RISKS AND UNCERTAINTIES AS DETERMINANTS OF SIZE OF RECAPITALISED BANKS IN NIGERIA

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ABSTRACT

The study basically evaluates the effect of risks and uncertainties on the capital size and asset size of Money Deposit Banks in Nigeria. Two hypotheses were formulated for testing. The first hypothesis deals with risks' effect and the second one has to do with uncertainties' effect. The study utilises secondary data for the period of ten years ranging from 1999 to 2008. The techniques employed for the purpose of analysis are multiple regression models. Based on the data analysis and hypothesis testing of the effect of the relationship between risks and capital size of banks in Nigeria, the results provide evidence for the rejection of the null hypothesis. The study, therefore, concludes that risks have significant effect on the capital size of banks in Nigeria. In the case of the second hypothesis, the results of the study provide evidence for the rejection of the null hypothesis in the case of all the variables with the exception of long-term debt capacity uncertainty. The study concludes that uncertainties have significant effect on the asset size of banks in Nigeria. The study, therefore, recommends that the regulatory authorities of the Nigerian banking sector and the board of directors of Money Deposit Banks should work harder to ensure that effective monitoring of the variables used in this study are put in place as they have significant effect on the dependent variables. This shall assist in mitigating risks and uncertainty effect facing Money Deposit Banks.

Keywords: On-Balance Sheet Activities, Off-Balance Sheet Activities, Recapitalisation, Risks, Uncertainties

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1.0 Background to the Study

One of the basic roles expected of banks is expediting payment mechanism in order to ensure efficient allocation of deposits in their custody. It is through this intermediation function that banks generate income, and in the course of this income generation, they are confronted with a lot of risks and uncertainties.

From accounting perspective, two activities lead to emergence of risks that are facing banks. Technically, they are referred to as on-balance sheet activities and off-balance sheet activities. Alston and Bird (2002) define on-balance sheet activities as those transactions or financial arrangements that are fully disclosed in a company's financial statements under Generally Accepted Accounting Principles (GAAP). While off-balance sheet activities also known as contingents are those transactions not appearing on the balance sheet liabilities because the transactions are not complete until certain conditions or requirements are met. Off-balance sheet activities normally generate fees, but produce liabilities or assets that are deferred or contingent and thus, under GAAP, do not appear on the institution's balance sheet until or unless they become actual assets or liabilities with a value or cost that can be determined (Barron, 2000).

Although the terms risk and uncertainty are often used interchangeably, there exists sharp difference between the two. Risk is associated with those situations in which a probability distribution of the returns on a given project can be estimated. While, uncertainty is associated with those situations in which insufficient evidence is available even to estimate a probability distribution (Knight, 1921; Ellsberg, 1961; and Luca and Chris, 2004). In the context of this work, they are not used interchangeably. The reasons for not using them interchangeably are because both of them can be determined using different proxies, and also to enable thorough evaluation as to whether both significantly serve as determinants of size of consolidated banks in Nigeria.

In the course of discharging their functions, a number of underlying factors have caused changes to occur in risks and uncertainties facing banking institutions. To address the effect of the changes on the general performance and stability of banks in the Nigerian banking sector, the idea of capitalising banks through mergers and acquisition, issue of new shares, injection of new capital from foreign parent banks, among other measures emerged. The basic essence is to create banking sector with adequate capital base and asset size that can ensure the safety and soundness of banks in the sector. This decision is based on the literature argument that the larger the bank size in

terms of capital and asset size, the lower the riskiness of banking institution, which are believed to be triggered by uncertainties. For instance, according to Kishan and Opiela (2000), small banking systems under-perform and as a result, they suffer from a concentration of risks. They argue that the smaller the banking system, the more vulnerable it is to external shocks, because the system provides fewer services at higher unit costs, largely because they cannot explore economies of scale, and partly because of lack of effective competition.

Although increment in banks' size due to recapitalisation appears to make the Nigerian banking environment more innovative and competitive, it also subjects the environment to more uncertainty and risks vulnerability. This is as a result of the trade off relationship that exists between risks and profitability. Uncertainty though difficult to estimate, is considered to triggers off risks, and risks in turn are directly and exponentially related to the face of change being undertaken by any organisation. The risks management problems of the Nigerian banks have become more compounded as banks concentrated only on managing credit and liquidity risks neglecting other significant risks both due to on and off-balance sheet activities that can significantly impact on their activities. The implication of neglecting significant components is limiting the ability of banks to behave prudently, and this in turn leads to rapid deterioration in capital base and eventual failure.

Another area of concern is the approach adopted by the Nigerian regulatory authorities in recapitalising Nigerian banks through consolidation and in determining capital size. While consolidation of banks in other countries is through voluntary initiations by the concerned banks after thoroughly investigating all the relevant factors that are to impact on the capitalizing outcome, in the Nigerian context, it is through a hasty mandatory directive from the authorities without critically evaluating the factors that should form the basis of the exercise (Jude, 2004).

In spite of the fact that Nigerian banks have been undergoing recapitalisation as far back as 1969, with the hope of creating a stable banking sector that is resilient to shocks, the various recapitalisations have not yielded the desired outcomes. One of the most likely reasons is the arbitrary determination of the capital size in which the regulatory authorities are accused of doing. Instead of the regulatory authorities to define the capital size based on objective and scientific criteria taking into consideration risks and uncertainty facing the sector as the bench marks, the authorities rely on abstract and rule of thumb. The consequential effect of this is having a banking

sector with capital size and asset size that cannot resist risks and uncertainty.

Although, there are various attempt at evaluating the performance of the Nigerian banking sector following the introduction of certain reform, to the best of our knowledge, we have not come across previous works that have been carried out to empirically evaluate how risks and uncertainty are used as measures for determining what the capital size and asset size of banks should be in Nigeria.

In the light of the above, taking into consideration the oligopolistic nature of the Nigerian banking sector before the recapitalisation, there is every need to carry out an empirical study with a view to determining if and how risks and uncertainty are of significant impact and import in determining what the size of capitalized banks in Nigeria should be.

This study is restricted to Deposit Money Banks (DMBs), using data that are obtainable from selected banks. The aspects of the capitalized banks' size that the study is limited to are size in terms of capital and assets. Only on-balance sheets activities' risks components are taken into consideration. The uncertainty indicators used in the study are volatility of functional discharge, efficiency, financial stability and long term debt. The study is not intended to look at other factors that affect risk and uncertainty of banks; such as political instability and price of crude oil, among others. The secondary data that are utilised for the study are for ten (10) years ranging from 1999 to 2008. The period is chosen in order to establish trend effect of the latest bank recapitalisation policy that commenced in 2004, and hence five years before its emergence (1999-2003), and five years from the announcement period (2004-2008) are selected.

The study is expected to be of significance to regulatory authorities as it shall serve as an avenue of determining capital size and asset size of banks objectively. It shall also help banks in formulating risk policy. The risk policy both defines acceptable levels of risk for day-to-day operations, as well as the willingness of banks to incur risk weighted against the expected rewards. This in turn would assist banks in adjusting their portfolios on a timely basis.

On the basis of the above background, the study formulates the following hypotheses for testing:

H_{01}: Risks have no significant effect on recapitalised banks in Nigeria.

H_{02}: Uncertainties have no significant effect on recapitalised banks in Nigeria.

The remaining part of this paper is divided into the following sections. Review of related literature is in section 2. The methodology adopted for the purpose of the study is stated in section 3. Section 4 addresses data presentation and analysis, section 5 presents sizes estimation of Nigerian banks and, finally, section 6 deals with conclusions and recommendations.

2.0 Review of Related Literature

Capital is one of the key factors to be considered when the safety and soundness of a particular bank is assessed. The capital must be sufficient to protect a financial organisation's depositors and counterparties from the risks of the institutions due to on- and off-balance sheet activities. Moulton (1987) advocates that bank capital provides a stabilising influence on the risks faced by banks, and as a result suggest the need to have a minimum level of capital. In a study conducted by Greuning and Bratanovic (2003), they argue that in addition to serving as a safety-net for a variety of risk exposures and absorbing losses, adequate capital is a determinant of lending capacity and maximum level of assets. It is also argued in the literature that well capitalised banks benefit from potentially lower funding costs. In a study conducted by Berger (1995), a positive relationship between capital and earnings for United States banks is documented, a finding which he ascribes to the beneficial effect of capitalisation on funding costs. In another study conducted by Baele *et al.* (2004), they find that the stock returns and the conditional volatility of well capitalised banks are significantly less sensitive to shocks in credit market conditions than those of relatively less capitalised banks.

Due to the relevant roles that capital plays in the going concern existence of banks, the need for minimum capital adequacy rules become imperative. It is on that basis that Basle Accords comes into being in order to ensure that banks maintain adequate levels of capital for their risk exposures. Although, adopting the Accords lead to yielding a lot of potential benefits, but it is also linked up with a number of implications for bank management in Africa. As argued by Fry (1995a), the internationally agreed system of risk-weighted capital adequacy assessment is already too complicated for most developing economies to implement effectively. The Accord has also been criticised by Caprio *et al.* (1993) who are of the opinion that the 8% risk-adjusted Basle

ratio might not be high enough for countries whose economies are not well diversified. Polizatto (1991) shares this view by stating that an 8% capital to asset ratio should be seen as the "absolute floor", and that it should be increased on a case-by-case basis, especially where a bank has substantial off-balance sheet risks.

In another argument put forward on capital requirement, Kahane (1977) argued that although capital requirements are widely believed to reduce a bank's incentive to choose riskier assets, but the requirements by themselves may be ineffective in controlling bank risk, and may even induce a bank to choose riskier assets. Koehn and Santomero (1980) are also of similar opinion. In another study Besanko and Kanatas (1993) show that higher capital requirements may lead to greater outside equity, which could increase moral hazard because managers (insiders) have a reduced stake in the bank. This is also suggested by Gennotte and Pyle (1991). In a study conducted by Besanko and Thakor (1992), they illustrate that an increase in capital requirements increases the equilibrium loan size and decreases the equilibrium loan interest rate, but also decreases the equilibrium deposit rate. In this sense a higher capital requirement acts as a tax on depositors. Another intriguing result of capital adequacy is documented in Inaba *et al.* (2003) where they find that lower capital adequacy is associated with higher profitability, loan delinquencies and loan growth, which seems to support the “gambling for resurrection” story that banks with weak capital base tend to pursue for high-risk, and high-return projects.

Other studies of the relationship between risks and capital are in Aggarwal and Jacques (1998), Jacques and Nigro (1997), Shrieves and Dahl (1992), Koehn and Santomero (1980), Kim and Santomero (1988), Hellman *et al.* (2000) and Demsetz and Strahan (1997) in which capital and risks are in tandem.

The position of this paper as regards the relevance of capital adequacy is except and unless capital base that banks should have are determined on the basis of risks facing the banks, the banks would continuously have capital adequacy problems.

Another serious factor that plays significant role in banks' survival is the degree of uncertainty facing the banking sector. Due to the significance of uncertainty, there is every need for measuring and quantifying its effect in a given banking sector. Basically, there are three different ways to construct uncertainty indicators on the firm level as argued by Kalckreuth (2001). The most direct method is to ask managers about the subjective certainty of their expectations. This approach was adopted by Guiso and Parigi (1999) in studying investment and demand uncertainty of Italian banks. Patillo (1998) also adopted similar approach to study investment, uncertainty and irreversibility in Ghana. Alternatively, one can make use of regular industry survey data. Caselli *et al.* (2000) computed for each year the standard deviation of the balance of positive and negative answers in studying investment and growth in Europe and United States in the nineties. In adopting subjective approach to data generation, right persons should be administered questionnaires in order to overcome bias issue.

A second approach is to rely on high frequency financial market data and use volatilities, either of commodity prices or exchange rates, or else of stock prices. Darby *et al.* (1999) used this approach to quantify the degree of uncertainty with respect to some crucial economic variables. Bloom *et al.* (2000) and Böhm *et al.* (2001) both used stock market data in respectively studying the dynamics of investment under uncertainty and discovering the link between uncertainty and investment. One disadvantage of this approach is a priori limitation to large and listed firms.

A third approach is where one tries to generate uncertainty indicators from annual or quarterly financial statements of individual firms, measuring the volatility of operating profits, cash flow and other variables. Ghousal and Loungani (1996, 2000), Minton and Schrand (1999) and Bo (1999) used this approach in studying investment under uncertainty. Although both balance sheet and income statement data yield firm specific indicators and thus can exploit the individual variability of a large panel data set, one still has to find a convincing way to make them time specific as well.

According to Lensink *et al.* (2000), there are basically five methods to construct an uncertainty proxy. These methods are: i) The standard deviation of the variable under consideration; ii) The

standard deviation of the unpredictable part of a stochastic process; iii) The standard deviation from a geometric Brownian process; iv) The Generalised Autoregressive Heteroskedasticity (GARCH) model of volatility; and v) The standard deviation derived from Survey Data.

In the context of this work, the third approach to measuring uncertainty is adopted. This is because of appropriate proxies that could be used in measuring uncertainty, which could supplement the risks proxies used by this study.

3.0 Methodology of the Study

The basic research methods adopted by this study are descriptive and historical. The data used in this research came from secondary source and the instrument adopted is documentation. The population of this study is made up of all the Deposit Money Banks of the Nigerian banking sector and they are 25 in number as at the year ended 31st December, 2007. The sample size of the study is 10 banks drawn from the defined population and it is arrived at by using Yamane (1967) adjusted sample size formula, which is represented thus:

$$n = n_0 \div 1 + (n_0 - 1) \div N$$

and

$$n_0 = N \div 1 + N(e)^2$$

Where:

n = *Adjusted Sample Size*

n_0 = *Sample Size prior to Adjustment*

e^2 = *Level of precision*

N = *Population Size*

A 90% Confidence level is used and P = 0.1 are assumed.

On substituting the value of N=25 and e=0.1, we have $n_0 = 25 \div 1 + 25(0.1)^2 = 20$. On substituting the value of n_0 in the adjusted sample size formula we have $n = 20 \div 1 + (20 - 1) \div 25 = 11.3333$, in which case we have decided to take the nearest even number to the sample size figure.

Simple random sampling is a basic sampling design adopted in selecting the sample; this is because it allows equal representation. The randomly selected sample banks are: Afribank Plc; Diamond Bank; First Bank Plc; Guaranty Trust Bank; Oceanic Bank; Platinum-Habib Bank; Union Bank; United Bank of Africa; Wema Bank and Zenith Bank. The study utilises aggregated data of the respective ten sample banks.

The technique adopted for the purpose of the analysis was Regression Model. Two regression models are constructed for the purpose of testing the hypotheses. The first model is used to determine whether on-balance sheet risks exposure affected capital size of the selected DMBs, while the second model is used in testing the effect of the uncertainties on the capitalized banks' size.

$$CAPSIZE = \varphi_0 + \varphi_1 MARKT + \varphi_2 OPRN + \varphi_3 GNRL + \varphi_4 CRDT + \varepsilon_i \ldots\ldots\ldots\ldots\ldots 1$$

$$ASSTSIZESD = \omega_0 + \omega_1 FDUN + \omega_2 EFFUN + \omega_3 FSUN + \omega_4 LTDUN + \varepsilon_i \ldots\ldots\ldots 2$$

The following table represents the variables used in the two models above, coupled with their definitions.

Table 1 Models Variables

Variable	***Symbol***	***Measurement***
Capital Size	*CAPSIZE*	*Core Capital/Total Assets*
Market Risk	*MARKT*	*Interest Income/Total Assets*
Operation Risk	*OPRN*	*Personnel Expense/Operational Expenses*
General Risk	*GNRL*	*Net Income/Total Assets*
Credit Risk	*CRDT*	*Loan Loss Provision/Total Assets*
Functional Discharge Uncertainty	*FDUN*	*Coefficient of Variation of Asset Growth Rate*

Efficiency Uncertainty	*EFFUN*	*Debtors/Tangible Assets*
Financial Stability Uncertainty	*FSUN*	*Book Value of Equity/Tangible Assets*
Long-term Debt Capacity Uncertainty	*LTDUN*	*Long-Term Debt/Tangible Assets*

Source: Various Literature Definitions

The definitions of the variables that are used in the model one are based on the regression models developed by Chaudhry (1991) and Keskinkilic and Sari (2006). The first four variables *MARKT*, *OPRN*, *GNRL*, and *CRDT* represent on-balance sheet components. The variables *FDUN*, *EFFUN*, *FSUN* and *LTDUN* are based on the models developed by Minton and Schrand (1999), and Ghousal and Loungani (2000) and they represent various uncertainties facing banks.

In an effort to estimate the goodness of fit of the models, Mc Fadden R^2 is used. Apart from using the R^2, Correlation Matrix, Tolerance Value, and Variance Inflation Factor are also adopted in order to address multicollinearity problems. As for the Parameters' estimate, the Regression models do not permit looking at pre and post separately. This is on the ground that the regression lines require wide range of data, and the feasibility studies carried out using sub-samples data of the study do not allow that.

4.0 Data Presentation and Analysis

As earlier stated, the study used Regression Models in order to provide basis for testing the two hypotheses. The following table gives the descriptive statistics for the hypothesis one variables:

Table 2 Descriptive Statistics for the Hypothesis one Variables

Variable		***MARKT***	***OPRN***	***GNRL***	***CRDT***

	CAPSIZE				
Mean	*1.1782*	*1.1589*	*4.2588*	*0.3205*	*0.3158*
Standard Error	*0.1251*	*0.1680*	*0.3925*	*0.0311*	*0.0159*
Median	*0.9104*	*1.0281*	*3.6381*	*0.3460*	*0.3255*
Mode	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
Standard Deviation	*0.3956*	*0.5314*	*1.2412*	*0.0982*	*0.0503*
Sample Variance	*0.1565*	*0.2823*	*1.5405*	*0.0097*	*0.0025*
Kurtosis	*-0.9129*	*5.0545*	*-0.6136*	*0.2292*	*0.8362*
Skewness	*0.8564*	*2.0841*	*0.9983*	*-0.9219*	*-1.0330*
Range	*1.0436*	*1.9053*	*3.401*	*0.3164*	*0.1647*
Minimum	*0.8635*	*0.5998*	*3.1201*	*0.1261*	*0.211*
Maximum	*1.9071*	*2.5051*	*6.5211*	*0.4425*	*0.3757*
Sum	*11.7822*	*11.5890*	*42.5882*	*3.2047*	*3.1584*
Count	*10*	*10*	*10*	*10*	*10*

Source: Microsoft Excel Result

From the Table 2 above, the average values of the dependent variable *CAPSIZE* (capital size) is 1.1782 and the coefficient of variation is 0.3358 indicating lack of substantial variation. The other variables in the table also exhibit some level of variability and in some cases the mean is larger than the median and vice versa, indicating outlier and skew to the data. On the overall, *OPRN* (operation risk) has the highest standard deviation and *CRDT* (credit risk) has the lowest. The higher the standard deviation, the higher the risk banks face.

The level of *CAPSIZE* (capital size) during the study period lies between 86.35 and 191 percent, while the value of *MARKT* (market risk) lies between 59.98 and 251 percent. *OPRN* (operation risk) lies between 312 and 652 percent, *GNRL* (general risk) lies between 12.61 and 44.25 percent and *CRDT* (credit risk) lies between 21.1 and 37.6 percent.

In an effort to ascertain the nature of the relationship between the dependent and the independent variables, and also to establish whether or not multicollinearity exists as a result of the correlation amongst the variables, Table 3 is incorporated for the purpose of analysis.

The correlation matrix in Table 3 provides some insights into which of the independent variables are related to the dependent variable *CAPSIZE* (capital size).

Table 3 Correlation Matrix of CAPSIZE with On-balance sheet components

Variable	*CAPSIZE*	*MARKT*	*OPRN*	*GNRL*	*CRDT*
CAPSIZE	*1.000*				
MARKT	*.466*	*1.000*			
OPRN	*.759*	*-.137*	*1.000*		
GNRL	*-.640*	*-.204*	*-.787*	*1.000*	
CRDT	*-.595*	*-.123*	*-.753*	*.840*	*1.000*

Source: Microsoft Excel Result

From the matrix above, the values on the diagonal are all in 1 indicating each variable is perfectly correlated with itself. The highest correlation with *CAPSIZE* (capital size) is for *OPRN* (operation risk) (0.759) and *MARKT* (market risk) (0.466). Both correlations are positive, which implies that as the value of *OPRN* (operation risk) increases, or the value of *MARKT* (market risk) increases, so does *CAPSIZE* (capital size). Though, both correlations are positive, only the relationship between *CAPSIZE* (capital size) and *OPRN* (operation risk) shows strong correlation. On the other hand, *GNRL* (general risk) and *CRDT* (credit risk) show negative correlation of -0.640 and -

0.595, respectively.

The correlations between independent variables are negative with the exception of the correlation that exists between *GNRL* (general risk) and *CRDT* (credit risk) of 0.840. The correlations range between -0.787 (*OPRN* and *GNRL*) and 0.840 (*GNRL* and *CRDT).*

To further assess the validity of non-multicollinearity indication revealed by the correlation matrices, the study uses tolerance value (TV) and variance inflation factor (VIF). The following table represents the results of TV and VIF for the on-balance sheet components.

Table 4 Tolerance Value and Variance Inflation Factor for on-balance sheet components

	Collinearity Statistics	
Variables	*Tolerance Value*	*Variance Inflation Factor*
MARKT	*0.723*	*1.382*
OPRN	*0.268*	*3.738*
GNRL	*0.200*	*5.001*
CRDT	*0.271*	*3.691*

Source: Microsoft Excel Result

From Table 4, TV ranges from 0.200 to 0.723 which signifies non-multicollinearity feature. Multicollinearity feature exists when the value of TV is less than 0.2 (Statnotes, 2007). The VIF which is simply the reciprocal of TV ranges from 1.382 to 5.001 and this indicates absence of multicollinearity. VIF shows multicollinearity when its value exceeds 10 (Tobachnick and Fidell, 1996).

As for the results of the regression equation of the dependent variable, capital size on the independent variables on-balance sheet components, the following table shows the summary of the outcome of the regression. The full results are contained in Appendix A.

Table 5 CAPSIZE (Capital size) as a dependent variable for on-balance sheet components	
Variables	***Coefficients and t-values***
Intercept	*-1.958* *(-4.346)*
MARKT	*0.551* *(9.350)****
OPRN	*0.405* *(9.754)****
GNRL	*1.792* *(2.954)***
CRDT	*0.626* *(0.615)*
R^2	*0.997*
Adj. R^2	*0.959*
F-Stat	*53.823****
Durbin Watson	*2.182*

Source: Microsoft Excel Regression Result

t-statistics are reported in parentheses and the symbols ***,**, indicate statistical significance at the 1 and 5 percent levels, respectively.

From Table 5 regression equation (1) relates *CAPSIZE* (capital size) to *MARKT* (market risk), *OPRN* (operation risk), *GNRL* (general risk), and *CRDT* (credit risk). The estimated regression relationship for the capital size model is:

CAPSIZE = -1.958 + 0.551 MARKT + 0.405 OPRN + 1.792 GNRL + 0.626 CRDT

The equation indicates that three of the four independent variables have significant positive effect on *CAPSIZE* (capital size) with the exception of *CRDT* (credit risk). An increase in any of these variables is expected to increase *CAPSIZE*. The Durbin Watson statistic shows no serial correlation as the value is within the range of 1.5 to 2.5.

The results provide evidence for the rejection of the null hypothesis that risks have no significant effect on consolidated capital size of banks in Nigeria.

The study provides support to the findings of Aggarwal and Jacques (1998), Jacques and Nigro (1997), and Shrieves and Dahl (1992) that the higher the capital size, the higher the banks' risk. It contradicts the findings made by Koehn and Santomero (1980), Kim and Santomero (1988) and Hellman *et al.* (2000) that the higher the capital size, the lower the risks of banks.

The t-values in the regression results indicate that the variable with the greatest influence on *CAPSIZE* (capital size) is *OPRN* (operation risk) with a value of 9.754; it is then followed by *MARKT* (market risk) with a value of 9.350, all significant at 1 percent. The other t-values are for *GNRL* (general risk) with a value of 2.954 and *CRDT* (credit risk) with a value of 0.615. *GNRL* (general risk) is significant at 5 percent, while *CRDT* (credit risk) is not significant at all.

In terms of the fitness of the model, the regression equation indicates an adjusted coefficient of determination of 96 percent. This implies that 96 percent of the variations of *CAPSIZE* (capital size) are explained by the combined influence of the three statistically significant explanatory variables used in the model. This provides evidence that the model is well fitted. Another factor in favour of the fitness of the model is the F-Statistics value of 53.823 exhibited by the model, which is found to be significant at 1 percent.

As for the second hypothesis that deals with testing the effect of the uncertainties on the capitalized banks' size in Nigeria, the following table gives the descriptive statistics of the variables:

Table 6 Descriptive Statistics for the Hypothesis Two Variables

Variable	***ASSTSIZESD***	***FDUN***	***EFFUN***	***FSUN***	***LTDUN***
Mean	*1.8817*	*0.0164*	*4.1955*	*0.5742*	*2.7711*
Standard Error	*0.5067*	*0.0059*	*2.1414*	*0.2198*	*1.7181*
Median	*1.5131*	*0.0081*	*2.2168*	*0.18375*	*0.4298*
Mode	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
Standard Deviation	*1.6023*	*0.0187*	*6.7717*	*0.6952*	*5.4330*
Sample Variance	*2.5673*	*0.0004*	*45.8554*	*0.4833*	*29.5170*
Kurtosis	*5.8637*	*0.8408*	*8.3833*	*0.9187*	*8.3891*
Skewness	*2.1602*	*1.4477*	*2.82002*	*1.2891*	*2.8329*
Range	*5.8178*	*0.0544*	*22.8143*	*2.0557*	*17.741*
Minimum	*0.2133*	*0.0000*	*0.0624*	*0.0162*	*0.0247*
Maximum	*6.0311*	*0.0544*	*22.8767*	*2.0719*	*17.7657*
Sum	*18.8173*	*0.1638*	*41.9546*	*5.742*	*27.7109*
Count	*10*	*10*	*10*	*10*	*10*

Source: Microsoft Excel Result

From the above Table, the average value of the dependent variable *ASSTSIZESD* (volatility of assets size) is 1.8817, and its coefficient of variation is 1.1744, which implies that the variable is positively skewed. Other variables in the table also indicate skewness of the data. The extent of the dispersion of the variables under study shows that on the overall, *EFFUN* (efficiency uncertainty) has the highest standard deviation and (functional discharge uncertainty) *FDUN* is having the lowest.

The level of *ASSTSIZESD* (volatility of assets size) during the study period lies between 21.33 and 603.11 percent. The value of *FDUN* (functional discharge uncertainty) lies between 0.00 and 5.40 percent, *EFFUN* (efficiency uncertainty) lies between 6.24 and 2287.67 percent, *FSUN* (financial stability uncertainty) lies between 1.62 and 207.19 percent and *LTDUN* (long-term debt capacity uncertainty) lies between 2.47 and 177.65 percent.

It should be noted that none of the variables in both Table 6 is normally distributed, as the values of kurtosis in some of the variables is greater than 3, but since the values of the skewness are above 0 in most of the variables, that can take care of non-normality problem. The non-normality of the variables is a well-known phenomenon in panel studies as argued by Bo (1999).

In an effort to ascertain the nature of the relationship between the dependent and the independent variables, and also to establish whether or not multicollinearity exists as a result of the correlation amongst the variables, Table 7 is incorporated for the purpose of analysis.

The correlation matrix in Table 7 shows the relationship between the dependent variable *ASSTSIZESD* (standard deviation of assets size) and other independent variables that represent uncertainty volatility variables.

Table 7 Correlation Matrix of ASSTSIZESD with Uncertainty Volatility Variables

Variable	*ASSTSIZESD*	*FDUN*	*EFFUN*	*FSUN*	*LTDUN*
ASSTSIZESD	*1.000*				
FDUN	*.308*	*1.000*			
EFFUN	*-.349*	*.670*	*1.000*		
FSUN	*-.013*	*-.435*	*-.021*	*1.000*	
LTDUN	*-.153*	*-.284*	*-.031*	*.452*	*1.000*

Source: Microsoft Excel Regression Result

From the Table 7 above, the value of 0.670 represents the highest correlation and it shows the correlation between *FDUN* (functional discharge uncertainty) and *EFFUN* (efficiency uncertainty). The correlation is followed by the relationship that exists between *FSUN* (financial stability uncertainty) and *LTDUN* (long-term debt capacity uncertainty) (0.452), and *ASSTSIZESD* (standard deviation of assets size) and *FDUN* (functional discharge uncertainty) (0.308). Although the correlations are positive, they are all weak. Other variables from the correlation matrix show negative correlations.

As there is no excessive correlation of the predictor variables in the correlation matrices, this implies an indication of non-multicollinearity. Excessive correlation exists when correlation coefficient is greater than 90 percent (Statnotes, 2007).

To further assess the validity of non-multicollinearity indication revealed by the correlation matrices, the study uses tolerance value (TV) and variance inflation factor (VIF). The following table represents the results of TV and VIF for the uncertainty variables.

Table 8 Tolerance Value and Variance Inflation Factor for Uncertainty Variables		
	Collinearity Statistics	
Variables	***Tolerance Value***	***Variance Inflation Factor***
FDUN	*0.367*	*2.725*
EFFUN	*0.457*	*2.187*
FSUN	*0.607*	*1.648*
LTDUN	*0.781*	*1.281*

Source: Microsoft Excel Regression Result

From Table 8 above, TV ranges from 0.367 to 0.781 which signifies non-multicollinearity feature. Multicollinearity feature exists when the value of TV is less than 0.2 (Statnotes, 2007). The VIF which is simply the reciprocal of TV ranges from 1.281 to 2.725 and this indicates absence of multicollinearity. VIF shows multicollinearity when its value exceeds 10 (Tobachnick and Fidell, 1996).

As for the regression equation, the following table represents the results of the equation of the dependent variable *ASSTSIZESD* (standard deviation of assets size) on the independent variables, volatility of uncertainty indicators. The full results are contained in Appendix B.

Table 9 ASSTSIZESD (Assets Size Standard Deviation) as a dependent variable for Uncertainty Indicators	
Variables	***Coefficients and t-values***
Intercept	*.429* *(.906)*

FDUN	*121.156* *(5.711)****
EFFUN	*-.305* *(-5.799)****
FSUN	*1.390* *(3.130)***
LTDUN	*-.019* *(-.378)*
R^2	*0.942*
Adj. R^2	*0.797*
F-Stat	*9.845***
Durbin Watson	*2.290*

Source: Microsoft Excel Regression Result

t-statistics are reported in parentheses, and the symbols ***,**, indicate statistical significance at the 1 and 5 percent levels, respectively.

From Table 9, the regression equation relates *ASSTSIZESD* (standard deviation of assets size) to *FDUN* (functional discharge uncertainty), *EFFUN* (efficiency uncertainty), *FSUN* (financial stability), and *LTDUN* (long-term debt capacity uncertainty). The estimated regression relationship for the uncertainty model is:

ASSTSIZESD = 0.429 + 121.156 FDUN -0.305 EFFUN + 1.390 FSUN - 0.019 LTDUN

The equation indicates that only *FDUN* (functional discharge uncertainty) and *FSUN* (financial stability uncertainty) have significant positive effect, which implies that any increment in anyone

of them is expected to increase *ASSTSIZESD* (standard deviation of assets size). The other variables in the model *EFFUN* (efficiency uncertainty) and *LTDUN* (long-term debt capacity uncertainty) show negative effects, which in the case of *EFFUN* (efficiency uncertainty) is significant but insignificant in *LTDUN* (long-term debt capacity uncertainty), taking into consideration the ρ value. The Durbin Watson statistic shows no serial correlation as the value is within the range of 1.5 to 2.5.

The results provide evidence for the rejection of the null hypothesis in the case of all the variables with the exception of *LTDUN* (long-term debt capacity uncertainty) that uncertainty has no significant effect on consolidated banks' size in Nigeria.

The study provides support to the arguments in the literature that growth rate of businesses, investment decisions made by individuals and organisations, and marginal revenue product of capital are affected by uncertainty (Caballero and Pindyck (1993), Pindyck and Solimano (1993), Alesina and Perotti (1993), and Ghousal and Loungani (2000)).

The t-values in the regression results indicate that the variable with the greatest influence on *ASSTSIZESD* (standard deviation of assets size) is *FDUN* (functional discharge uncertainty) with a value of 5.711; it is followed by *FSUN* (financial stability uncertainty) with a value of 3.130, all respectively significant at 1 and 5 percent. The other t-values are for *EFFUN* (efficiency uncertainty) with a value of -5.799 and *LTDUN* (long-term debt capacity uncertainty) with a value of -0.378. *EFFUN* (Efficiency uncertainty) is significant at 1 percent, while *LTDUN* (long-term debt capacity uncertainty) is not significant at all.

In terms of the fitness of the model, the regression equation indicates an adjusted coefficient of determination of 80 percent. This implies that 80 percent of the variations of *ASSTSIZESD* (standard deviation of assets size) are explained by the combined influence of the three statistically significant explanatory variables used in the model. This provides evidence that the

model is well fitted. Another factor in favour of the fitness of the model is the F-Statistics value of 9.845 exhibited by the model, which is found to be significant at 5 percent.

5.0 Estimation of Capital Size and Asset Size of Nigerian Banks

The estimated minimum capital size and asset size that Nigerian banks should have are N37.07billion and N32.21billion, respectively. The estimations are done using regression equations of Table 5 and Table 9. The equations are re-presented thus:

CAPSIZE = -1.958 + 0.551 MARKT + 0.405 OPRN + 1.792 GNRL + 0.626 CRDT

ASSTSIZESD = 0.429 + 121.156 FDUN -0.305 EFFUN + 1.390 FSUN - 0.019 LTDUN

On substituting the values of on-balance sheet risks components and uncertainty components of the year 2005, the equations yielded the earlier mentioned values as follows:

CAPSIZE = -1.958 + 0.551(0.7711) + 0.405(5.9727) + 1.792(0.2782) + 0.626(0.2936)

CAPSIZE = -1.958 + 0.425 + 2.419 + 0.499 + 0.184

CAPSIZE = 1.569

On taking the antilog of 1.569, the absolute figure which represents the capital size in Naira term is 37.068, which is approximately N37.07billion. The reason behind taking the antilog is to determine the capital size in absolute term.

As for the asset size estimation, the value is computed thus:

ASSTSIZESD = 0.429 + 121.156(0.0095) - 0.305(5.2986) + 1.390(1.1579) - 0.019(3.4199)

ASSTSIZESD = 0.429 + 1.151 – 1.616 + 1.609 - 0.065

ASSTSIZESD = 1.508

On taking the antilog of 1.508, the absolute figure which represents the asset size in Naira term is 32.21, which is approximately N32.21billion. Similar explanation for taking the antilog applies as above.

There exists discrepancy of N12.07billion between the minimum capital size that the Nigerian regulatory authorities announced and the capital size determined by the model. The discrepancy figure appeared significant and on that basis, there is every tendency that some banks operating in the Nigerian banking sector would still face distress problems, which failure to take prompt precautionary measures could lead to eventual winding up. This is because the N25billion capital base announced by the regulatory authorities is not up to the basic minimum that could resist uncertainty and risks vulnerability.

6.0 Conclusion and Recommendations

Based on the data analysis and hypothesis testing of the effect of the relationship between risks and capital size of banks in Nigeria, the results provide evidence for the rejection of the null hypothesis that Risks have no significant effect on recapitalised banks in Nigeria. The study, therefore, concludes that risks have significant effect on the capital size of banks in Nigeria. In the case of the second hypothesis, the results of the study provide evidence for the rejection of the null hypothesis in the case of all the variables with the exception of *LTDUN* (long-term debt capacity uncertainty) that uncertainties have no significant effect on the banks' size in Nigeria. The study, therefore, concludes that uncertainties have significant effect on the asset size of banks in Nigeria. The study, therefore, recommends that the regulatory authorities of the Nigerian banking sector and the board of directors should work harder to ensure that effective monitoring of the variables used in this study are put in place as they have significant effect on the dependent variables. Finally, future researches in this area should be conducted that will incorporate more of both on and off-balance sheet risks' components and uncertainty variables using accounting data that have been adjusted for inflation.

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APPENDIX A

Regression analysis

0.977	R^2
0.989	R
0.080	std. error of estimate
10	observations
4	predictor variables
CAPSIZE	dependent variable

						confidence interval	
Variables	*coefficients*		*std. error*	*t (df=5)*	*p-value*	*95% lower*	*95% upper*
Intercept	φ_0 =	-1.9575					
MARKT	φ_1 =	0.55140277	0.05897488	9.35	.0002	0.39980326	0.70300228
OPRN	φ_2 =	0.40497869	0.04151858	9.75	.0002	0.29825196	0.51170542
GNRL	φ_3 =	1.79189597	0.60662930	2.95	.0317	0.23250825	3.35128368
CRDT	φ_4 =	0.62615208	1.01884319	0.61	.5657	-1.99286343	3.24516759

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*
Regression	1.3764	4	0.3441	53.82	.0003

Residual	0.0320	5	0.0064
Total	1.4084	9	

	Y'	*Residual*
1	0.8894280	-0.01102795
2	0.8688466	0.02445339
3	0.9095748	-0.02057484
4	0.7518438	0.11165621
5	0.9859891	-0.05848906
6	0.9432733	-0.06737332
7	1.5688018	-0.06210182
8	1.3721693	0.03193070
9	1.6567264	-0.02002645
10	1.8355469	0.07155315

Durbin-Watson = 2.18

APPENDIX B

Regression analysis

0.797	R^2
0.942	R
0.722	std. error of estimate
10	observations
4	predictor variables
ASSTSIZE	dependent variable

						confidence interval	
Variables	*coefficients*		*std. error*	*t (df=5)*	*p-value*	*95% lower*	*95% upper*
Intercept		0.4284					
FDUN	ω_1	121.17917305	21.21957351	5.71	.0023	66.63261195	175.72573415
EFFUN	ω_2	-0.30462682	0.05253950	-5.80	.0022	-0.43968370	-0.16956995
FSUN	ω_3	1.39001306	0.44451932	3.13	.0260	0.24734163	2.53268448
LTDUN	ω_4	-0.02642224	0.07083192	-0.37	.7244	-0.20850120	0.15565672

ANOVA table

Source	*SS*	*df*	*MS*	*F*	*p-value*

Regression	20.5009	4	5.1252	9.84	.0137
Residual	2.6050	5	0.5210		
Total	23.1059	9			

	Y'	*Residual*
1	1.1753304	-0.67233040
2	1.1059753	0.47142475
3	1.6770295	0.16477047
4	2.9498243	-0.93822426
5	5.5089033	0.52219667
6	0.2192020	-0.00590202
7	1.5110651	-0.20996513
8	2.5352093	-0.06120932
9	1.5180537	-0.10275374
10	0.6167070	0.83199299

Durbin-Watson = 2.29

APPENDIX C

Year	*CAPSIZE*	*MARKT*	*OPRN*	*GNRL*	*CRDT*	*GUAR*	*ACCPT*
1999	0.8784	1.0274	3.3717	0.3834	0.3641	0.6613	0.3299
2000	0.8933	1.0287	3.2879	0.3864	0.3757	0.6462	0.3260
2001	0.889	1.0261	3.4556	0.3801	0.3526	0.6279	0.3287
2002	0.8635	0.9682	3.1201	0.3933	0.3309	0.6059	0.3324
2003	0.9275	1.0313	3.4262	0.4425	0.3105	0.6478	0.2947
2004	0.8759	1.0788	3.8206	0.3046	0.34	0.6614	0.4228
2005	**1.5067**	**0.7711**	**5.9727**	**0.2782**	**0.2936**	**0.5741**	**0.3955**
2006	1.4041	0.5998	6.5211	0.1261	0.211	0.6901	0.5623
2007	1.6367	2.5051	4.2345	0.1983	0.2599	0.7498	0.7327
2008	1.9071	1.5525	5.3778	0.3118	0.3201	0.7839	0.7632

Source: Computed from the Various Annual Reports of the Selected Banks

Year	*Bzsd*	*FDUN*	*EFFUN*	*FSUN*	*LTDUN*
1999	0.5030	0.0054	0.6217	0.2061	0.3120
2000	1.5774	0.0056	0.0624	0.0162	0.2407
2001	1.8418	0.0112	0.4995	0.0325	0.0830
2002	2.0116	0.0226	0.9989	0.0649	0.1661
2003	6.0311	0.0451	1.9976	0.1614	0.0247

2004	0.2133	0.0544	22.8767	0.1279	0.5476
2005	**1.3011**	**0.0095**	**5.2986**	**1.1579**	**3.4199**
2006	2.4740	0.0034	3.7832	2.0719	1.7482
2007	1.4153	0.0066	3.3800	1.1881	17.7657
2008	1.4487	0.0000	2.4360	0.7151	3.4030

Source: Computed from the Various Annual Reports of the Selected Banks