



## Does Arbitrage Opportunity Occur in the Foreign Exchange Market? Evidence from Nigeria

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### Abstract

The study has examined arbitrage opportunity in the Nigerian foreign exchange market. Ex-post facto and descriptive research designs were employed in this study. For the purpose of brevity, the Central Bank official dollar to naira exchange rates were examined for the month of May 2017 with the aim of ascertaining the arbitrage gain arising from the trade in the market and given that the investor has a quantum of investible funds to transact with. Findings made revealed that arbitrage gain arises in transactions in the Nigerian foreign exchange market. Investors/traders profit from the market if they have enough funds to trade with. Intuitively, the arbitrage gain prevalent in the informal FX market, the parallel exchange, is significantly high in Nigeria. The activities of the Bureau De Change and lopsided and politically influenced policies of successive government in Nigeria have continued to cause the somewhat arbitrarily arbitrage gains/opportunities in the Foreign Exchange market in Nigeria. This study therefore recommends that investors with idle funds should take advantage of investing and optimizing the arbitrage opportunities in the FX market. More studies should be carried out in the security market to empirically determine arbitrage opportunities/ gain in Nigeria.

**Key words:** Foreign Exchange Market, Arbitrage, Law of One Price, Arbitrageurs

**JEL Classification:** G12

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### Introduction

Arbitrage is central to financial economics. The dynamics of trade in the financial market makes arbitrage a peculiar area in financial studies. The role of arbitrageurs, that is, those who take advantage of arbitrage opportunity in financial markets no doubt is undeniable. Arbitrage is governed by the existence of one price law. The law of one price implies that identical securities are expected to have uniform price irrespective of how they occur particularly in a market that is efficient. In financial market reality, invasion of one price law due to market inefficiency and lack of market transparency appears to cause arbitrage opportunity to exist. The existence of arbitrage

opportunity could be risky in that it could attract transaction cost or risk – free rate. That is, attracts no transaction costs. In financial market reality, there is hardly an arbitrage opportunity without transaction costs. Operators in financial market do lose the motivation to expect occurrence of arbitrage opportunity under arbitrage paradox. Arbitrage paradox as propounded by Grossman and Stiglitz (1976, 1980) is a condition where arbitrage is continually absent in any financial market.

In face of recent proliferation of technological advancements, unstable foreign exchange policies in most countries' financial market, exploitation of arbitraging opportunities has become increasingly popular (Roman & Wing, 2013). In market for foreign exchange, exchange rates may be inconsistent perhaps due to systematic factors and/or unhealthy market practice like infiltration of the parallel market deepening and participants. In the case of the Nigeria for instance, foreign exchange market, particularly the parallel markets trade in foreign currencies in triangular arbitrage. Triangular arbitrage may be regarded as a situation where a particular exchange rate is sold and bought in dissimilar prices, a direct price, official price and an indirect parallel market price with other currencies. In Nigeria, this has been the occurrence in the parallel market where prices of exchange rate differ significantly from the official exchange rates. From the foregoing, skillful arbitrageurs could make high profits if they have large quantum of funds to trade with under the market for foreign exchange. Arbitrage profits might potentially be made by buying the lower of the two and selling the higher of the two simultaneously in the parallel markets. Although the activities in the parallel exchange markets are unofficial and unregulated, arbitrage opportunities appear to exist highly. The arbitrageurs in the foreign market infiltrate the market through Bureau De change, parallel market and make huge arbitrage profits daily.

There have been calls severally on the Central Bank of Nigeria to curtail the arbitraging in the black market, yet this has not yielded the desired results. The effect of investors seeking for gain in arbitrage business in the foreign exchange market has contributed greatly to the naira crash and engendered macro-economic volatility in the Nigeria economy especially in recent year. One of the reasons the parallel market is infiltrated by financial markets hoodlums trading in foreign exchange is the absence of limit order book defining quotes and prices. Limit order book could be seen as the rates at which currencies are convertible and sellable. In the Nigerian context, there are little or no empirical evidences on arbitrage opportunity in the foreign exchange market, hence this study seeks to bridge the gap. It further seeks to examine the arbitrage opportunities in the Nigerian foreign exchange markets with a view to contributing to literature in this area of research in finance.

## Literature Review

### Conceptual Clarification

In foreign exchange arbitrage, foreign currency is bought where its price is low and sold where the price is high. Another form of arbitrage is interest arbitrage. Interest arbitrage is the transfer of liquid funds from one financial currency to be received upon maturity of the investment. Arbitrage operation is made possible due to the existence of forward markets for currency and regular capital markets in which funds may be lent or borrowed (Obadan, 1998). Where an investor in one country invests in another country, he may wish to avoid a possible foreign exchange loss in converting the proceeds of his investment in that country upon maturity or he was not interested in making a profit on top of the added interest by country at a more favourable rate. In this case, the investor would enter into a forward contract. By doing so, he would obtain a 'forward cover' for the subsequent conversion of the proceeds of his investment in the foreign

country. This type of transaction is referred to as covered interest charge. The factors that determine whether or not an investor will find arbitrage operations attractive include interest rate levels, spot and forward exchange rates, transaction costs, the investor disposal towards investment in other countries and liquidity (Obadan, 2012).

## Foreign Exchange

Foreign exchange market is an aspect of the financial system of a nation. Foreign exchange market is a market where national currencies are traded the same way and manner goods are sold and bought in the commodity or stock market. It is a market where the currencies of two or more different countries are sold and bought. For example, the US dollar is traded against the naira in Nigeria in the foreign exchange market. The demand and supply of different countries' currencies usually brings about increase in exchange rates. The foreign exchange market consists of sellers (suppliers) and buyers (demanders) of foreign currencies.

Thus the price in the foreign exchange market is caused mainly by the forces of demand and supply. Basically, the foreign exchange market has no defined geographical location like the market for beans, yams, tomatoes, meats, clothes, cars, among others. Apart from the foreign exchange market is a market for international transactions with convertible currencies; it is a market for hedging, arbitraging, speculation, among others. It is different from domestic trade. In domestic trade, a nation's own currency is used to make payment for goods and services. While in international trade, foreign currencies are used to effectuate the payment for goods and services. The volume of trade in the foreign exchange market no doubt influences the economic activities in a country and also enhances the growth, given that all other factors are held constant.

In the foreign exchange market, foreign exchange is the basis of trading. Foreign exchange is used loosely as foreign currency or exchange rate. Foreign exchange facilitates international trade and payments. By simple definition, foreign exchange is the process whereby a foreign exchange trader gives one currency in exchange for another currency in attempt to pay for importation or exportation of goods and services or other foreign payments. Every country has its own currency which it trades with other country's currency. For instance, Britain uses the pound sterling; the U.S uses the dollar, Nigeria uses the naira, Ghana uses the cedi, Japan uses the Japanese yen, Germany uses the Deutschmark. If an importer wishes to buy goods from the United States of America, he will need to convert the naira to dollar in the foreign exchange market. The same goes for an America trader who wants to buy goods in Nigeria. He will first require to convert U.S dollar to naira equivalent.

Foreign exchange consists of convertible and non-convertible currencies. Convertible currencies are mainly the basis of trade among different nations of the world. These convertible currencies are commonly used for international trade settlement. They are also called hard currencies. Examples of convertible currencies are the U.S dollar, European euro, the Canadian dollar, French franc, the Japanese yen, the Germany Deutschmark and British pound sterling. An individual, firm or government doing international transactions with other nations must first convert these hard currencies into the importing or exporting country currencies. Among these key foreign currencies, the U.S dollar is the most dominant because of the strength of the United States of America economy in addition with the high confidence of international investors on the economy. Non-convertible currencies are the Ghanaian cedi, the Nigerian naira, among others. These currencies are not used for trade among different countries of the world. They must first be converted to the U.S dollar, European euro or British pound sterling subject to the agreed currency conversion by the parties involved in the international trade. It is rare for lesser currencies to

be used to carry out international transactions. The Nigerian naira and Ghanaian cedi cannot be used to pay for international transaction due to their lesser value. However, they have to be converted to a dominant currency like the U.S dollar. At first the naira may be converted to the U.S dollar and then to cedi. For example, if N400 is exchanged for \$1.0 and 80 cedi for \$1.0, the cross exchange rate between the naira and cedi is  $400/80 = 5$  naira. This suggests that there is N5.00 to one cedi.

## Exchange Rate

Exchange rate may be seen as the price of one currency in terms of another. Imagine, exchanging one U.S dollar for three hundred and sixty naira in the Nigerian context. Thus, exchange rate is the basic denominator of transaction in the foreign exchange market world- wide. It is one of the macro- economic variables countries all over the world engage in to influence general economic policy and stability.

There are two types of exchange rates. They are the nominal exchange rate and real exchange rate. The nominal exchange rate (NER) is the price of one currency in terms of another currency. Nominal exchange rate may be seen as the price of the local currency in the context of a unit of foreign currency. The nominal price of one U.S dollar could be four hundred naira in the Nigerian context subject to fluctuation in exchange rate. This quickly reveals the proportion by which the domestic currency in the case of Nigeria has devalued (i.e depreciated) or revalued (i.e appreciated) in the foreign exchange market.

Real exchange rate is the rate by which the currency of a country can be exchanged for another, taking into cognizance the variation in prices and wages existing between the two countries in question. Real exchange rates are especially used to compare the value of currencies between two countries over a given period of time under different inflation rates. Countries that seek to maintain competitive real exchange rate tend to experience better economic performance. The real exchange rate (RER) may be explained as the ratio of foreign price level to the local price level, given that the foreign price level has been converted into domestic currency units through the current nominal exchange rate. Formally,  $RER = (E.P^*)/P$ , where the foreign price level is denoted as  $P^*$  and the domestic price level as  $P$ . A decrease in  $R$  is termed appreciation of the real exchange rate, an increase is termed depreciation.

## Operators in the Foreign Exchange Market

It is worthy to note that the operators in the foreign exchange include Central Bank of Nigeria, dealers, the brokers and Bureau De Change.

### Central Bank of Nigeria

The Central Bank of Nigeria maintains surveillance and keeps record of foreign exchange. CBN always strives to maintain stable and target exchange rate for the purpose of encouraging investment and consequently the performance of the economy. In the context of Nigeria, the CBN manages the foreign exchange supply, foreign exchange reserves, the naira exchange rate as well as uses monetary policy to work side by side with the ministry of finance at influencing the foreign exchange market with effective fiscal policy. Dealers in the foreign exchange market mainly consist of commercial banks. They buy foreign currencies and sell same currencies to customers. They also maintain deposits with correspondent banks overseas. Through this, customers wanting to transact business abroad can liaise with the dealer bank and payments are

made on his behalf electronically. However, the banks charge a commission for services rendered to the bank customer (s). Brokers often act as intermediaries between one bank and another bank in the buying and sale of foreign currency. The job of the broker is to connect a bank with surplus foreign currency to another one with deficit currency for buying and selling purpose. This process is however different in the context of Nigeria where banks deal with each other via the interbank foreign exchange market.

Bureau De Change may be regarded as a licensed body serving as retail foreign exchange dealer. Bureau De Change plays the critical function of ensuring rate convergence between official rate and parallel market rate, providing liquidity in the foreign exchange market towards promoting the Central Bank of Nigeria (CBN) exchange rate stability policy. A Bureau De Change is often found close to a bank, in a travel agent location, railway station and airports as well as anywhere there is likely to be a market for people needing to convert currency for international transaction purpose. A Bureau De Change makes a lot of profit from exchanging of currencies. Charging of commission depending on the volume of currency exchanged could contribute to profit making of the Bureau De Change. The market for Bureau De Change is often regarded as spot market.

In the past in Nigeria, the different auction system like the Retail Dutch Auction and Wholesale Dutch Auction did not yield the desired result. In fact, there was high spike in exchange rate. Later, there was the need to come up with prescriptions to check mate the problem of spike in the foreign exchange market. This then birthed the Bureau De Change in Nigeria in 2006 into the official market. Prior to this period, a gap of about N50 ranging to N60 was observed between the official and parallel market exchange rates. But as soon as Bureau De Change came into the official market, within one month, the rates converged to a difference of only 50 kobo between the parallel market and the official market. The CBN overtime has continued to strengthen the operation of the Bureau De Change (BDC). This effort has engendered BDC to significantly reduce volatility and uncertainty of exchange rates in the foreign exchange market in Nigeria.

For example, in recent times, the dollar has been relatively stable between N360 and N365 even at the parallel market occasioned by the influence of Bureau De Change. This has enabled manufacturers to conveniently order for inventories abroad. Thus far, Bureau De Change has to an extent eliminated currency exportation and speculations which often create opportunities for rent seeking. However, it must be clearly stated here that there are pockets of challenges faced by Bureau De Change in Nigeria. One of these challenges is the unabated multiple exchange rate which often has the propensity to hamper transparency and stability of the foreign exchange market. For instance, there are times the CBN sells exchange rate at N358 to banks and N360 to Bureau De Change per dollar. This largely contributes to poor profitability of the operators. Another factor affecting the success of Bureau De Change is bank charges. Sometimes, banks may buy exchange rate at N358 and sell to Bureau De Change at N361. The N3.00 is a whole lot of profit to banks but big costs to Bureau De Change.

### **The Parallel Market**

In Nigeria, parallel market is also referred to as black market, illegal market, shadow market, hidden market, grey market, among others. In the parallel market, exchange rates are often exchanged at the rate different from what the government has set. Parallel market can simply be defined as an informal market that exists side by side with the official foreign exchange market. Parallel market tends to always distort the regulation and control of exchange rate. For example, the rate at which they sell is not within the government control. Income generated by dealers in

the parallel market is not taxed. Parallel market is an avenue for promoting money laundering and high profile corruption. Exchange of fake hard currency is a major destabilizing factor between operators and customers in the parallel market. In the Nigerian context, parallel market is highly politically influenced and imbued with ethnic politicization. Whatever may be the policy of the monetary authority to eliminate operators of the parallel market could hit the brick. For instance, the parallel market is highly dominant in Nigeria by the Hausas from the northern region. Often times, the presidential candidate and key political positions are zoned to the north. For a northern man who is the president of the country to support CBN policies to quash the parallel market in which the Hausas are dominant operators is tantamount to impossibility. On the flip side, there is the craving support for parallel market in Nigeria. One of the reasons is the inadequacy of foreign exchange to meet the needs of many individuals and business persons. Besides, higher profits are easily made by the operators. In other words, foreign exchange arbitrage opportunity (gain), all things being equal is high in the parallel exchange market. It is also easier for people, especially through western union money transfer and others to exchange foreign currencies to meet their needs.

### **Foreign Exchange Hedging and Speculation**

Hedging is carried out by hedgers. Hedgers are agents usually firms that enter the forward exchange market to protect themselves against exchange rate fluctuations which entails exchange rate risk. Hedging is the act of avoiding or covering a foreign exchange risk (Obadan, 2012). It basically involves the act of purchasing a currency in the forward market in order to eliminate the exchange risk involved in international trade transactions. However, hedging can also take place through the spot market. Foreign exchange speculation refers to the deliberate taking of foreign risk or an uncovered position in the hope of making a profit. It is the opposite of hedging (Obadan, 2012). The speculator has definite expectations about future exchange rates and is concerned about making profit by buying foreign exchange when its price is cheap and selling when it is expensive. If the speculator is right in his expectations, he makes profit but if he is wrong, he incurs a loss. According to Obadan (2012), pure speculation can take place either in the spot or forward market. However, the forward market is usually more attractive to speculators because it is simple and at the same time involves no borrowing of foreign currency or tying up of the speculator's capital or funds.

Obaseki (1997) noted that foreign currency speculation can be stabilizing or destabilizing. It is stabilizing if speculators buy a currency when the rate is below its normal level and sell the currency at a time of high exchange rates. Stabilizing speculation stabilizes the exchange rates in that it moderates or reverses the fall or rise in the exchange rate such that the rate moves to the equilibrium level. Stabilizing speculation prevents the exchange rate from over- or under shooting the equilibrium level. Destabilizing speculation is concerned with the sale of foreign currency when its exchange rate falls in the expectation that it will fall even more or to the purchase of the foreign currency when its exchange rate rises in the hope that it will rise even further. In a situation of destabilizing speculation, the speculator buys not with the hope of selling in the near future when prices rise but to hoard with the expectation that the price will continue to rise. As these speculators are very unlikely to make any profits, their losses will eventually force them to stop their activities.

### **Empirical Literature**

Ritz (2014) examined price differentials and limits to arbitrage with reference to liquefied natural gas (LNG) market in the United States of America using descriptive analysis. Finding



reveals that varying characteristics of the liquefied natural gas (LNG) market do not positively incentivize major participants to be involved in arbitrage trading. The empirical result clearly points out that riskless arbitrage opportunities exist in the market for liquefied natural gas. The research of Marshall, Treepongkaruma and Young (2008) using descriptive statistics reveals the occurrence of arbitrage opportunity in Indian foreign exchange market. The outcome of the research also shows that exploitable arbitrage opportunities in the foreign exchange (FX) market exist in India in the period observed. Gagnon and Kavolyi (2009) examined 39 country domestic stock pairs. The study found the existence of price discrepancies which resulted in adequate arbitrage gain. However, the price discrepancy may be adduced to inefficiency of the stock market under period observed. Roman and Wing (2013) empirical study reveals that when arbitrageurs compete sharply in the market, it limits efficiency. The implication of this is that it could result to bad externalities as a result of the indirect transactions cost of trading and holding cost of inventory. Similarly, Roman and Wing (2013) examined how the size of arbitrage deviation impacts market illiquidity using correlation and descriptive statistics. The study finding indicates a statistically significant relation in which the deviation is positively correlated with measures of market illiquidity. Their empirical results support the work of Roll, Schwentz and Subrahmayam (2007) who argued that market liquidity plays a key role in moving prices to eliminate arbitrage opportunities. Under this case, arbitrageur losses worsen as the number of competing arbitrageurs increase from time to time. Akram et al. (2005) investigated opportunity for arbitrage in the foreign exchange market using unique data set for three major foreign exchange markets covering a period of more than seven months at tick frequency obtained from Reuters. The analysis indicates the existence of numerous short – lived arbitrage opportunities, whose size is economically significant across exchange rates and comparable across different maturities of the instruments involved in bringing about arbitrage opportunity.

## Methodology

Ex-post facto and descriptive research designs were employed in this study. For the purpose of brevity, the Central Bank official dollar to naira exchange rates were examined for the month of May 2017 with the aim of ascertaining the arbitrage gain arising from the trade in the market and given that the investor has a quantum of investible funds to transact with. Data were extracted from the Central Bank of Nigeria Statistical Bulletin for the month of May 2017.

## Data Presentation and Analysis

In this section, the data extracted are presented in the Table below. It reflects the dollar to naira official foreign exchange rates prevalent in the Nigerian foreign exchange market. In testing for the arbitrage opportunities in this study, it is hypothetically taken that an investor in the foreign market has the sum of one million naira (₦1000, 000) investible funds to trade with. Findings arising from the analysis are coherently interpreted and discussed underneath the table.

**Table A: Arbitrage Opportunity in the Nigerian Official Foreign Exchange Market**

Date	Currency	Buying (NGN)	Central (NGN)	Selling (NGN)	Arbitrage gain	Total arbitrage gained at N1,000,000
31/5/2017	Dollar	304.40	304.9	305.41	.1	1000,000
31/5/2017	Euro	341.62	342.18	342.75	1.13	1,130,000
31/5/2017	Pounds sterling	390.9714	391.6136	392.2558	1.28	1,284,400
30/5/2017	Dollar	304.4	304.9	305.4	1	1000,000

30/5/2017	Euro	340.1061	340.6648	341.2234	1.1173	1,117,300
30/5/2017	Pound sterling	391.5802	392.2234	393.8665	1.2863	1,286,300
29/5/2017	Dollar	304.35	304.85	305.35	1	1000,000
29/5/2017	Euro	340.6285	341.1881	341.7477	1.1192	1,119,200
29/5/2017	Pound sterling	390.6637	391.3055	391.9473	1.2836	1,283,600

Source: CBN Exchange Rates Reports, 2017

**Table B: Arbitrage Opportunity in the Nigerian Parallel Exchange Market**

Date	Currency	Buy (AM)	Sell (AM)	Arbitrage gain	Total arbitrage gained at 1000,000	Buy (pm)	Sell (pm)	Arbitrage gain	Total arbitrage gained at 1000,000
31/5/2017	Dollar	375	380	5	5000,000	376	378	2	2,000,000
31/5/2017	Euro	415	426	11	11,000,000	415	420	5	5,000,000
31/5/2017	Pounds sterling	480	491	11	11,000,000	485	492	7	7,000,000
30/5/2017	Dollar	375	382	7	7,000,000	375	380	5	5,000,000
30/5/2017	Euro	415	427	12	12,000,000	415	426	11	11,000,000
30/5/2017	Pound sterling	480	491	11	11,000,000	480	491	11	11,000,000
29/5/2017	Dollar	375	382	7	7,000,000	375	382	7	7,000,000
29/5/2017	Euro	415	427	12	12,000,000	415	427	12	12,000,000
29/5/2017	Pound sterling	480	491	11	11,000,000	480	491	11	11,000,000

Source: Computed by the researcher, 2017

It can be observed that arbitrage opportunities exist in the official fx market. It arises as a result of the differences between the buying rate and selling rate of the various hard currencies. For example, on 31/5/2017, the arbitrage gain was \$1 and if the investor traded \$1,000,000, he would gain \$1000, 000, but for Euro, the arbitrage gain was 1.13 resulting to 1,130,000 total amount given that 1000,000 Euro was sold and bought at the foreign exchange market. At the pound sterling rate, the arbitrage gain was £1.2844; the total gain made was £1,284,400. Therefore, the arbitrage gain arising in the foreign exchange market when the three major foreign currencies are traded varies from each day to the other. Some of the limits to the arbitrage in the foreign exchange market that tend to reduce arbitrage opportunity or gain is specifically the influence of the monetary policy by the Central Bank of Nigeria, external shocks like oil prices and other macro-economic factors. Due to these adverse effects, the law of one price is quite difficult to exist in the foreign exchange market.

The result of the analysis of the parallel market connotes that arbitrage opportunities/gains are high (see the above table for analysis). Although, the trading activities in the parallel (block) markets are considered as illegal, the net income margin arising is quite huge. Government intervention to reduce the adverse effect of the participants in the parallel market has not yield the desired results. It can therefore be concluded that arbitrage opportunities exist very highly in the foreign exchange market in Nigeria. In the foreign exchange market, arbitrage opportunities exist. Naturally, arbitrageur makes profit from it, but the amount of profits made is dependent on the investible funds at his/her disposal. The empirical analysis of the parallel market (black market) and the official exchange rate market points out that profit per day in any of the foreign currencies differ from one another. There are a lot of factors that interplay to serve as limits to



arbitrage opportunities in the foreign exchange market. For example present day happenings in the foreign exchange market indicate that there as many rates as possible set in every transaction. These myriad foreign exchange rate create limits to arbitrage opportunities. For example, in the foreign exchange market, there are BTA foreign exchange rates, PTA foreign exchange rate, form – M processing invisible and visible trades Foreign exchange rate, Small and medium scale enterprises foreign exchange rate, and master international on line transaction foreign exchange rates, amongst others as set by CBN. When holistically examined are nothing more but sources of frictions in the foreign exchange markets. So, despite the facts arbitrage opportunity exists in the Nigeria foreign exchange market, the limits / constraints are quite enormous.

### Conclusion and Recommendations

The findings made revealed that arbitrage gain arises in transactions in the Nigerian foreign exchange market. Investors/traders profits from the market if they have enough funds to trade with. Intuitively, the arbitrage gain prevalent in the informal FX market, the parallel exchange is significantly high in Nigeria. The activities of the Bureau De Change and lopsided and politically influenced policies of successive government in Nigeria have continued to cause the somewhat arbitrarily arbitrage gains/opportunities in the Foreign Exchange market. This study therefore recommends that investors with idle funds should take advantage of investing and optimizing the arbitrage opportunities in the Foreign exchange market. More studies should be carried out in the security market and money market to empirically determine arbitrage opportunities/ gain in Nigeria.

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