

# Impact of Derivative Instruments on Risk Management in the Nigerian Banking Sector

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## Abstract

This study examined the impact of derivative instruments on risk management in the Nigerian banking sector, between 2014 and 2018. Ordinary least squares (OLS) model was employed to analyze data and draw inference; data used were elicited from Central Bank of Nigeria Statistical Bulletin of 2018 and Nigerian Stock Exchange Statistical Bulletin of 2018. The study employed foreign exchange derivative as proxy for derivative instruments (independent variable), while exchange rate was employed as a measure of risk management in the Nigerian banking sector (dependent variable). The inferential result suggested that financial derivative impacted positively and significantly on risk management in the Nigerian banking sector.

**Keywords:** Derivative instruments, risk management, exchange rate, foreign exchange derivative.

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## INTRODUCTION

### Background to the Study

Derivatives are financial instruments that derive their values from the performance of underlying entity. This underlying entity can be an asset index, or interest rate.

Risk is at the centre of economic activity. The financial market is broader, encompassing bonds, foreign exchange, real estate, commodities and numerous other assets classes and financial instruments. A developed financial market promotes economy and institutional stability. Likewise, a healthy financial system facilitates economic growth and development. An economy that experience sustainable growth is likely an active banking sector and high incentives for investment. Moreover, a healthy financial system provides effective structural linkages necessary for economic growth. Hence, there is greater responsibility on the banking sector of an economy to mobilise the required capital to generate employment and income [1-3]. Banking sector is an important part of a country financial system; and derivative market is a segment of the financial market. Following the recent global financial crisis, the derivatives market has attracted more attention. Although the financial crisis is caused by structured credit-linked securities that are not derivatives, but there is need for countries to maintain a

functional and virile derivatives markets. Consequently, governments and regulators all over the world are working to strengthening regulations in order to increase transparency and safety both for derivatives and other financial instruments. The use of derivatives in developing countries, including Nigeria, is not yet as widespread as in developed economies. The developed countries have used financial derivatives to share risks among financial institutions; thereby reduced the impact of financial crisis significantly. Specifically, derivatives are not understood or traded anywhere in Africa, except South Africa, and marginally Ghana Global Analytics, 2012. To develop derivative markets in Nigeria, the CBN issued the guidelines for foreign exchange derivatives in Nigeria on 22 March 2011 [4]. CBN is responsible for regulating and developing the Nigerian financial markets and assuring the stability of the nation's financial system. Derivatives provides firms the opportunity to hedge (insure) against systemic and non-systemic risks. Consequently, a thorough understanding of derivatives market, products and participants is necessary.

### Statement of the Problem

Derivatives are forms of risk management tools. Little research has been done on the subject in developing countries, including Nigeria. Specifically, no study has been conducted on management of

banking sector risk exposures with derivatives in Nigeria. Moreover, there is low level of awareness of derivative products in Nigeria. Beside high transaction costs and volatile market conditions, banks in Nigeria are reluctant to use derivatives due to the lack of awareness about derivatives products and their benefits. The study intends to fill this gap and contribute to knowledge on the benefit and adoption of derivatives to manage risks associated with Nigerian banking sector. Considering the benefits of derivatives to the economy; the study is imperative to facilitate adequate understanding of derivatives market, its products and participants.

### Objective of the Study

The main objective of this research is to examine the impact of derivative instruments on risk management in the Nigerian banking sector, while the specific objective is:

1. To evaluate the impact of foreign exchange derivative on exchange rate in Nigeria.

### Research question

1. What is the extent of the impact of foreign exchange derivative on exchange rate in Nigeria?

In the light of the foregoing, the study tests the following hypothesis stated in the null form:

### Research Hypothesis

H01. Foreign exchange derivative have no significant impact on exchange rate in Nigeria.

## LITERATURE REVIEW

### Meaning of Derivatives

Derivatives refer to a broad class of financial instruments which derive their value from the value of an underlying asset or market variable [5-8]. They do not have worth of their own, but derive their value from the claim they give to their owners to own some other financial assets or security. Derivatives are financial instruments used in hedging. Derivatives are just one form of hedging instruments which comes in form of contracts or agreements between two parties. The basic meaning of derivatives is to derive something from something else. A simple example of derivative is butter, which is a derivative of milk. The price of butter depends upon the price of milk, which also depends upon the demand and supply of milk. Size is an important factor influencing the decision of firms to use derivatives [9-11]. Hence, the huge initial cost of establishing a derivative position can discourage small firms from using them [12]. Nevertheless, derivatives are highly suitable managing risks associated with the FSS operations, if appropriately employed.

### Use of Derivatives

Derivatives are good risk management tools. Derivatives can be used for hedging, speculating and

arbitrage purposes. With a hedge, an investor can protect himself against risk he is routinely exposed to. Since there are two parties to a derivative deal, a speculator needs to find someone who holds the opposite view or would like to transfer a particular risk. Hedging provides an investor the option of passing on some of the risk that he bears to another party. He either takes on another risk in return or makes cash payment in exchange for the risk transfer. Risks that can be hedged with derivatives include movements in market variables, such as exchange and interest rate, share and commodity prices. Derivatives can also useful for speculating movement of market variables. Speculators add liquidity to the market by taking a view on the direction of the movement; consequently, what is often called taking a bet can be called taking a risk. Derivatives can also be used for arbitrage, to make arbitrage profits. Arbitrage profit provides risk-free, zero net investment profits, opportunities by capitalising on price differentials on the same commodity in different markets. Arbitrage profit accrues from differential profit emanating from the intention to buy low and sell high in two different markets. Derivatives allow for large portfolio position changes without incurring the buying and selling transaction costs. Derivatives can be combined to replicate other financial instruments, thus they can be used to connect markets by eliminating pricing inefficiencies between markets. Derivative are suitable for managing risks associated with FSS operations, because the primary aims of financial derivatives are to enhance profitability and mitigate risks.

### Underlying Asset in a Derivative Contract

While forwards, futures, options and swaps can be view as the mechanics of derivation, the value of these contracts (derivative instruments) depends upon the prices of the underlying assets. The underlying asset in a derivatives contract may assume many forms, such as: commodities including orange juice, coffee beans, grain; precious metals, e.g. gold and silver; foreign exchange rates or currencies; bonds of different types, including medium to long term negotiable debt securities issued by governments, companies, etc; short term securities such as Treasury bills (T-bills); shares and share warrants of companies traded on recognised stock exchanges and Stock Index; and Over-the-Counter (OTC)1 money market products such as loans or deposits [12 5, 8]. Depending on the type of underlying, the values of the derivative contracts can be derived from the corresponding equity prices, interest rates, exchange rates, commodity prices and probabilities of certain credit events. In view of the advancement of financial innovation, the variety of derivatives products (commodities) have increased significantly [13].

### Derivatives Market Participants

Basically, derivatives can be used for hedging, speculating and arbitrage purposes. There are three

main participants in derivatives market: hedgers, speculators, and arbitrageurs [14, 8].

- Hedgers: are those who counterbalance one transaction against another to protect against loss. They use the derivatives markets to reduce or eliminate the risk associated with price of an asset. Majority of the participants in derivatives market belongs to this category.
- Speculators: are risk-takers which assume risk of losses for the possibility of considerable gains. They transact 'futures' and 'options' contracts to secure extra leverage in betting on future movements in the price of an asset. They can increase both the potential gains and potential losses by usage of derivatives in a speculative venture.
- Arbitrageurs: engage in arbitrage by purchasing securities in one market for immediate resale in another market with an intention to profit from the price difference. Their behaviour is guided by the desire to take advantage of a discrepancy between prices of more or less the same assets or competing assets in different markets. For example, if they see the futures price of an asset getting out of line with the cash price, they will take offsetting positions to profit from the price differential.

### Classification of Derivatives

Basically, derivatives can be categorized into two, commodity derivatives and financial derivatives. The most common types of derivatives are: forwards, futures, options and swaps. Commodity derivatives underlying asset can be silver, gold, grain, etc; but financial derivatives underlying assets are stocks, bonds, currencies and other interest rates bearing securities, etc

### Types of Derivatives

The main types of derivatives (forwards, futures, options and swaps) are examined below.

#### Forward Contract

A forward is a contract whereby two parties agree to exchange the underlying asset at a predetermined point in time in the future at fixed price. The buyer agrees today to buy a certain asset in the future and the seller agrees to deliver that asset at that point in time, in the future. Forward contract is the simplest form of derivative contract. In addition, forward contract is a cash market transaction, the price of which is determined on the initial trade date, but the delivery is made in the future. The contract must be honoured by the parties whether the real price increases or decreases. Although forward contracts can help reduce volatility in certain market; however, they are not easily transferred or cancelled, i.e. not liquid [5, 15, 8].

#### Future Contract

Futures is a standardised forward contract to buy (long) or sell (short) the underlying asset at a specified price at a specified future date through a specified exchange [14, 8, 16]. Futures are standardised forwards traded on-exchange. Such contracts are traded on exchange (clearinghouse), which sets the standardised terms regarding the quality, price quotation, date and delivery (in case of commodity). The exchanges work as a buyer or seller for the counterparty. The clearinghouse provides a mechanism that guarantees the honouring of the contract, thus ensuring very low level of default [15, 8, 16, 17]. The major types of financial futures contract include: stock future or equity futures, stock index futures, currency futures, and interest rate bearing securities such as bonds, Treasury bill futures.

#### Options Contract

An option is a contract that gives the buyer the right, but not the obligation, to buy (call) or sell (put) the underlying asset at or within a certain point in time in the futures at a predetermined price (strike price) against the payment of a premium, which represent the maximum loss for the buyer of an option [15, 8, 16, 17]. Both parties are under obligation to perform their contractual obligations. However, an options contract, as the name suggests, is rather an optional contract. This is because an option is the right, but not the obligation, to buy or sell something at a stated date at a stated price. What distinguishes option from forwards and futures is that, options settle only if exercised and will be exercised only if in-the-money, i.e. if the strike price is lower/higher than the current market price for a call/put. Options, if employed properly, are a cost effective and economical practice to hedge against market exposures. The main strength of options is their flexibility; but they are expensive and risky. Consequently, options afford financial services firms' a robust strategy to protect themselves from potential negative effects of market fluctuations. Basically, there are two types of options contracts: call options and put options. A 'call option' gives one the right to buy; and a 'put option' gives one the right to sell. Options can also be classified as Over-the-Counter (OTC) options and exchange traded options. The exchange traded options contracts are customised contracts trades on recognised exchanges; whereas the OTC options are customised contracts traded privately between parties [8, 16, 17].

#### Swap Contract

Swap is a contract whereby the parties (known as counter parties) agree to exchange a predetermined series of payments, or exchange interest payments or one set of interest payment (fixed with floating or vice-versa) with another, for a specified time [8, 16]. A swap is like a barter or exchange. The two commonly used swaps are: interest rate swaps and currency swaps. The interest rate swaps entail swapping only the interest related cash flows between the parties in the same

currency; while the currency swaps entail swapping both principal and interest between the parties, with the cash flows in one direction being in a different currency than the cash flows in the opposite direction [16, 8].

### **Factors that contribute to rapid growth of derivative markets**

According to Chui [18], some fundamental changes in global financial markets have contributed to rapid growth in derivative markets. First, the collapse of the Bretton Woods system of fixed exchange rates in 1971 increased the demand for hedging against exchange rate risk. Consequently, trading in currency futures is allowed at the Chicago mercantile Exchange in the following year. Second, emerging market financial crises substantially influence the demand for hedging against credit risk. Third, innovation in financial theory and advancements in options pricing research also contribute to rapid development of the derivative markets. Lastly, rapid improvements in computer technology enabled asset managers to design and develop increasingly sophisticated derivatives as part of their risk management tools.

### **Potential Benefits of Derivatives for Nigerian Economy**

Derivatives are useful risk management tools when used appropriately. Derivatives market creates a platform for transferring financial risks to other parties who are more willing or better suited to take or manage those risks. Thus, purchasing derivatives can be a safer choice (of hedging risks) if there is a possibility of a looming bear market. In other words, a derivatives market can benefit the Nigeria economy in three major ways. First, effective derivatives market can help Nigeria economic agents to manage risks, thereby enhancing the nation's economic efficiency. Some of the risk Nigeria economy is exposed include: inflation, excessive dependency on foreign economics, foreign trade prices, foreign currency and foreign interest rates. Second, effective derivative market can enhance liquidity in Nigeria economy through shift of risk (currency and default) and futures contract or option before the expiration date at the derivative exchange. Finally, a derivatives exchange can attract more foreign investments to Nigeria. Thus, provides a medium through which foreign investors can reduce foreign-exchange risk regarding investments return. Derivatives, however, have some drawbacks. If derivatives are used as a speculative instrument, it is possible to incur financial loss if the market changes dramatically. Similarly, with regard to options, the party that hold the put option are obliged to adhere to it if the holder of the call chooses to exercise its right to sell or buy; thus resulting to financial loss. Furthermore, derivatives have been associated with some high-profile corporate events that off-balanced the global financial markets over the past two decades, resulting to global financial crisis [18]. Warren Buffet views derivatives as time bombs for the economic system and called them

financial weapons of mass destruction [19]. Similarly, derivatives have played an important role in the near collapses or bankruptcies of Barings Bank in 1995, Long-term Capital Management in 1998, Enron in 2001, Lehman Brothers in and American International Group (AIG) in 2008.

### **Modern Portfolio Theory of Investment**

The Modern Portfolio Theory (MPT) is an improvement upon traditional investment models. It is an important advancement in the mathematical modelling of finance. The MPT encourages asset diversification to hedge against market risk as well as risk that is unique to a specific company. The theory (MPT) is a sophisticated investment decision approach that aids an investor to classify, estimate, and control both the kind and the amount of expected risk and return; also called Portfolio Management Theory. Essential to the portfolio theory are its quantification of the relationship between risk and return and the assumption that investors must be compensated for assuming risk. The Modern Portfolio Theory (MPT) departs from traditional security analysis in shifting emphasis from analyzing the characteristics of individual investments to determining the statistical relationships among the individual securities that comprise the overall portfolio [20].

The MPT mathematically formulates the concept of diversification in investing, with the aim of selecting a collection of investment assets that has collectively lower risk than any individual asset. The possibility of this can be seen intuitively because different types of assets often change in value in opposite ways. But diversification lowers risk even if assets' returns are not negatively correlated-indeed, even if they are positively correlated.

Chanzu and Gekara [21] investigated the effects of the use of derivatives on financial performance of companies listed in the Nairobi Securities Exchange (NSE), with the main objective of determining how risk management, efficiency, price stabilization and price discovery in derivative affect the financial performance of companies in NSE. The study adopted a descriptive research design with the use of correlation analysis to analyse the responses from questionnaires. Other qualitative responses were analysed using content analysis. The study finds that, apart from price stabilization other variables contributed positively to the financial performance of companies listed in NSE.

Also, Lenee and Oki [22] investigated financial derivatives and financial and non financial firms' performance in the UK using Panel Least Square (PLS) regression. Their findings reveal that financial firms tend to hedge more of interest rate risks while non financial firms hedge more of foreign exchange rate risks. In addition, hedging interest rate risks by both

groups with the use of a combination of forwards and futures derivatives was found to be positive and statistically significant with return on assets as firm performance, but directly has a reverse effect when only swap derivatives were used.

In another study, Olawale [23] examined the effect of credit risk on the performance of commercial banks in Nigeria. Using the ratio of loan and advances to total deposit, the result reveals that there is a significant relationship between bank performances in terms of profitability and credit risk management which is loan performance.

Similarly, Olusanmi, Uwuigbe and Uwuigbe [24] investigated the effect of risk management on Banks financial performance in Nigeria. The study employed Ordinary Least Square (OLS) regression technique to test the formulated hypothesis. Their findings showed the existence of a negative non significant relationship between risk management and bank's performance measured by return on equity.

In the same vein, Kolapo, Ayeni and Oke [25] examined credit risk and commercial banks' performance in Nigeria using panel model analysis. The result showed that the effect of credit risk on bank performance is cross-sectional invariant. That is the effect is similar across banks in Nigeria. Though the degree to which individual banks are affected was not captured by the method of analysis utilized.

Furthermore, Tijani and Mathias [26] also investigated corporate use of derivatives and financial risk management in Nigeria with evidence from non financial firms. The study employed multivariate analysis and logistic regression tests on SPSS version 18. Their findings revealed very low usage of derivatives. And this was traced to lack of knowledge on the use of derivatives and the underdeveloped nature of our financial market.

In yet another study, Adeusi, Akeke, Adebisi, and Oladunjoye [27], examined risk management and financial performance of banks in Nigeria. Adopting a panel data estimation technique, their findings revealed an inverse relationship between financial performances of banks and doubt loans, and capital asset ratio was found to be positive and significant. This finding implies that the higher the managed funds by banks the higher the performance.

Bali, Hume, & Martell [28] in their study of derivatives and interest rate risk, demonstrate that there is no significant effect of credit derivatives on interest rate exposure. Furthermore, Hentschel and Kothari [29]

### Model specification

This study adopts and modifies the model of Lenee and Oki [37] who investigated financial derivatives and financial and non financial firms' performance in the UK. The model was specified as;

in their study conclude that when compared to non-users; users of derivatives are less prone to risk. In another study by Chaudhry [30] as well as Reichert and Shyu [31] examined the effect of derivative instruments on bank risk in industrial countries. Their findings reveal that the use of options tends to increase all types of bank risk for all US banks. However, Swaps have a negative effect on bank risk, while the effect of forwards on bank risk is not significant. Similarly, Reichert and Shyu [31] find that the use of options increases the interest rate beta for all US, European and Japanese banks, while both interest rate and currency swaps generally reduce risk. Focusing only on credit derivatives, Instefjord [32] noted that credit derivatives increase bank risk in England.

In another study, Shanker [33] investigates the effect of the use of derivative instruments on different types of bank risk. The result reveals that the use of swaps, future, and options reduce interest-rate risk. Choi and Elyasiani [34] find that options are positively related to both interest-rate and currency risk, while currency swaps reduce exchange rate risk. Finally, and similarly to the study by Yong *et al.*, [35], Hirtle [36] finds that the use of interest-rate derivatives increases the interest-rate exposure of Bank Holding Companies (BHC).

Finally, Puranandam [37] in his empirical investigation of 8000 (eight thousand) banks on the use of interest rate derivatives, it suggest that potential benefit of derivatives usage is its ability to allow an organization to maintain a smooth operating policies in the event of external shocks. He also observed that interest rate risk had a significant impact on the banking sector and provides a useful setting to test the theories of risk management.

## METHODOLOGY

### Research Design

This study adopts the *ex-post facto* research design as it deals with event that had taken place and secondary data were readily available for collection.

### Source of Data Collection

Data for this study are elicited from Nigerian Stock Exchange Market Bulletin of 2018 and Central Bank of Nigeria Statistical Bulletin of 2018.

### Method of Data Analysis

This study used descriptive statistics, correlation matrix and ordinary least squares (OLS) linear regression model in testing the hypothesis of the study. E-view 9.0 econometric statistical software package was used for the analysis.

$$\text{Bank Performance (PAT)} = f(\text{DFL}, \text{DFA}, \text{TID}, \text{TA}) \text{ ----- (1)}$$

The econometric form of the model is specified thus:

$$\text{PAT} = \beta_0 + \beta_1 \text{DFL}_t + \beta_2 \text{DFA}_t + \beta_3 \text{TID}_t + \beta_4 \text{TA}_t + \text{U}_t \text{ ----- (2)}$$

Where:

- PAT = Profit after Tax
- DFL = Derivative Financial Liabilities.
- DFA = Derivative Financial Assets.
- TID = Trading Income on Derivatives
- TA = Total Assets
- U<sub>t</sub> = Stochastic Error Term;
- β<sub>0</sub> = Intercept for Estimation.
- β<sub>1</sub> - β<sub>4</sub> = coefficient of independent variables

The econometric model for this paper is stated below:

$$\text{EXR} = \beta_0 + \beta_1 \text{FED}_t + \varepsilon_t \text{ ----- (3)}$$

Where:

- EXR = Exchange rate
- FED = Foreign exchange derivative
- β<sub>0</sub> = Intercept
- β<sub>1</sub> = coefficient of independent variable

The results of the descriptive statistics above shows that average exchange rate was N22.9.4 to 1\$, while foreign exchange derivatives had an average of N1540 billion. While the minimum of exchange rate and foreign exchange derivative stood at 158.6 and 546.2 respectively, their maximum was 286.5 and 4247.8 respectively.

## DATA ANALYSIS AND RESULTS

### Descriptive Statistic

The descriptive statistics which generally explore the characteristics of the data include: the mean, median, maximum, minimum, standard deviation as well as number of observations per each variable.

**Table-1:**

	EXR	FED
Mean	229.3508	1540.640
Median	253.4920	899.2000
Maximum	286.5430	4247.800
Minimum	158.5530	546.2000
Std. Dev.	52.00804	1553.762
Observations	5	5

Source: Appendix

**Table-2: Correlation Matrix**

	EXR	FED
EXR	1.000000	0.746531
FED	0.746531	1.000000

Source: Appendix

Correlation is a way to index the degree to which two or more variables are associated with or related to each other. The result shows that exchange rate correlated with foreign exchange derivatives at 75%.

**Table-3: Inferential Result**

Result Of OLS Model				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FED	0.093291	0.031696	2.943294	0.0423*
R-squared	0.557309	Mean dependent var		229.3508
Adjusted R-squared	0.409745	S.D. dependent var		52.00804
S.E. of regression	147.0521	Akaike info criterion		12.99631
Sum squared resid	86497.29	Schwarz criterion		12.91820
Log likelihood	-31.49077	Hannan-Quinn criter.		12.78666
Durbin-Watson stat	0.668817			

Source: Appendix

The result of the OLS model above shows that foreign exchange derivative had a positive and significant impact on exchange rate, as indicated by the p-value of 0.0423, such that a unit increase in foreign exchange derivative would bring about a 0.093291 unit increase in exchange rate.

From the results of the (OLS) above, R<sup>2</sup> of 55% as well as the adjusted R<sup>2</sup> of 41% is an indication that the model is fairly represented. That is the independent variables explained about 55% variations in the dependent variable while the remaining 45%

may be explained by variables not included in the model.

## CONCLUSION

This study was carried out to investigate the impact of derivative instruments on risk management in the Nigerian banking sector between 2014 and 2018. The study employed exchange rate as proxy for risk management in the Nigerian banking sector, while foreign exchange derivative was employed as proxy for derivative instruments. Data for foreign exchange derivative were elicited from Nigerian Stock Exchange Statistical Bulletin of 2018, while data for exchange rate was elicited from Central Bank of Nigeria (CBN) Statistical Bulletin of 2008.

From the result obtained from the inferential analysis, it suffices to submit that derivative instruments impacted positively and significantly on risk management in the Nigerian banking sector.

## RECOMMENDATIONS

This study suggests the following recommendations:

- The main challenge to CBN is to ensure that derivatives transactions are properly traded and prudently supervised. The CBN should, therefore, regulate and monitor the nation's derivatives market participants to ensure compliance with the market guidelines.
- Development of derivatives markets in Nigeria will attract foreign investment. The CBN must strengthen regulations to increase transparency and safety of the nation's derivatives market.
- The government and CBN must prevent the market participants from excessive risk-taking, while not slowing the financial innovation aspect of the market.
- There is urgent need to improve the quality of data of derivatives contracts. This calls for improved data quantity and quality to enhance the understanding of derivatives markets.

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