

TESTING ARBITRAGE OPPORTUNITIES: THE CASE OF THE NIGERIAN FOREIGN EXCHANGE MARKET

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ABSTRACT

Utilizing the exchange rates of the Naira to the three most commonly traded currencies—the US dollar, the British pound, and the euro—the study examines the presence or absence of foreign exchange rate arbitrage opportunities in the Nigerian foreign currency market. Specifically, the exchange rate for the month of December 2017 (that is, 4/12/17 to 29/12/17) was used in the analysis. The study employed the ex post facto and descriptive research designs. The analysis confirms the existence of arbitrage opportunities in the foreign exchange market in Nigeria. Findings from the study also reveal that there is a clear net gain in the parallel market compared to the official government rates. The implication of this is that the effort of the government to attain a level of convergence between the parallel and official rates seems not to have yielded the desired result. The study makes the suggestion that the regulatory body (the Central Bank of Nigeria) keep making sporadic interventions in the foreign exchange market to address the unfavorable movement in the Nigerian naira that results in the emergence of arbitrage opportunities in the foreign exchange market.

Keywords: *Arbitrage, Official Arbitrage Spread, Parallel Arbitrage Spread, Foreign Exchange Market, Nigeria*

1. INTRODUCTION

The goal of the foreign exchange (FX) trade is to make money by buying and selling currencies. A component of a nation's financial system, the foreign exchange market allows for the selling and buying of national currencies from two or more other nations. The market is where the exchange rate between two currencies is decided. In effect, it is a clearing house through which purchases and sales of foreign exchange are offset against each other. The foreign exchange market is efficient and competitive. Due to the demand and supply for different currencies, exchange rates frequently increase. Exchange rate arbitrage is one of several ways to make money on the FX market. Arbitrage is the process that should make sure the one-price law is legitimate. Arbitrage is crucial to the maintenance of efficient markets because it keeps underlying values and market prices in balance. Arbitrage, a crucial idea in financial economics, theoretically underpins a mechanism for bringing about equilibrium in financial markets (Obadan, 2012).

Simultaneous acquisition and disposal of the same, or substantially identical, securities in two different marketplaces at different and profitable prices, according to Sharpe and Alexander (1990), is the definition of arbitrage. According to this definition, all assets that are the subject of arbitrage are presumed to have a fundamental value that is known to rational actors," according to Sharpe and

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Alexander (1990), is the definition of arbitrage. According to this definition, It is assumed that all assets that are the topic of arbitrage have a basic value that rational actors are aware of. When rational agents are informed that the same product can be exchanged for two different prices, they simultaneously buy at one price and sell at a higher one, making a profit without taking any risks. Until there is a restoration to equilibrium between asset prices and their fundamental values, the cycle is repeated.

The existence of arbitrage in foreign exchange markets is attributed to market inefficiencies. The majority of earlier research on the occurrence of arbitrage in foreign exchange markets has focused on developed and Asian markets, mostly ignoring the African markets, particularly the Nigerian one. Therefore, research on the possibility of arbitrage in foreign exchange markets has not been primarily done in Nigeria; this justifies the need for this research. This paper's goal is to examine if there are any arbitrage possibilities in the Nigerian foreign currency market.

The rest of the article is structured as follows after the introduction: The literature is reviewed in Section 2. The issue of data and methodology is covered in Section 3. Section 4 analyzes the empirical findings, and Section 5 concludes the work.

2. LITERATURE REVIEW

2.1. Conceptual Clarification

Arbitrage - Arbitrage is the practice of buying and selling an item at the same time in an effort to capitalize on a momentary difference in price. Another definition of arbitrage includes buying in one market and selling in another while doing so, making money off of a brief discrepancy. The transactions are riskless because an arbitrageur will only move from one market to another if the prices in both markets are known and if profit outweighs the cost of the transaction (Osaze, 2007). In foreign exchange arbitrage, foreign currency is bought when it is cheap and sold when it is expensive. Foreign exchange arbitrage is the simultaneous buying and selling of two or more currencies in order to profit from price discrepancies. Interest arbitrage is a different type of arbitrage. The movement of liquid capital from one financial currency to another for receipt at investment maturity is known as "interest rate arbitrage." Arbitrageur is the term used to describe someone who uses arbitrage. By making a few matching deals in several markets and profiting from the discrepancy between the market prices, the arbitrageur takes advantage of the imbalance that exists in the market. Locational, triangular, and covered interest arbitrage are the three types of arbitrage that are most frequently used in the foreign exchange markets (Obadan, 2012).

Locational arbitrage opportunity: A trader who uses the locational arbitrage opportunity method looks to profit from variations in the exchange rates provided by various banks on the same currency. These variations are small and transient.

Triangle arbitrage: Triangle arbitrage takes advantage of differences in exchange rates between three different currencies. The selling and purchasing of a specific exchange rate at two separate prices—a direct official price and an indirect parallel market price with other currencies—is referred to as "triangle arbitrage." This is

typical in Nigeria, where the black market exchange rate differs greatly from the official rate. Triangular arbitrage is performed by successively exchanging one currency for another when the quoted rates for the provided currencies disagree. There will frequently be price disparities when one market is overvalued and another is undervalued. **Covered interest arbitrage:** Covered interest arbitrage involves taking a long position in a foreign exchange investment and a short position in a forward contract on the same currency at the same time. A lengthy investment in the base currency should cost the same amount as the amount one earns from the forward contract. One takes a short position to protect against exchange risk (Investor word, 2019).

Exchange Rate: According to Ogundipe & Ogundipe (2013), the cost of one unit of a currency in respect to another country's currency is known as the exchange rate. As a result, the exchange rate serves as the primary unit of transaction in the global foreign exchange market. It is one of the macroeconomic factors that nations throughout the world use to affect stability and broader economic policy. International trade and payments are made easier thanks to foreign exchange. The nominal exchange rate and the real exchange rate are the two fundamental types of exchange rates. The cost of one currency in relation to another is known as the nominal exchange rate (NER). When discussing a unit of foreign currency, the nominal exchange rate can be thought of as the cost of the local currency. Subject to currency rate fluctuations, the nominal price of a US dollar in Nigeria might be as low as 400 naira. This instantly indicates the degree to which Nigeria's local currency has decreased in value (depreciated) or increased in value (appreciated) on the foreign exchange market.

The rate at which a currency may be translated into another while taking into consideration the variations in living expenses and income between the two countries in issue is known as the real exchange rate. When comparing the value of two currencies over a specific time period and with varied inflation rates, real exchange rates are particularly helpful. Countries that make an effort to keep their actual exchange rates competitive frequently perform well economically. The real exchange rate (RER), which is the rate at which the foreign price level has been translated into domestic currency units using the current nominal exchange rate, can be defined as the ratio of the international price level to the local price level. Formally, RER is defined as $(E.P^*)/P$, where P^* stands for the domestic price level and $E.P^*$ for the foreign price level. Real exchange rates (R) are considered to increase when they decline and depreciate when they increase (Ogundipe & Ogundipe, 2013).

Movement in Foreign Exchange Rate: The adjustment in currency prices caused by the foreign exchange market's dynamics is known as an "exchange rate movement." Pegged, fixed, controlled float and freely floating exchange rate regimes are all possible. In a fixed exchange rate regime, the government regulates the currency's price at a set rate or allows it to fluctuate within narrow margins. On the other hand, in a system where prices are set at will by the market, prices are frequently adjusted. A managed float exists between fixed and freely floating. Exchange rates alter

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without any set rules. However, the government can intervene to prevent the currency from consistently moving in one direction. In a pegged system, the value of the local currency is inversely correlated with the value of a stable foreign currency (Obadan, 2012).

Determinants of Foreign Exchange Arbitrage Profits: The following are some of the main variables that affect whether arbitrage profits exist in foreign exchange markets: the rate of exchange of a country, prevailing interest rates, and the rates of inflation.

Flows of net capital: According to Zhou (1997), in an environment of free-floating exchange rates, decisions on trade and investment determine how much a currency will cost. Financial inflows from exports and investment income will lead to current account surpluses, which will raise demand for the local currency and cause it to appreciate in value. Whether or not there are prospects for arbitrage profits depends on the fluctuation in currency values.

Prevailing Interest Rate: Because interest rates and currency exchange rates have a strong link, the current interest rate may also influence the availability of an arbitrage benefit. A currency inflow into banks and other financial institutions is anticipated in a nation with higher interest rates than other countries. As a result, the exchange rate will rise, allowing for the determination of any potential arbitrage earnings (Mckenzie, 1999). However, when a country's exchange rate increases relative to other nations, investors will be drawn to the nation because they will receive a larger return on their savings in the local banks. At some point, the local money is in demand and will increase along with the increase in exchange rates. While loan borrowers must pay more interest, higher interest rates lower consumers' purchasing power (Pareshkumar, Narendra, and Ashoke, 2014).

Rate of inflation: Arbitrage earnings are also impacted by inflation. High inflation weakens the national currency and diminishes the purchasing power of the nation. Foreign exchange and inflation can occasionally have a negative association. This could be due to speculation by traders in the forex market (Zhou, 1997).

Payment Balance: The balance of payment methodology is one of the earliest techniques used in exchange rate modeling. This technique monitors all monetary inflows across a nation's borders throughout a predetermined time frame. A country's trade terms will be favorable if its exports value exceeds its imports value. This will enhance the demand for the nation's currency, which in turn will raise the value of the currency (Solnik, 2000).

The foreign exchange market in Nigeria

The Central Bank of Nigeria tracks and monitors foreign exchange (CBN). The CBN continuously strives to keep the exchange rate steady and within target range in order

to encourage investment and, ultimately, the health of the economy. In Nigeria, the CBN is in charge of managing the naira's exchange rate, foreign exchange reserves, and foreign currency supplies. In order to successfully affect the foreign currency market through fiscal policy, it also works with the ministry of finance through monetary policy. Commercial banks make up the majority of market participants. They purchase foreign currencies and exchange them for consumers' use. They also maintain deposits with foreign correspondent banks. Customers who want to transact business internationally can use this to get in touch with the dealer bank and have payments processed electronically on their behalf. The banks do, however, charge a fee for the services they provide to bank customers. Brokers frequently serve as middlemen between banks when purchasing and selling foreign currency. Brokers connect banks for trading and buying and selling purposes between those with surplus foreign currency and those with below-deficit currency. The interbank foreign currency market is how banks in Nigeria transact with one another, which makes this procedure distinct.

Taking Bureau de Change into account as a legitimate organization engaged in retail foreign exchange trading The bureau de change plays a critical role in ensuring rate convergence between the official rate and parallel market rate in order to support the CBN's goal of exchange rate stability by providing liquidity on the foreign exchange market. A Bureau de Change is typically located adjacent to a bank, at a travel agency, near a train station, an airport, or any location where there is likely to be a market for people looking to change money for international transactions. Currency exchange generates significant profits for a bureau de change. The Bureau de Change could turn a profit by charging a commission based on the amount of cash exchanged. The Bureau de Change market is frequently referred to as a spot market.

Two different auction systems, the retail Dutch auction and the wholesale Dutch auction were previously employed in Nigeria but did not produce the expected results. The currency rate actually rose considerably. Later, solutions had to be created to halt the issue of a rise in the foreign exchange market. As a result, the Bureau de Change made its official market debut in Nigeria in 2006. Prior to this, there was a roughly N50–N60 spread between the official and black market exchange rates. The rates did, however, settle to a 50-kobo difference between the official market and the parallel market within a month after Bureau de Change entered the official market. Over time, the CBN has kept up its efforts to improve the efficiency of the Bureau de Change (BDC). As a result of this endeavor, BDC has been able to dramatically lower exchange rate volatility and uncertainty in the Nigerian foreign currency market.

As an illustration, even in the parallel market created by the Bureau de Change, the dollar has recently been comparatively constant between N360 and N365. This has made it easier for firms to order inventory abroad. As of now, Bureau de Change has mostly stopped the exporting of cash and currency speculation, which sometimes gives rise to chances for rent-seeking. However, it must be made clear that the Bureau de Change in Nigeria does suffer certain specific difficulties. The unabated multiple

exchange rate is one of these problems, which frequently tends to undermine the foreign currency market's stability and transparency. For instance, the CBN occasionally offers currency rates to banks and Bureau de Change at N358 and N360, respectively, per dollar. This primarily accounts for the operators' low profitability. Bank fees have an impact on Bureau de Change business success as well. Every now and again, banks will purchase money at N358 and sell it to the Bureau de Change for N361. For banks, the N3.00 represents a large profit; yet, the Bureau de Change incurs sizeable costs.

The black market, illicit market, shadow market, hidden market, and grey market are further names for the parallel market in Nigeria. Exchange rates that vary from those set by the government are frequently used in the parallel market. A parallel market is an informal market that coexists alongside the official foreign currency market. The parallel exchange market in Nigeria is unofficial and uncontrolled, nevertheless, in its operations. The regulation and control of currency rates are frequently distorted by the parallel market. For instance, the government has no influence over the rate at which they sell. Dealers' income from the parallel market is not subject to taxation. The parallel market is a platform for promoting high-profile corruption and money laundering. The exchange of phoney hard cash between operators and clients in the parallel market is a significant destabilising factor.

In Nigeria, the parallel market is heavily influenced by politics and infused with ethnic politicization. Whatever the monetary authority's strategy for getting rid of the parallel market operators, it could run into trouble. One of the causes is that there is not enough foreign exchange to satisfy the demands of many people and businesses. Additionally, operators may simply generate higher earnings. In other words, the parallel exchange market offers a high degree of foreign exchange arbitrage potential (gain), given that all other factors are equal. Additionally, it is simpler for customers to exchange foreign currencies to fit their needs, particularly through Western Union Money Transfer and other services (Obadan, 2012).

2.2 Theoretical Review

The ideas that are pertinent to this study include the Purchasing Power Parity (PPP), Interest Rate (Fisher Effect and International Fisher Effect), and Efficient Market Hypothesis.

The Efficient Market Hypothesis

Fama proposed the Efficient Market Hypothesis in 1956, which states that securities prices, provided the market is efficient, reflect all currently available information. This implies that foreign currency rates are optimal and that there won't be any opportunities to profit from arbitrage. Depending on how much information is reflected in pricing, markets can be strong, semi-strong, or weak, based on the efficient market theory. Given that all of this information is freely available, Bodie,

Kane, and Marcus (2014) contend that the study of historical price statistics is not necessary.

Using historical price statistics, publicly available data, or information that can only be obtained by market participants would be profitable for investors as long as the market is efficient. Investors cannot regularly outperform the market in an efficient market by using past prices, either information that the general public may easily acquire or information that only market insiders have access to. According to Bodie et al. (2014), unrealized arbitrage profitability exists because of a market's inefficiency. The degree of market inefficiency can be determined by the bid-ask spread. Banks that operate in financial markets that may have extremely high arbitrage returns due to market illiquidity may decide to use a broader bid-ask spread, which may eventually result in fewer arbitrage possibilities.

Purchasing Power Parity

According to the notion of purchasing power parity, the ratio of prices for comparable goods in two distinct nations is identical to their respective exchange rates. If PPP is not the current exchange rate, there is a chance for an arbitrage benefit. The currency of a nation may be perceived as being overpriced or underpriced as a result of the disparity in values. Therefore, PPP and the law of one price are similar. Whether or not the PPP succeeds, it has an impact on global trade. Changes in exchange rates between two nations are offset under the PPP by variations in their inflation rates. Therefore, the nations will continue to compete with their trading partners. However, if PPP collapses, these nations' ability to compete would suffer (Cheol & Bruce, 2012).

Theories of Interest Rates: The Fisher Effect and the International Fisher Effect

In the theories relating to interest rates, foreign exchange rates are calculated using inflation rates. The real interest rate and the inflation rate are added to arrive at the nominal interest rate under the Fisher Effect. Real interest rates are used to analyze exchange rate changes since they are influenced by both inflation and interest rates. Changes in the real interest rate have a significant impact on the country's exchange rate, even when all other factors remain constant. The international Fisher Effect combines the PPP and FE to determine the effect of interest rate changes on FX pricing. A country's currency's exchange rate would decline if its inflation rate increased relative to other nations. According to the IFE, differences in interest rates from one country to another will decline as a result of probable inflation. Future changes in the exchange rate can be predicted using the disparities in interest rates between two nations. Therefore, whether or not there are arbitrage profits in the foreign exchange market depends on the level of inflation (Cheol & Bruce, 2012).

2.3 Empirical Review

Finance is paying more and more attention to the question of whether arbitrage opportunities exist in the foreign currency market. The research done to determine whether there are chances for currency arbitrage in foreign exchange markets is briefly reviewed below.

Using a distinct data set for the three main foreign exchange markets for a period of more than seven months at tick frequency collected from Reuters, Akram, Rime, and Sarno (2005) assessed the possibility of arbitrage in the foreign currency market. The research shows the existence of several transient arbitrage opportunities, with sizes that are economically significant across exchange rates and comparable across various instrument maturities that give rise to arbitrage possibilities.

Wekesa (2006) carried out a research to ascertain whether arbitrage opportunities exist in the foreign exchange market, with a focus on forex bureaus operating in Nairobi. Out of the ninety-four (94) forex bureaus functioning in Kenya, the study selected thirty (30) for Nairobi as a sample. These currency bureaus' secondary data was gathered, and arbitrage opportunities were discovered. By purchasing currencies from one forex bureau and selling them in another (locational arbitrage), forex dealers in different currencies might profit from the inefficiencies before the equilibrium is restored.

Using descriptive statistics, Marshall, Treepongkaruma, and Young (2008) examine whether there are arbitrage opportunities in the Indian foreign currency market. The results of the inquiry show that there were exploitable arbitrage opportunities in the foreign exchange (FX) market during the research period.

Osu (2010) found that currency arbitrage happens in the Nigerian foreign exchange market using Aba as a case study. The analysis also shows that there are potential for triangular and cross-rate arbitrage in the Nigerian foreign exchange markets.

The Mombasa spot market was the focus of Mwangi and Duncan's (2012) investigation into possible arbitrage opportunities. A chi-square was used to assess the goodness of fit based on the frequencies of the expected zero and observed values. It was discovered that there was potential for both triangular and geographic arbitrage in the market. Additionally, it was discovered that there were more opportunities for triangular arbitrage than locational arbitrage, and that hard currencies like the US dollar, the British pound, and the euro were valued more effectively than those that were traded less frequently, such as the yen, the Canadian dollar, and the Australian dollar.

In order to determine whether there are chances for foreign currency rate arbitrage between loans denominated in Kenyan shillings and loans denominated in US dollars, Figondo (2013) conducted research. The explicit aims of the study were to confirm

the existence of individual currency arbitrage on the USD, GBP, and EUR in Kenyan commercial banks and to assess the significance of the arbitrage in some Kenyan institutions. Data was evaluated using descriptive statistics, and the mean and mode were used to determine if the forex prices were evenly distributed or not. Paired t-tests were employed as an inferential statistic to determine the significance of the performance. Depending on the season, different banks offered arbitrage chances with specific currencies.

Ogbeide and Naimo (2018) investigate the possibility of arbitrage in the Nigerian foreign exchange market using descriptive statistics. The central bank's authorised dollar-to-naira exchange rates for the month of May 2017 were examined. According to the study's results, transactions on the Nigerian foreign exchange market generate benefits from arbitrage.

3. METHODOLOGY

A descriptive research design was utilized in this study to confirm the presence of arbitrage gains in the Nigerian forex market using the Naira exchange rate to the three frequently traded currencies: the euro (EUR), pound sterling (GBP), and the US currency (USD) (EUR). Specifically, the month of December 2017 (4/12/17 to 29/12/17) was used in the analysis. The foreign exchange regime was liberalised in June 2016; hence, we selected a year after the liberalization to test for arbitrage opportunities. The information was obtained from the websites of Nariametrics and the Central Bank of Nigeria.

4. ANALYSIS AND DISCUSSION OF RESULTS

Table 1 provides the official exchange rate used by the central bank and the parallel market rate that were used to determine whether arbitrage opportunities existed in the Nigerian foreign currency market.

Table 1: Arbitrage Spread Analysis

OFFICIAL MARKET PRICES						PARALLEL MARKET PRICE					
Date	Currency	Buy	Central	Selling	Arbitrage Spread	AM SPREAD			PM SPREAD		
						Buying	Selling	Arbitrage spread	Buy	Sell	Arbitrage spread
4/12/17	Dollar	306.0	306.5	307.0	1	360	363	3	360	363	3
	Pounds	411.5	413.9	413.2	1.7	475	480	5	472	480	8
	Euro	362.8	363.4	363.9	1.1	425	430	5	422	430	8
5/12/17	Dollar	305.85	306.35	306.85	1	360	363	3	360	363	3
	Pounds	410.21	410.87	411.55	1.34	422	430	8	423	428	5
	Euro	362.98	363.57	364.17	1.19	474	480	6	474	480	6
6/12/17	Dollar	305.5	306	306.5	1	360	363	3	360	363	3
	Pounds	408.42	409.09	409.76	1.34	474	480	6	474	480	6
	Euro	360.82	361.42	362.01	1.34	421	426	5	422	426	4
7/12/17	Dollar	305.45	305.95	306.45	1	360	363	3	360	363	3
	Pounds	407.29	407.95	408.62	1.33	474	480	6	475	480	5
	Euro	360.75	360.84	361.43	1.18	422	428	6	422	427	5
8/12/17	Dollar	305.4	305.9	306.4	0.5	360	363	3	360	363	3
	Pounds	410.15	410.82	411.49	0.69	475	480	5	475	480	5
	Euro	358.29	358.88	359.47	0.59	422	427	5	422	427	5
11/12/17	Dollar	305.35	305.85	306.35	0.5	360	363	3	360	363	3
	Pounds	408.43	409.11	409.77	0.66	476	481	5	476	483	7
	Euro	308.18	308.69	309.19	0.5	422	427	5	422	428	6
12/12/17	Dollar	305.3	305.8	306.3	0.5	360	363	3	360	363	3
	Pounds	401.66	408.33	409.01	0.67	476	483	7	476	483	7
	Euro	359.58	360.17	360.76	0.59	422	428	6	420	428	8
13/12/17	Dollar	305.3	305.8	306.3	1	360	363	3	360	363	3
	Pounds	407.88	408.55	409.22	1.34	476	483	7	475	480	5
	Euro	358.42	359.54	359.59	1.17	420	426	6	420	425	5
14/12/17	Dollar	305.25	305.75	306.25	1	360	363	3	360	364	4
	Pounds	409.68	410.35	411.02	1.34	475	480	5	475	482	7
	Euro	361.05	361.64	362.23	1.10	420	425	5	420	426	6
15/12/17	Dollar	305.25	305.75	306.25	1	360	364	4	361	365	4

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	Pounds	408.94	409.61	410.28	1.34	476	484	8	476	486	10
	Euro	360.22	360.82	361.41	1.19	420	426	6	420	428	8
18/12/17	Dollar	305.2	305.7	306.2	1	361	365	4	361	365	4
	Pounds	408.27	408.93	409.60	0.67	477	484	7	477	485	8
	Euro	359.98	360.57	361.63	1.65	420	428	7	420	428	8
19/12/17	Dollar	305.2	305.7	306.2	1	361	365	8	361	364	3
	Pounds	408.11	408.78	409.45	1.34	477	485	4	477	485	8
	Euro	360.47	361.06	361.65	1.18	420	428	8	420	428	8
20/12/17	Dollar	305.15	305.65	306.15	1	361	365	4	361	365	4
	Pounds	408.68	409.36	410.03	1.35	477	485	8	476	486	10
	Euro	361.24	361.83	362.42	1.18	422	427	5	422	427	5
21/12/17	Dollar	305.15	305.65	306.15	1	361	365	4	361	365	4
	Pounds	407.894	408.56	409.23	1.34	476	485	9	477	485	8
	Euro	362.18	362.78	363.37	1.19	422	428	9	422	428	6
22/12/17	Dollar	305.15	305.65	306.15	1	361	365	4	361	365	4
	Pounds	408.82	408.99	409.65	1.33	477	485	8	477	485	8
	Euro	361.73	362.31	362.91	1.18	422	428	6	422	428	6
27/12/17	Dollar	305.1	305.6	306.1	1	361	365	4	361	365	4
	Pounds	409.20	409.87	410.54	1.34	478	488	10	478	488	10
	Euro	362.82	363.42	364.01	1.19	422	430	8	422	430	8
28/12/17	Dollar	305.05	305.55	306.05	1	361	363	2	361	363	2
	Pounds	409.83	410.51	411.18	1.35	476	386	10	475	484	9
	Euro	364.14	364.74	365.33	1.21	420	426	6	420	426	6
29/12/17	Dollar	305	305.5	306	1	361	363	2	361	363	2
	Pounds	412.66	412.97	413.65	0.99	475	484	9	477	485	8
	Euro	365.66	366.26	366.86	1.2	420	426	6	420	427	7

Source: Author's Computation, (2022).

Table 1 above demonstrates that there are arbitrage possibilities in Nigeria's official foreign currency market. This demonstrates the inefficiency of Nigeria's foreign currency market. The allocated column displays the arbitrage benefit resulting from the official rate. The table also demonstrates that the parallel market clearly outperforms the official government rates in terms of net gain. This finding concurs with those of Ogbeide and Naimo (2018). Because of this, it appears that the government's efforts to bring the official market and the parallel market closer together did not have the desired effect.

4.1 Comparative Test of the Performance of the Official Arbitrage Spread and Parallel Arbitrage Spread

The performance of the official arbitrage spread and parallel arbitrage spread will be compared using the paired t test. The Paired Samples t Test result is displayed below:

Table 2: Statistics for Paired Samples

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Officialarbitragespread	1.07	54	.285	.039
	Parallelarbitragespread	5.70	54	2.203	.300

Source: Author's Computation using SPSS 22.0, (2022)

Table 3: Correlations between Paired Samples

		N	Correlation	Sig.
Pair 1	officialarbitragespread¶llel arbitragespread	54	.412	.002

Source: Author's Computation using SPSS 22.0, (2022)

Table 4: Test of Paired Samples

		Paired Differences							
					95% Confidence Interval of the Difference		T	df	Sig. (2- tailed)
		Mean	Std. Deviation	Std. Error	Lower	Upper			
Pair 1	officialarbitragespread - parallelarbitragespread	-4.632	2.102	.286	-5.205	-4.058	-16.195	53	.000

Source: Author's Computation using SPSS 22.0, (2022)

Decision and Conclusions

From the results, we can say that:

- The official arbitrage spread and parallel arbitrage spread display a low correlation ($r = 0.412$, $p < 0.002$)
- The official arbitrage spread and parallel arbitrage spread had a significant average difference ($t_{53} = -16.195$, $p < 0.000$).
- On average, official arbitrage spread were ₦4.63 kobo lower than parallel arbitrage spread (95% CI [-5.21, -4.06])

The statistical evidence reveals that there is a meaningful difference between the official arbitrage spread and parallel arbitrage spread which confirms the analysis in table one that there is a clear net gain in the parallel market compared to the official government rates.

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

By comparing the exchange rate of the naira to the three most often traded currencies—the US dollar, the British pound, and the euro—this research examines whether arbitrage possibilities exist in the Nigerian foreign currency market. Specifically, the exchange rate for the month of December 2017 (that is, 4/12/17 to 29/12/17) was used in the analysis. The analysis confirms the existence of arbitrage opportunities in the foreign exchange market in Nigeria, and this finding is in consonance with prior empirical studies. The implication of this is that the effort of the government to attain a level of convergence seems not to have yielded the desired result. In contrast to Ogbeide and Naimo (2018), this study went further to demonstrate that there is a significant difference between the official arbitrage spread and the parallel arbitrage spread using statistical evidence. This confirms the analysis in Table 1 that there is a clear net gain in the parallel market compared to the official government rates. This is one of the unique aspects of this paper.

5.2. Recommendations

Following are some recommendations based on the study's findings:

The regulatory body (the Central Bank of Nigeria) should keep making sporadic forays into the foreign exchange market to counteract the naira's unfavorable movement, which gives rise to arbitrage possibilities. Also, the regulatory authority should ensure that there is transparency in the market, especially among deposit money banks; that is, the Central Bank of Nigeria (CBN) needs to keep an eye on how deposit money banks utilize the foreign currency allocated to them; this will ensure that the deposit money banks do not use the currency to fund the parallel market.

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