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The Exchange Rate Determination in Nigeria: The Purchasing Power Parity Option

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Abstract
Exchange rate determination in Nigeria has gone through many changes since 1986. The increasing demand for foreign exchange and the inability of the exchange control system to determine a realistic exchange rate for the Naira prompted the switch over to floating rate system in 1986. However, in spite of this reform, a realistic exchange rate has not been found for naira and presently naira is undervalued. This study tested the validity of the purchasing power parity (PPP) either as a compliment or an option to the present floating exchange rate system. *The study used ordinary least square* multiple regression *method and* time series secondary data for the data analysis. The time series secondary data used for the study were tested for stationarity and co-integration and were processed by an E-view for windows econometric packages. The multiple regression results confirmed the validity of purchasing power parity (PPP) as the better option for the determination of exchange rate and the realistic value of naira. The study suggested the need for the Central Bank of Nigeria to dump the floating exchange rate system and opt for the purchasing power parity (PPP) system of exchange rate determination.

Key Words: Floating Exchange Rate, Fixed Exchange Rate, Purchasing Power Parity (PPP), Structural Adjustment Programmes (SAP), Foreign Exchange Market (FEM).

Introduction

Exchange rates have become unfavorable to Nigeria as a result of using the floating foreign exchange determination system. Prior to 1986 Nigeria was on a fixed exchange rate

determination system. At that time, naira was very strong in reference to dollar. The exchange rate was one naira to one US dollar i.e. N1=$1. The increasing demand for foreign exchange and the inability of the exchange control system to evolve an appropriate mechanism for foreign exchange allocation in consonance with the goal of internal balance makes it to be discarded in September 26, 1986 while a new mechanism was introduced under the Structural Adjustment Programmes (SAP). The main objectives of the new exchange rate policy were to preserve the value of the domestic currency, maintain a favourable external balance and the overall goal of macroeconomic stability and to determine a realistic exchange rate for the Naira.

Since 1986 when the new exchange rate policy has been adopted, however, exchange rate determination in Nigeria has gone through many changes. Before the establishment of the Central Bank of Nigeria in 1958 and the enactment of the Exchange Control Act of 1962, foreign exchange was earned by private sector and held in balances abroad by commercial banks that acted as agents for local exporters. The boom experienced in the 1970s made it necessary to manage foreign exchange rate in order to avoid shortage. However, shortages in the late 1970s and the early 1980's compelled the government to introduce some ad hoc measures to control excessive demand for foreign exchange. However, it was not until 1982 that a comprehensive exchange controls were applied. These lists include the fixed exchange rate, the freely floating and the managed floating system among others.

In an attempt to achieve the goal of the new exchange rate policy, a transitory dual exchange rate system (First and Second –Tier – SFEM) was adopted in September, 1986, but metamorphosed into the Foreign Exchange Market (FEM) in 1987. Bureau de change was introduced in 1989 with a view to enlarging the scope of FEM. In 1994, there was a policy reversal, occasioned by the non-relenting pressure on the foreign exchange market. Further reforms such as the formal pegging of the Naira exchange rate, the centralization of foreign exchange in the CBN, the restriction of Bureau de change to buy foreign exchange as an agent of CBN etc. were all introduced in the foreign exchange market in 1994 as a result of the volatility in exchange rates.

Still, there was another policy reversal in 1995 to that of "guided deregulation". This necessitated the institution of the Autonomous Foreign Exchange Market (AFEM) which later metamorphosed into a daily; two ways quote Inter-Bank Foreign Exchange Market (IFEM) in 1999. The Dutch Auction System was reintroduced in 2002 as a result of the intensification of the demand pressure in the foreign exchange market and the persistence in the depletion of the country's external reverses. Finally, the wholesales Dutch Auction System (W-DAS) was introduced in February 20, 2006. The introduction of the WDAS was also to deepen the foreign exchange market in order to evolve a realistic exchange rate of the Naira.

In summary, the numerous methods of exchange regimes practiced in Nigeria hitherto include the extreme case of fixed exchange rate system, freely floating regime, adjustable peg, crawling peg, target zones, managed float and so on. A fixed exchange rate regime entails the pegging of the exchange rate of domestic currency to a unit of gold, a reference currency or a basket of currencies with the primary objectives of ensuring a low rate of inflation. This induced an overvaluation of Naira and was supported by exchange control regulations that engendered significant distortions in the economy. The major drawback of the fixed regimes, however is that it implies the loss of monetary policy discretion or independence. The floating exchange rate regime, on the other hand implies that the forces of demand and supply will determine the exchange rate. This regime assumes the presence of an invisible hand in the foreign exchange market and that the exchange rate adjusts automatically to clear any deficit or surplus in the market. Again, the disadvantages of the freely floating regime have been documented. These include persistence exchange rate volatility, high inflation and transaction cost. Under the managed floating regimes the government intervenes in the foreign exchange market in other to influence the exchange rate, but does not commit itself to maintaining a certain fixed exchange rate or some narrow limit around it. The Central bank only "get its hands dirty" by manipulating the market for foreign exchange. Again this could not solve the problem as naira is now being undervalued.

However, in spite of these different methods of determining exchange rate, a realistic exchange rate has not been found for naira because the existing exchange rate systems had continued to widen the gap between the official and the parallel markets and had failed to prevent disequilibrium in the foreign exchange market. It has also failed to ensure stability of the exchange rate as well as maintaining a favorable external reserve positions and consequently ensure external balances. In addition, the various exchange rate systems in used in Nigeria had also failed to eliminate or reduces the incidence of capital flight and the power to correct the sky rocketing Naira exchange rate has been missing. Therefore, what an unfavorable movement in exchange rates meant is a movement in current exchange rates away from mint parities in the direction of specie-export points. This is a lower exchange value for Nigeria.

1.1 The problem and the objective of the study.

The exchange rate between naira and other currencies of the world especially dollar is now very volatile. It fluctuates on weekly, daily and even on hourly basis and there is no limit to its variability. This fluctuation has made naira to be very unstable and its value reduced to the barest minimum. This problem of exchange rate variability became too disturbing after the emergence of the generalized floating system in the early 1970's. It was not however surprising that six different systems were tried between 1986 and 2008. Between 1986 and 1989, the average pricing system, marginal pricing system and the Dutch Auction System

were used while the Interbank Foreign Exchange Market (IFEM) system was in place between 1989 and 1990. This was replaced by the re-introduction of the Dutch auction system which was tested till March 1992 when a new system based on the interbank foreign exchange market was instituted. Finally, the wholesales Dutch Auction System (W-DAS) was introduced in February 20, 2006. The introduction of the W-DAS was also to deepen foreign exchange market in order to evolve a realistic exchange rate for the naira. Although the naira firmed up at the end of 1986 relative to its position at the beginning of the second-tier market, the fluctuation from one bidding session to another was large. The Central Bank of Nigeria actually had to intervene on two occasions in order to moderate the amplitude of fluctuation in the exchange rate.

The frequency with which new exchange rates were introduced and changed and the intermittent intervention of the Central Bank is informed by the determined effort of the monetary authorities to un-relentlessly combat the un-abating depreciation and instability of the naira exchange rate. In addition to the generalized floating exchange rate system, a number of other factors have contributed to the dwindling fortune of Naira. These includes weak production base and undiversified nature of the economy; import dependent production structure; sluggish foreign capital inflows; unguided trade liberalization policy; over reliance on the imperfect market system, weak balance of payment position, loss of monetary policy and more importantly, poor foreign exchange management system. (Obadan, 2001).

This undesirable phenomenon has sparked off the emergence of serious theoretical and empirical studies on the exchange rate determination that dominated the literature of recent. The research community has however, casted doubts both on the validity and adequacy of these various exchange rate determination systems ever tried in history. Some of the authors that have researched this area found that the floating exchange rate system alone can not determine the realistic value of naira. Their findings suggested the need to compliment the floating exchange rate system with purchasing power parity. For instance, Cassel (1916) opined that the nominal exchange rate should reflect the purchasing power of one currency against another. His proposal was that a purchasing power exchange rate existed between any two countries, and it is measured by the reciprocal of one country's price level against another. He wrote that: "at every moment the real parity between two countries is represented by this quotient between the purchasing power of the money in one country and the other. It is however instructive to test the validity of the purchasing power parity either as compliment or an option to the present floating exchange rate system. This forms the background and the objective of this study.

2 Literature Review

Purchasing power parity constitutes one of the fundamental building blocks in modeling modern theories of exchange rate determination. The origin of purchasing power concept has been traced to the 16th century Salamanca School of Spain. During the nineteenth century, classical economists, like Ricardo, Mill, Goshen and Marshall endorsed and developed more or less qualified PPP views. According to Rogoff (1996), the theory, in its modern form, is credited to Gustav Cassel, a Swedish economist, who developed and popularized its empirical version in the 1920s. Cassel (1916) opined that the nominal exchange rate should reflect the purchasing power of one currency against another. His proposal was that a purchasing power exchange rate existed between any two countries, and it is measured by the reciprocal of one country's price level against another. Aghevli (1991) shared a similar view and posited that the central tenet of the PPP is that the equilibrium exchange rate is proportional to the relevant purchasing power parity of national currencies involved. In the same vein, Hakio (1992) observed that the Purchasing power parity is predicated on the law of one price which holds that identical goods should cost the same in all countries, assuming transportation costs are eliminated and tariffs and quota restrictions are removed. Still, author such as Davaranja et al (1993), had strengthen the views of the above commentators by adding that the purchasing power parity concept is not just only about the equalization of the relative prices of goods. It goes beyond that. For instance, Davaranja et al (1993) define the equilibrium exchange rate in terms of the relative prices of traceable and non traceable.

In his own contribution, Isard, (1995) argued that, as long as anything likes free movement of merchandise and a somewhat comprehensive trade between the two countries takes place, the actual rate of exchange cannot deviate very much from this purchasing power parity". However for free trade to take place, Taylor (1988) gave certain condition. According to Taylor (1988), the condition for free trade is that the nominal exchange rate between two countries should be equal to the ratio of the price levels in the two countries. This approach assumes that equilibrium real exchange rates remain constant over time and therefore, the nominal exchange rate movement tends to offset relative price movements. This view was supported by Baldwin and krugman (1989); Dixit (1989) and krugman (1990). However, despite the law of one price assumption and the condition given by Taylor (1988), Froot and Rogoff, (1995) and Rogoff (1996) argued that due to the existence of trade barriers and transportation costs that drive a wedge between prices in different countries, the law cannot hold exactly. According to Rogoff (1996), the wedge depends on the tradability of the goods. For goods, which are highly traded, such as gold, the law holds quite well, whereas for non-traded goods such as big maces, factors such as non-traded inputs, value-added taxes and profit margins militate against the law. This stance was also corroborated by Taylor (1988) and Taylor and McMahon (2003) who pointed out that the relation between exchange rates and prices described by Purchasing Power Parity can be weaken by many factors such as non traded goods, transaction cost and

price-level measurement errors associated with aggregation and index construction. Although, controversies exist over which index should be used for Purchasing Power Parity calculations.

Discussing the measurement of the Purchasing Power Parity along this line, Edison (2002) disagreed with the above view and argued that no attempt has been made to compare identical baskets of goods. Instead, Froot and Rogoff (1995) opined that different countries' consumer price indices (CPIs) and wholesale price indices (WPIs) are used. The use of these indices to test for absolute PPP (APPP) can most definitely lead to results not supporting this version of the theory. This is because different countries use different compositions of goods in the baskets for constructing price indices. Also, since the weights assigned to goods are not necessarily standard, this makes it less likely that Absolute Purchasing Power Parity measured in this way will hold.

Chinn (2000) was concerned with why deviations from the purchasing power parity occur by stating several reasons. First, he opined that there may be restrictions on trade and capital movements, which will distort the relationship between domestic and foreign prices. Secondly, speculative activities and official intervention may create a Purchasing Power Parity disparity. Thirdly, the productivity bias when there is a relatively faster productivity growth in the tradable sector than the non-tradable sector will result in systematic divergence of internal prices. Lastly, he stated that the prices are sticky and do not move rapidly enough to offset frequent changes in nominal exchange rates. In support, Engel and Rogers (1996), (1998) and (1999) have shown that although "border effects" do matter, a very large share of deviations from parity across countries is accounted for by the effect of currencies, that is, by nominal exchange rate volatility. In their contribution, they explain that many countries undertake corrective measures of their exchange rates based on inflation differentials with partner countries. While fundamental equilibrium exchange rates (FEERs), derived from medium term internal/external macroeconomic balance conditions, are becoming more and more attractive for detecting misalignment in a country's real exchange rate, PPPs remain much easier to compute.

The importance of time for commodity arbitrage has also been stressed in literature. Pippenger (2004) argued that commodity arbitrage takes place across time as well as space. Because arbitrage takes time, the theoretical exchange rates and the commodity prices in the law of one price are forward or futures prices, not spot prices. Since the modern theory of purchasing power parity rests on the modern theory of the law of one price, the theoretical exchange rates and commodity prices in PPP are also forward or futures prices.

Relative Purchasing Power Parity has been tested in a large number of studies, and some empirical evidences strongly believe that PPP is not a valid hypothesis about the relationship between nominal exchange rates and national price levels in the short term. However, most monetarists opined that deviations from the PPP frequently occur in the short- run. For example, Dornbusch [1980] and Frenkel [1978] found evidence against PPP in the short-run. In contrast, the existence of PPP in the long-run, although widely researched, has produced mixed results in the extant literature. For instance, Abuaf and Jorian [1990], Darby [1983], Baillie and Selover [1987], Meese and Rogoff [1988], Mark [1990] and Hakkio [1984] found evidence of PPP in the long-run. In contrast, Cooper [1994], Messe and Singleton [1982], and Ahking [1997] found evidence against PPP in the long-run. Meese and Singleton [1982] marked the turning point in the investigation of PPP. Empirical testing has, nevertheless, shown that the PPP hypothesis may, even in the short term, have considerable validity during hyperinflations or other periods of very large changes in price levels.

The main argument against the validity of long-term PPP comes from the structural models of inflation. Balassa (1964) made an important contribution to the development of these set of arguments. In the long term, PPP has, nevertheless, received considerable empirical support. Flood and Taylor (1996) shows that cross-sectional data yields very high correlations between changes in nominal exchange rates and relative national price levels over 10- or 20-year horizons. A number of studies from the mid 1980s and onwards have also tested if divergence from PPP between national price levels can be explained in terms of the Balassa-Samuelson effect. The literature does, however, not provide a unanimous agreement on how to interpret the evidence. Froot and Rogoff (1995) argued that the Balassa-Samuelson effect may be relevant in the medium term, but that the spreading of knowledge, together with the mobility of physical as well as human capital, generates a tendency toward absolute purchasing power parity over the very long run.

Wang (2000) in another study using monthly data during the current float, examined PPP for seven Asian countries (Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, and Thailand) against the U.S. Using Johansen long run model, it was found that a long run relationship hold but could not accept the symmetry and proportionality restrictions. In another development, Doğanlar (1999), using quarterly time-series data from 1980 to 1995 for India, Indonesia, Pakistan, Turkey, and the Philippines accepted the long run relationship in the specified model.

Baharaumshah and Ariff (1997 used annual data to tests the absolute version of PPP for five Asian countries: Indonesia, Malaysia, the Philippines, Singapore, and Thailand. The main finding of the paper is lack of stationarity in the real exchange rate for all countries except Singapore.

Beginning with simple regressions in 1970s, studies on PPP now employ more complex approaches to look into data for evidence on PPP. Researchers have examined alternative approaches towards achieving this goal including unit root testing of real exchange rates, co integration procedure and long span studies. MacDonald (1996), Frankel and Rose (1996), Coakley and Fuertes (1997) are few examples that use panel data approach. Most of the studies in this approach report results in favor of PPP. For example, Frankel and Rose (1996) were able to reject the random walk null in a large sample of 150 countries over the period of 1948–1992. The recent studies that use panel data to test for PPP include, MacDonald (1996), and Coakley, Kellard and Snaith (2005). Finally, most of the studies in the literature tested the purchasing power parity for developed countries with little or no attention been paid to the developing countries. Although there are many works on exchange rate in Nigeria, (to the best of our knowledge) research based on the Purchasing Power Parity as an option to evolving a realistic exchange rate is lacking. Thus, this approach will allow studying exchange rate from a new perspective and will contribute to the empirical literature.

3 Methodology and Materials

This section address the issues that relate to the methodology of the study with emphasis being laid on the choice of the research design and strategies, data requirements and sources, the nature and type of data collected, the data processing and the parameters to be estimated. The section also specifies the model designed to test the hypothesis of the study. Vital concepts and terms used will be defined and described for the purpose of giving the readers a deep insight into the phenomena under study.

3.1 The Hypothesis:

The study verifies the null hypothesis stated below:

1. Ho: purchasing power parity (PPP) is not a valid exchange rate determination system for Nigeria.

3.1.1 The Research Design and Strategies

The study uses experimental research design approach for the data analysis. Under this approach, the theoretical consideration (a *priori* criteria) is combined with the empirical observation and extracts maximum information from the available data. It enables us to observe the effects of explanatory variable (Domestic prices and the foreign price level) on the dependent variable (Nominal exchange rates).

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3.1.2 The Model

The version of the monetary model used in the study is similar to that of Isard (1977) and Richardson (1978) formulations but with little modifications. This model is based on the following assumptions:

i. All goods are tradeable
ii. There is zero transport cost
iii. No barrier to trade.
iv. Prices in the good market are flexible
v. Foreign prices are exogenous to the domestic economy
vi. There is perfect homogeneity of domestic and foreign prices.

Combining these assumptions, the model can be derived mathematically as follows:

Following the law of one price, free trade must lead to equal prices across countries (Isard, 1977). In this context, for any good i we have

$P_t(i) = P^*_t(i).\ E_t$ …… (1)

Where:

$P_t(i)$ = the price of good *i* in terms of domestic currency in period t,
$P^*_t(i)$ = the analogous price in foreign currency, and
E_t = the price of one unit of foreign currency in terms of domestic currency in period t.

The simple arbitrage-in-the-goods-market argument underlying the "law of one price" has in fact given rise to a number of derivations of PPP, which is formulated in one of two alternative ways: absolute PPP and relative PPP.

The absolute version of PPP may be presented in the following manner:

$P_t(CPI) = P^*_t(CPI).\ E_t$ …… (2)

Where:

CPI =the basket of goods employed in the construction of a consumer price index.

In its absolute version, PPP implies that one unit of currency, after conversion, should purchase the same baskets of goods both at home and abroad. Naturally, even if the "Law of One Price" holds, we are not sure that condition (2) holds, unless both countries consume identical baskets of goods.

With the goal of allowing for the existence of a constant price differential between the two baskets of goods, the empirical literature has also tested the relative version of PPP. Taking logs and defining the variables as rates of change, relative PPP may easily be obtained from expression (2):

$\Delta p_t(CPi) = \Delta p_t^*(CPi) + \Delta e_t$ ……**(3)**

Where lower cases denote the log of the original variables such that;

Δp_t =log of domestic price at period at period t

$\Delta p_t{}^*{}_{=}$ the log of foreign price at period t

$\Delta e_{t\,=}$ the log of exchange rate at period t.

The relative version of PPP requires movements in the relative price levels to be offset in the same period, by movements in the exchange rate.

To simplify the notation, we may write P, P* and E instead of P_t (cpi), P^*_t (cpi) and e_t, respectively and obtain the definition of the real exchange rate (R) from expression (2) such that:

$$R = \frac{E.P^*}{P} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (4)$$

Rogoff (1996) contends that in the long-run the real exchange rate should equal to one, such that, given enough time for price movements to be transmitted to the exchange rate, domestic and foreign prices are identical when expressed in terms of the same currency.

However, the construction of the price indices does not usually assign the same weight to each good, nor is the quality of those goods the same in different countries. Besides, recent theories of international trade are based on differentiation, either on the demand side or on the supply side. These theories imply added difficulties for the construction of comparable price indices.

Thus, there is widespread agreement that the long-run equilibrium level of the real exchange rate assumed to be the one implied by PPP, is not always correct, but may be obtained by including a constant *K* that depends on the base year of the price indices that is:

$$R = \frac{E.P^*}{P.K} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. \quad (5)$$

Where:

R=real exchange rate.

K=constant.

By taking the logs, and making the lower case the log of the original variables, we have:

$$r = e + p^* - p - k \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(6)$$

Where:

r= log of the real exchange rate.

The value of K is determined by a set of factors that affect in different ways different countries and thus prevent prices to equal foreign prices after converting to the same unit of account. One of the factors that affect the value of K is the policy maker’s commitment to fight inflation.

In all of these cases, not taking account of the change in K may result in a rejection of the theory of PPP. However, even if we take that into account, deviation from PPP may occur as a result of the fact that what determines K is a function of other elements.

Empirical papers on the issue of determining the equilibrium long-run value of the real exchange rate implicitly use the relative version of PPP. But some authors, such as Edison (1987), MacDonald (1995) consider still another unrestricted version of PPP, which may be expressed by means of a price function.

$$P = \beta.E^{\alpha t} (P^*)^{\alpha 2} \quad \ldots\ldots\ldots\ldots\ldots \quad (7)$$

The reduced equation for the above will appears as:

$$P = \alpha_0 + \alpha_1 e + \alpha_2 p^* + u_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

Re-arranging equation (8) we have:

$$e = \alpha_0 + \alpha_1 p + \alpha_2 p^* + u_i \ldots\ldots\ldots\ldots\ldots\ldots (9)$$

Where: u_i represents the error term.

α_0 = the intercept of the function

α_1 = the coefficient of the exchange rate

α_2= the coefficient of the foreign price level.

e= Nominal exchange rate.

P= Domestic Price (Nigerian Consumer Price index).

p*=Foreign Price (United State Consumer price index)

Equation (9) shall be estimated in the course of this study.

The *a priori* expectations of the coefficient are:

$$\alpha_0 > 0, \alpha 1 > 0, \quad \alpha_2 < 0$$

In theoretical terms, there is going to be a positive relationship between the real exchange rate and the domestic price level. In other words, any increase in the domestic price is expected to lead to an appreciation of real exchange rate. However, it is expected that a negative relationship will hold between the real exchange rate and foreign price. Any real increase in the foreign price level will result into a shortage and cause the real exchange rate to depreciate.

3.1.3 Data Requirement, Sources and Processing

Given the nature of the model, it is imperatives that the data that will permit the estimation of the stochastic equations representing the empirical test of Purchasing power Parity option of exchange rate determination has to be collected. These include Nominal exchange rate, domestic price level and the foreign price level data.

Time series data were used in the study and they are entirely secondary data. The data series covered the period between 1986 and 2010. The data were obtained from Central Bank of Nigeria (CBN) and the Federal Bureau of Statistic (FBS). The model is estimated

on the yearly data of naira per U.S. dollar rate for the period 1970-2008.The secondary data used for the study will be estimated using multiple regressions combined with error correction mechanism. The data shall be processed through the ordinary least square (OLS) estimation technique. Unit root test shall be conducted to test the stationarity of the time series data used in the study. Beside, the study shall employ co-integration and error correction mechanism to overcome the problem associated with non- stationary time series data. These packages are suitable because they are time efficient, not biased and more importantly, it add richness, versatility and flexibility to the econometric modeling and it integrates the short run dynamics with the long run equilibrium.

4 Data Analysis and Interpretation of Results

Table 2: unit root test

Variable	Integration	No of lag	Critical value	ADF test	Remark
NEXCR	1(2)	3	3.0114	4.958548	stationary
DPRIC	1(2)	3	3.0114	3.28456	Stationary
FPRIC	1(2)	3	3.0114	3.352416	stationary

The stationary of the unit root test in table 2 above shows that all the variables were stationary in their second difference. Since the Augment Dickey Fuller test statistics of each variable was greater than their 95% critical value in absolute terms.

Following this, the test for co-integration was performed using the Johansen Maximum likelihood estimation approach. Under this approach, the trace test statistic was used in testing whether a long run equilibrium relationship exist among the variables. If this test established that at least one co integration vector exist among the variable under investigation, then a long term equilibrium relationship exist among them. The co integration test result is presented below in table 3

Table 3: The Co- integration Test Result

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesizd No. of CE(s)
0.746566	44.97138	29.68	35.65	None **
0.376259	12.02776	15.41	20.04	At most 1
0.028716	0.699272	3.76	6.65	At most 2

The result from table 3 shows that there is a co-integration vector in the function and hence we can conclude that a long run relationship exist between Nominal exchange rate, domestic price and foreign price level.

4.1 Regression Results and Discussions

The result of the equation estimated to test the validity of the PPP is presented in the table 4 below:

Table 4 : Regression Results.

Dependent Variable: NEXR
Method: Least Squares
Date: 09/19/07 Time: 12:02
Sample(adjusted): 1990-2010
Included observations: 21 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-884.3901	210.4017	-4.203340	0.0009
DPRIC	13.65192	3.101675	4.401467	0.0006
DPRIC(-2)	-15.07017	5.739768	-2.625572	0.0200
DPRIC(-3)	7.769292	4.820888	1.611589	0.1294
FPRIC	-0.340761	0.254996	-1.336336	0.2028
FPRIC(-1)	-3.058787	0.836708	-3.655739	0.0026
ECM(-1)	0.770419	0.197108	3.908610	0.0016

R-squared	0.891683	Mean dependent var	62.31905
Adjusted R-squared	0.845262	S.D. dependent var	55.42304
S.E. of regression	21.80163	Akaike info	9.263048

		criterion	
Sum squared resid	6654.357	Schwarz criterion	9.611223
Log likelihood	-90.26201	F-statistic	19.20843
Durbin-Watson stat	2.348956	Prob(F-statistic)	0.000005

4.1.1Statistical significance of the parameter estimates.

The statistical significance of the parameter estimate can be verified by the correlation coefficient of the parameter estimate i.e. the adjusted R -squared, the standard error test; the F- statistics test and the Durbin-Watson statistics.

i. The value of adjusted R-squared (R^2) for the model is fairly high and is pegged at 0.845262 which implies that both Domestic price and foreign price explained about 84 percent systemic variations on the nominal exchange rate. The remaining 16 percent could be attributed to some other forces affecting exchange rate outside the model.
ii. The standard error test revealed that the parameter were statistically significant. It was discovered that the standard error of the variables were less than half of their co-efficient. For instance, the standard error for domestic price which stood at 3.101675 is less than half coefficient of the variable which is 6.82596. This shows that domestic prices were statistically significant in explaining the model. Again, the standard error for the foreign price (lagged once) is 0.836708 is less than half coefficient of the variable (i.e 3.058787) which stood at 1.5293935. This again shows that this variable is statistically significant.
iii. The F- statistic of 19.20843 shows the overall significance of the model and this indicates that collectively, both the Foreign Price and the Domestic price are important determinant of real exchange rate.
iv. The value of Durbin Watson is 2.348956 for the model. This falls within the determinate region and this implies that the model is free from autocorrelation problem.

In summary, since all the econometric test applied in this study show a statistically significant relationship between the dependent and independent variables from the model, thus, we accept the alternative hypothesis which states that: purchasing power parity (PPP) is a valid exchange rate determination system in Nigeria.

4.1.2 The Theoretical Significance of the Parameter Estimate.

Table 4 above reported the ordinary least square multiple regression results. The result indicates that domestic price has positive coefficient and it is statistically significant. This result suggests that a direct relationship exist between domestic price and nominal exchange rate in Nigeria. It further indicates that 1 unit increase in domestic price level will cause nominal exchange rate to appreciate by 136 units. This result is in accord with our a priori proposition. The foreign price level is correctly signed but not statistically significant in the short run. However, it is correctly signed and also statistically significant in the long run. This result suggests an inverse relationship between foreign price level and the Nominal Exchange rate. It implies that an increase in the foreign price (U.S consumer price index) over the years had negatively affected the nominal exchange rate. It shows that 1 dollar increase in the foreign price level has actually caused the Nominal exchange rate to depreciate by 34 naira. Again, the value of the coefficient of foreign price shows a correct sign which is in consonance with the *a priori* expectations.

5 Summaries and Conclusion.

This paper tested a long run version of the purchasing power parity model of exchange rate determination. Empirical analysis was conducted by applying the multiple regression of the ordinary least square technique to the annual data on the Nigeria economy for the period 1986-2010.The model was found to be significant and most of its estimates are as expected. In conclusion, the empirical result of this study shows that a long run relationship exist between exchange rate and the relative price on the basis of Nigerian data. This was established through the unit root tests which showed that the series applied in the study are differenced stationary while the residuals are trend stationary. The study thus confirmed that the purchasing power parity (PPP) approach provides a useful benchmark for analyzing the process of exchange rate determination in a less developed country like Nigeria. In other words the findings confirmed the validity of purchasing power parity (PPP) as the better option for the determination of exchange rate. The purchasing power parity (PPP) is able to determine the realistic value of naira if adopted. The results suggested the need for the Central Bank of Nigeria to dump the floating exchange rate system and opt for the purchasing power parity (PPP) system of exchange rate determination. This evidence should thus serve as a cornerstone for the future conduct of monetary and exchange rate policies in Nigeria and in all Less Developed Countries of the world.

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