exchange rate. The result shows that the  
44 actual exchange rate and PPP rate do not co-integrate, in order word there is no  
45 long run relationship between the Canadian dollar and US dollar exchange rates.  
46 The study also noted that output prices move more slowly, and is evidence against  
47 PPP in the short run. It is noted that the study time frame of the study is to close to

1 capture the existence of a long run relationship between the two countries. the  
 2 study however, concluded that relative price movements are important in  
 3 explaining the actual exchange rate between US and Canada.

#### 4 *Absolute Purchasing Power Parity Theory*

5  
 6  
 7 Lawrence (1978) in his study of the Absolute Purchasing Power Parity  
 8 (APPP) theory asserts that the equilibrium exchange rate is determined by the ratio  
 9 of price of the domestic country to the price level of the foreign country. The  
 10 relative PPP theory on the other hand states that the equilibrium exchange rate in a  
 11 current period (t) to the equilibrium in a base period (o) is determined by the ratio  
 12 of the domestic country price index in period (i) (Lawrence, 1978)

#### 13 14 15 **Exchange Rate and Economy Growth**

16  
 17 Chuanjian Li, et al (2021), study the effect of COVID 19 on exchange rate of  
 18 selected countries using the autoregressive distribution lag (ARDL) model and  
 19 noted that The results indicated that the exchange rate is affected negatively due to  
 20 the effect of COVID-19 cases. It also noted that the effect of the pandemic is  
 21 both short run and long run in nature as it affect the nation of chine and united  
 22 states of America.

23 Tory (2021) review the reason for floating exchange rate within nation it  
 24 noted that exchange rate fluctuation could be duty to the strength of the nation  
 25 economy it could also the as a result of the inflation rate and interest rate within  
 26 the economy, it could also be traced to capital flows from exportation and  
 27 importation. Largely a nation with better trade fctor of export over import will  
 28 likely have a better rate

29 Agya, et al (2020) study the determination of real exchange rate equilibrium  
 30 and misalignment of naira vis-a-vis US dollar and British pound and noted that on  
 31 the average naira is undervalued in relation to dollar for the period covered by the  
 32 sturdy to a point of difference of 1 %, such that averagely, the Naira is 4 percent  
 33 overvalued and 5 percent undervalued against US dollar with average productivity  
 34 change, interest rate change and balance of trade change. Also in relation to UK  
 35 pound, 1 percent rise in Nigeria productivity, discount rate, UK discount rates and  
 36 favourable terms of trade would bring about 21, 45, 11 and 26 percent appreciation  
 37 in the value of the Naira while 1 percent rise in real interest rate differential will  
 38 lead to 15 percent depreciation of the Naira against Pound Sterling

#### 39 40 41 **Theoretical Review**

##### 42 43 *The Purchasing Power Parity Theory*

44  
 45 The Dictionary of Economics defines purchasing power parity (PPP) as  
 46 “a theory which states that the exchange rate between one currency and another is

1 in equilibrium when their domestic purchasing powers at that rate of exchange are  
2 equivalent”.

3 The PPP is a theory of exchange rate determination. It state that the exchange  
4 rate between two countries in the long run is relative to change in price in the two  
5 countries. It relates price to exchange rate. It is sometimes called “inflation theory  
6 of exchange rate” (Rudiger, 1985). The purchasing power parity (PPP) theory  
7 states that there is a causal relationship between exchange rates and prices  
8 (Hussein, 2015, Chortareas & Kapitanios, 2013). The PPP theory noted that, in the  
9 long run, identical goods and services in different countries should have the same  
10 price in the two countries. This is premised on the assumption that the exchange  
11 rate will adjust to eliminate the arbitrage opportunity of buying and selling a  
12 product or service between counties for profit and selling it in another country for  
13 profit. Exchange rates drive from the PPP are frequently used in the comparison  
14 of living standards internationally. Specifically, the theory using the exchange rate  
15 between two countries asserts that price of the same basket of goods and service  
16 should cost the same within the two countries. David Ricardo was credited with  
17 the invention while Cassel was credited with name (Rudiger, 1985. Cassel, 1918).  
18 The concept of purchasing-power parity (PPP) has two applications. it was  
19 originally developed as a theory for exchange rate determination. It is also used  
20 secondarily to compare the standard of living among nations. From the perspective  
21 of exchange rate determination, PPP can be used to determine the long run  
22 relationship between monetary policy and exchange rate. Where two countries  
23 with different inflation rates are in trade relation their exchange rate is expected to  
24 adjust over time to offset inflation rate disparity among the nation in the long run.  
25 (Robert & Lawrence, 2002)

26 When PPP is used as living standards gauge within two countries, it is constructed  
27 using price of basket of goods or services within the two countries. The basket will  
28 consist of the same goods within the two countries, generated rates are used to  
29 translate different currencies into a common currency rate to measure the  
30 purchasing power and per capita income within the two countries. Robert and  
31 Lawrence (2002) however noted that PPP exchange rate generated in this manner  
32 may not yield an accurate measure of the equilibrium value of the market-  
33 determined exchange rate.

#### 34 35 *The Asset Market Equilibrium Model*

36  
37 The model is an attempt to determine the equilibrium point of the exchange  
38 rate between two countries the model made use of the assets tradable between the  
39 two countries. These assets include the consumables, financial assets and other  
40 assets tradable between the two countries. The asset market model of exchange  
41 rate determination made use of the price of these assets between the two countries,  
42 the idea is premised on the demand for and supply of these assets denominated in  
43 the currencies between the two countries. The asset market model assume that  
44 currencies is an important element in determining the equilibrium exchange rate.  
45 These assets are not limited to any class of goods or services. They

1 include investments, such as assets as shares, debenture, bond and so on that are  
2 denominated in the currency. (Boundless, 2019).

#### 4 *Balance of Payment Equilibrium Model*

6 The balance of payment model for exchange rate determination state that  
7 domestic exchange rate against a foreign exchange rates will be at an equilibrium  
8 level when they produce a stable current account balance. It thus means that a  
9 nation with a trade deficit will have a reduction in its foreign reserves this will  
10 invariably reduce, or depict, the value of its currency. An undervalue currency  
11 makes the nation's exports earning unpleasant though the good may enjoy more  
12 patronage in global market while making it imports more expensive. Stability and  
13 enhanced equilibrium will be attained where export and import are at per  
14 (Boundless, 2019).

15 De Ridder (1981) in a study of the exchange rate determination and balance  
16 of payment constructed a non-dynamic model for the balance of payments against  
17 the more fundamental determinants of the exchange rate, from this background it  
18 was noted that the exchange rate is determined by three types of phenomena: the  
19 first is a real phenomenon such as exploitation of natural resources and the  
20 relative level of economic activity. The Second is the nominal phenomenon such  
21 as relative prices of goods and service. The third is the monetary policy  
22 phenomenon such as interest rate differentials, exchange rate expectations and  
23 official intervention. It is the determination of the exchange rate through the price  
24 interaction that follow the assumption of the PPP which is the idea that this study  
25 will exploit.

26 Semudram and Argy (1981) study the exchange rate determination from the  
27 point of view of interest rate parity theory. He used the interest rate parity equation  
28 as well as exchange rate expectations to explain the movement of the effective  
29 exchange rate over a period of time. The interest rate parity equation adopted the  
30 log of the exchange rate to explain the interest rate differential and the log of  
31 exchange rate expectations. The theory assume that expected exchange rate should  
32 be determined principally by relative prices, the current account and the interest  
33 rate differential, with this he derived an equation for the exchange rate.

#### 36 **Empirical Review**

38 The essence of this study is to examine the relationship between the exchange  
39 rate and the purchasing power parity theory. Several studies have examined the  
40 exchange rate determination among nation (Samudram 1981, De Ridder 1981,  
41 Artus 1976). Frankel, J.A. (1979 (1979) examined the theory of floating exchange  
42 rate based on real interest differentials, he was of the same line of thought with  
43 Samudram (1981) who also examined the exchange rate determination from the  
44 point of view of interest rate. On the other hand, Rudiger (1985) examined the  
45 exchange rate determination from the point of view of the Purchasing Power Party  
46 theory (PPP). The Purchasing Power Party theory (PPP) adopted the price of good

1 approach. It tends to determine the exchange rate for a nation against another or  
 2 corresponding nation (i.e. trading nation) by way of the standard of living in the  
 3 domestic nation against foreign nation. The exchange rate from this angle depict  
 4 the standard of living of the domestic nation. The PPP determine exchange rate  
 5 based on the standard of living of the domestic nation (Hussein, 2015; Chortareas  
 6 & Kapitanios, 2013). The standard of living is hinged on the price of good that  
 7 could jointly be sold in both countries.

8 The approach to the exchange rate determination from empirical studies are  
 9 founded on either interest rate, or inflation as expected in price of goods across the  
 10 countries. The exchange rate has been determined by balance of trade and balance  
 11 of payment as studied by De Ridder (1981), Boundless (2019), Lawrence (1978)  
 12 and Hussein (2015) examined the relative PPP, Lawrence (1978) on the other hand  
 13 examined the APPP.

14 These studies are empirically and theoretically sound but applicably weak.  
 15 The interest rate approach to exchange rate determination is weak because in most  
 16 nations interest rate is a monetary policy tool and hence determined by fierce. Also  
 17 exchange rate determination from the balance of trade and balance of payment  
 18 view point also lack expression in reality, finally balance of trade equilibrium or  
 19 static balance of trade in reality may be nonexistence as done in the study by De  
 20 Ridder (1981). The APP and RPPP are also not without this weakness due to the  
 21 trade barrier inherent in the countries monetary and fiscal policy. Many of the  
 22 nation will want to protect themselves against dumping. The weakness in these  
 23 many previous studies have created the gap for this study.

24 This study attempts to determine the exchange rate applying the purchasing  
 25 power parity theory. The adoption of the PPP become necessary because the PPP  
 26 count on the replacement of goods with the standard of living as expressed by the  
 27 price of goods in the relative nations. The price of good have the inflation factor  
 28 embedded in it. The real price is an expression of the inflation factor within the  
 29 nation, the inflation factor is price and demand pushed, this is more realistic when  
 30 compared with interest rate which is responsive to the monetary policy (MP) of the  
 31 nation.

32 The study will also attempt to construct the relative exchange rate between  
 33 the two nations based on the Moving Average method(MA) of the exchange rate  
 34 in time(o) as the bases for the exchange rate in time (t), this follow the Lawrence  
 35 (1978) model for relative exchange rate determination adopting the purchasing  
 36 power party (PPP) theory assumption.

37 The study will adjust the inflating tendency in the price of basket of goods  
 38 that will be adopted for the study. The weakness in price used for the simple PPP  
 39 adopted by previous studies will also be adjusted using the weighted average of  
 40 the price (WAP) of goods selected for the study. The essence is to reduce the  
 41 inherent weakness of inflation and interest rate component of price used he simple  
 42 PPP approach.

43 The equilibrium exchange rate will also be determined by the log of WAP of  
 44 goods selected ( $\log W_{1p_1}$ ) and the demand of the goods is the foreign nation:

45  
 46

## 1 Method of Study

2  
3 The attempt in this study is to evaluate the exchange rate of a nation. in this study  
4 the approach is to estimate the exchange rate using the modify purchasing power  
5 parity theory (MPPP) the modify purchasing power parity theory is the  
6 remodelling done by this study. The attempt is to secure the efficient purchasing  
7 power parity theory (EPPP) exchange rate that will be the best for the nation.

8 The method adopted in this study is to secure the weighted average price of  
9 both the domestic and the foreign nation product price involve the Party theory.  
10 The average price is also deflated to secure the real price for the two nations. The  
11 two nations in focus in this study is Nigeria and USA, the choice of Nigeria to  
12 USA is to measure the Naira to dollar rate(N/\$). the products selected for this  
13 study as our sample products is the petroleum products exported mostly from  
14 Nigeria to USA. The study adopted a three-products price-deflated weighted  
15 average over the selected period of time(years) for the study. The MPPP was  
16 therefore applied, the robustness test was also done to ensure a realistic result. The  
17 study also developed both the graphical and the regression model evaluation  
18 model for comprehensive and realistic overview determination method.

## 21 Model Specifications

22  
23 The models for the implicit (real) exchange rate are as specified below:  
24

- 25 1.  $\sum_l^n \frac{W_i P_{inD}}{W_i P_{inF}} = E$
- 26 2. Inflation adjusted Price (IAP) =  $\frac{\text{nominal price}}{1 + \text{inflation}}$
- 27 3. Simple PPP exchange rate =  $\frac{P_D}{P_f}$

28  
29 Where:

- 30  $W_{iP_{inD}}$  = weighted average domestic price  
31  $W_{iP_{inF}}$  = weighted average foreign price  
32 E exchange rate for the domestic nation  
33  $P_D$  = nominal price of domestic basket of good  
34  $P_f$  = nominal price of foreign basket of good  
35

36 *Probability mean difference of data (PMD)*

- 37  
38 1) **(PMD)** =  $(M_a / MD_{AB})$

39 **Where:**

- 40 2)  $M_A$  = mean of data A  
41 3)  $MD_{AB}$  = mean defences of Data and B  
42  
43  
44



1 **The Mean Squared Error Mean for Efficiency (Test)**

2

3 **MSE = n-d/SE**

4 n=number of variables

5 d =degree of freedom

6 SE = standard error of the data

7 Efficiency frontier (E) is where  $0 = <E \leq 0.5$

8 *Note: E is the authors created standard (model from average correlation*  
 9 *standard)*

10

11

12 **Analyses of Data**

13

14 **Table 1. Paired Sample Statistics**

		Mean	N	Std. Deviation	Std. Error Mean	@2degree of freedom
Pair 1	Implicit Exchange Rate	46.8353	6	7.11693	2.90547	.02369
	Actual Exchange Rate	228.9450	6	69.10452	28.21180	

15

Source: Author's Computation aided by SPSS Version 21

16

17 **Table 2. Paired Samples Correlation**

		N	Correlation	Sig.
Pair 1	Implicit Exchange Rate & Actual Exchange Rate	6	-.066	.901

18

Source: Author's Computation aided by SPSS Version 21

19

20 **Table 3. Results for Paired Sample t-test**

		Paired Differences				T	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	Real Exchange Rate - Actual Exchange Rate	-182.11	69.94	28.55	-255.50	-108.72	-6.38	5	.001

21

Source: Author's Computation aided by SPSS Version 21

22

23

## 1 The Paired Sample Test

2  
3 The real exchange rate and the actual exchange rate is subjected to paired  
4 sample hypothesis test of significance. The mean difference of the real exchange  
5 rate to the actual exchange is -182.103 the large mean difference connotes the  
6 expanded difference between real and the actual exchange rate. Also, the  
7 significant test for difference is carried out using the p(value) of t-statistic. The p-  
8 value is 0.001 at 0.005 significant level, we reject the null hypothesis of no  
9 significant difference and accept the alternative hypothesis of significant  
10 difference between the real exchange and the actual exchange. Also the normality  
11 test for the data is done using the mean probability difference of data ( $R_m / A_m -$   
12  $R_m$ ) with p(value) of 0.257 and at 0.05 significant level the normalcy test is done  
13 for a null hypothesis of normalcy and alternate hypothesis of no normalcy. In the  
14 case above the normalcy of the data is confirmed. Thus, the difference between the  
15 data is not a subject of random error but of a real difference for the normal data  
16 applied.

17 The implication of the above is that the difference in the real and actual  
18 exchange rate is potent and of significant value.

## 21 Cross-sectional Approach to Analysis

### 23 Nigeria

25 **Table 4. Inflation-Adjusted Commodities Prices for Nigeria**

Inflation-Adjusted Commodities' Prices		
LPG	PMS	AGO
102.86	97.00	180.00
57.33	82.65	218.80
93.16	91.67	185.43
113.02	109.17	182.58
95.57	95.11	147.58
52.65	89.08	135.77

26 **Source:** Author's Computation aided by Ms-Excel, 2019

28 **Table 5. Weighted-Inflation-Adjusted Commodities' Prices for Nigeria**

Weighted-Inflation-Adjusted Commodities' Prices			
LPG	PMS	AGO	Overall
102.86	97.00	180.00	
114.65	165.29	437.60	
279.47	275.02	556.28	
452.09	436.67	730.31	
477.83	475.54	737.91	
315.93	534.47	814.61	
<b>1,742.85</b>	<b>1,984.00</b>	<b>3,456.71</b>	<b>7,183.55</b>

29 **Source:** Author's Computation aided by Ms-Excel, 2019

1 *United States of America*

2

3 **Table 6. Inflation-Adjusted Commodities Prices for United States of America**

Inflation-Adjusted Commodities' Prices		
LPG	PMS	AGO
2.3760	3.532	2.430
2.3142	2.265	3.298
1.9540	3.145	2.095
2.1981	2.165	2.341
2.3372	2.757	2.523
2.1763	2.726	2.109

4 **Source:** Author's Computation aided by Ms-Excel, 2019

5

6 **Table 7. Weighted-Inflation-Adjusted Commodities' Prices for United States of**  
7 *America*

Weighted-Inflation-Adjusted Commodities' Prices			Overall
LPG	PMS	AGO	
2.38	3.53	2.43	
4.63	4.53	6.60	
5.86	9.44	6.28	
8.79	8.66	9.37	
11.69	13.79	12.61	
13.06	16.36	12.66	
<b>46.40</b>	<b>56.30</b>	<b>49.94</b>	<b>152.65</b>

8 **Source:** Author's Computation aided by Ms-Excel, 2019

9

10 **Table 8. Implied (Real) Exchange Rates for the Three Baskets of products (Per \$1)**

	LPG	PMS	AGO	Overall
<b>Implied (Real) Exchange Rate</b>	37.5595	35.2372	69.2119	47.0589

11 **Source:** Author's Computation aided by Ms-Excel, 2019

12

13

14 **Time-series-approach to Analysis**

15

16 **Table 9. Inflation-Adjusted Commodities Prices for Nigeria**

Inflation-Adjusted Commodities' Prices		
LPG	PMS	AGO
102.86	97.00	180.00
57.33	82.65	218.80
93.16	91.67	185.43
113.02	109.17	182.58
95.57	95.11	147.58
52.65	89.08	135.77

17 **Source:** Author's Computation aided by Ms-Excel, 2019

18

19

1 **Table 10. Weighted-Inflation-Adjusted Commodities' Prices for Nigeria**

Weighted-Inflation-Adjusted Commodities' Prices			
1	3	2	
LPG	PMS	AGO	<b>Overall</b>
102.86	291.00	360.00	753.86
57.33	247.94	437.60	742.86
93.16	275.02	370.86	739.04
113.02	327.50	365.16	805.68
95.57	285.32	295.16	676.05
52.65	267.24	271.54	591.43
<b>514.59</b>	<b>1,694.02</b>	<b>2,100.31</b>	<b>4,308.92</b>

2 **Source:** Author's Computation aided by Ms-Excel, 2019

3

4 **Table 11. Inflation-Adjusted Commodities Prices for United States of America**

Inflation-Adjusted Commodities' Prices			
LPG		PMS	AGO
2.3760		3.532	2.430
2.3142		2.265	3.298
1.9540		3.145	2.095
2.1981		2.165	2.341
2.3372		2.757	2.523
2.1763		2.726	2.109

5 **Source:** Author's Computation aided by Ms-Excel, 2019

6

7 **Table 12. Weighted-Inflation-Adjusted Commodities' Prices for United States of America**

8

Weighted-Inflation-Adjusted Commodities' Prices			
1	3	2	
LPG	PMS	AGO	<b>Overall</b>
2.38	10.60	4.86	17.83
2.31	6.80	6.60	15.70
1.95	9.44	4.19	15.58
2.20	6.50	4.68	13.38
2.34	8.27	5.05	15.65
2.18	8.18	4.22	14.57
13.36	49.77	29.59	92.72

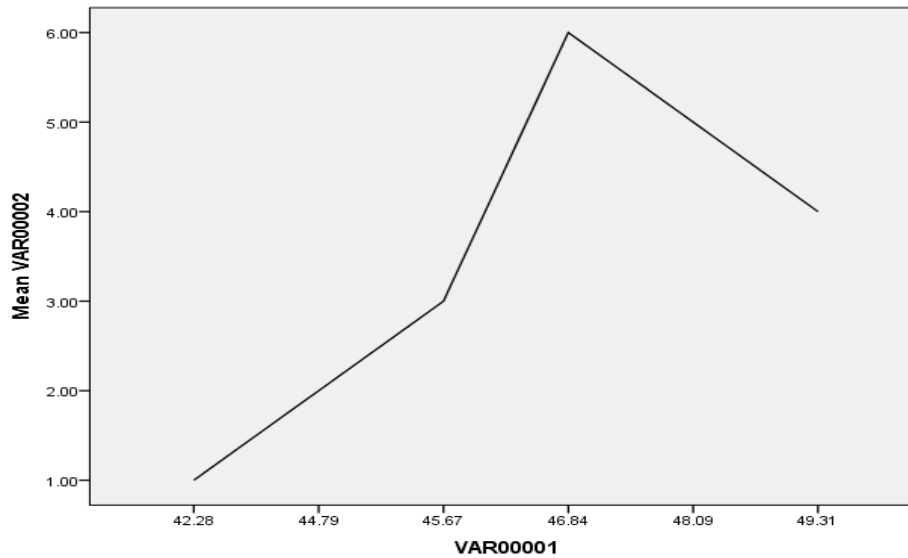
9 **Source:** Author's Computation aided by Ms-Excel, 2019

10

11 **Table 13. Comparison of Exchange Rates**

Years	Implied (Real) Exchange Rate	The moving average of the real exchange rate	Nigerian actual exchange rate
2014	42.2757	42.2757	158.55
2015	47.3014	44.7885	192.44
2016	47.4349	45.6707	253.49
2017	60.2317	49.3109	305.8
2018	43.1861	48.0859	306.1
2019	40.5818	46.8353	306.437

12 **Source:** Author's Computation aided by Ms-Excel, 2019

1 **Table14.**

2

3

4

5 **Interpretation of Results and Findings**

6

7 The results revealed that real exchange rate for Nigeria naira to USD in all the  
8 years under consideration using the MPPP is shows a gross difference between  
9 real exchange rate and the actual exchange rate. In 2019 while the real exchange  
10 rate is 40.5818/USD in 2018 it was 43.1861/USD and in 2017 it was 60.2317/USD  
11 in 2016 it was 47.4349/USD and so on.

12 The actual exchange rate of Naira to one USD stands at 306.437 in 2019,  
13 306.1 in 2018, 305.8 in 2017, 253.49 in 2016 and 192.44 in 2015 and 158.55 in  
14 2014 respectively.

15 The above significantly shows that the real exchange rate is far difference  
16 from the actual exchange rate. The above discovery is supported by the recent  
17 china and Nigeria currency swap that left the naira exchange for yuan at the rate of  
18 N48/CNY (Bella, 2018).

19

20

21 **Test of Hypotheses**

22

23 *Hypothesis 1*

24

25 *The modified-purchasing-power-parity-exchange-rate determination do not generate*  
26 *an Efficient Exchange Rate (EER).*

27

28 Taken from table1 above the mean squared deviation where is the natural  
29 measure of efficiency of a give data is used and the yield .0.2369 the natural  
30 efficiency measure is better the closers the value is to zero but for the efficiency  
31 frontier advocated by this study for measurement the criterion is set as  $0 = <E \leq$   
32 0.5 and from this point the MPPP provide an efficient exchange rate.

1 *Hypothesis 2*

2  
3 *The modified-purchasing-power-parity-exchange-rate model cannot have used to*  
4 *determine commodity price among two nations.*

5  
6 The MPPP generated exchange rate above project the real price between  
7 Nigeria and the USA since the model satisfy the normalcy test, also the impact of  
8 the domestic and foreign inflation from the price have been eliminated to give the  
9 true picture and value of commodity among the two nations selected for the study.

10  
11 *Hypothesis 3*

12  
13 *The real exchange rate of naira to dollar and other currency of the world cannot be*  
14 *determined by the MPPP*

15  
16 From the above table 13 the moving average for the real exchange rate  
17 revealed a linear relationship over the years this show that the MPPP is realistic  
18 and could be a dependable exchange rate. The table graph also supports this.

19  
20  
21 **Findings**

22  
23 **The followings are the salient findings from the analyses:**

- 24  
25 i. The current Nigeria exchange rate do not reflect the true value of the  
26 Naira.  
27 ii. The current exchange rate of naira to dollar (N/USD) is fixed at rate over  
28 above the realistic purchasing power of the Nigeria currency.  
29 iii. The MPPP generate an efficiency frontier price of the Nigerian naira.  
30 iv. The Nigeria currency using the N/USD have been grossly undervalued  
31 over the years and will not support the growth and international trade  
32 between Nigeria and other nation.  
33 v. The MPPP is a right model to determine the commodity price among  
34 nations

35  
36  
37 **Conclusion**

38  
39 The study is an evaluation of the several methods of determining the  
40 exchange rate among nations. The various method of exchange rate has been tried  
41 over time and the Breton wood agreement that place pre-eminence on the forces of  
42 demand and supply have play the leading role in this capacity the years. The study  
43 evaluated an alternate method using the Modify purchasing power parity  
44 theory(MPPP) the MPPP this study concluded is a better method as it yields the  
45 real exchange rate value among nations. It is also concluded that the current  
46 exchange rate of Nigeria has grossly undervalue the Nigerian naira against the  
47 USD. The impact of this the study concluded is the flight of valuable investment

1 off the Nigeria. The application of a single exchange rate to trade in all nations has  
 2 brought the Naira value to disparity and dishonour. this justify the recent single  
 3 currency valuation experimented between Nigeria and china which form the bases  
 4 for the recent currency swap agreement between Nigeria and china  
 5 Olayiwola(2019) also find out the same thing in the study of the impact of the  
 6 currency swap between china and Nigeria on the Nigeria exchange rate of Naira  
 7 to Dollar. The study also concluded that the efficiency frontier formula  
 8 constructed by the study based on the mean square error model(MSE) used to  
 9 justify the efficiency of the MPPP.

## 12 **Recommendations**

14 Based on the findings and conclusions above, the study offers the following  
 15 recommendations:

17 It is recommended that the MPPP be used in the Nigeria monetary policy  
 18 formulation. It is also recommended that the MPPP exchange rate used be  
 19 considered by the monetary policy authority of Nigeria in exchange rate  
 20 determination. This study further recommends that MPPP generated exchange rate  
 21 should be used to promote Nigeria local production and to bring growth and  
 22 development to the real sector. In addition, it is suggested that that MPPP should  
 23 form the bases of redenomination of the Nigeria currency to foster economic growth  
 24 and development as this will encourage inflow of foreign investment. Finally,  
 25 Nigeria should rethink the model for computing the nation's current exchange rate  
 26 along the MPPP model instead of over reliance on the market force that could be  
 27 subjected mostly to the invisible hands theory espoused by Adam Smith.

## 30 **Suggestion for Further Study**

32 This study covered only limited period due to time and scarcity of data and it  
 33 only covered the relationship between Nigeria naira and USA Dollar. A further  
 34 study could be carried out to cover a longer period and also the study could be  
 35 extended to other nations. In this study only three basket of products was  
 36 considered, a further study could be done with expanded basket of products.

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