Innovations

Bank Performance Based on Return on Equity: The Relationship with Enterprise Risk Management Indicators

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Abstract: *In this study, the researchers provide a fresh examination on the nexus between return on equity and enterprise risk management indicators for a panel of Nigerian banks using pooled OLS, WG-VC and flexible GLS methods. The study aims to determine whether the relationship with ERM will improve the performance (return on equity) of the Deposit Money Banks. The findings show that the chief risk officer, members of the risk committee, and derivative instruments for hedging foreign exchange rate risk have a positive impact on return, while risk mapping and derivative instruments for hedging credit risk maintain a positive relationship with return on equity. Banks have continued to fail due to high levels of non-performing loans, poor corporate governance, negligent credit administration, and failure to meet liquidity and capital ratio prudential ratios. The result clearly showed that enterprise risk management is a positive driver of return on equity. The study concludes that return on equity increase with an increase in risk committee member and derivative instrument for hedging foreign exchange risk, while the other three ERM indicators and return on equity move in a different direction, that is a negative relationship is evident. Financial institutions should weigh the risk vs the potential rewards to decide whether the risk is worthwhile. They can benefit from risks that are worthwhile taking as a result both in the short and long term.*

Keywords: *Banks, Deposit, Equity, Enterprise, Money, Performance, Return, Risk*

1. Introduction

The 21st century has been an era of continuous change and transformations in all fields of businesses, social and economic lives. However, prior to that, business organisations were used to apply traditional strategies to performance to maximise profitability, values and sales. This has developed into the adoption of modern ways (and strategies) to survive and succeed in a world of uncertainties arising from the megatrends of globalisation, technological advances, digitalisation, complicated financial model, corporate governance changes and changing structure of the markets (Li, Chiang, Sang, and Sullivan, 2018; Andrey, Javier, Vladimir and Vera, 2021).

The effect of non-performing loans on the performance of a few chosen commercial banks in Nigeria was investigated by Nwosu, Okedigba, and Anih (2020). Multiple regression algorithms and secondary data from three banks between 2000 and 2013 were employed in the study's research. The study's conclusions showed that there is an inverse link between non-performing loans and loan loss provision for both return on equity and return on asset. Nyarko-Baasi (2018) conducted a study akin to this one for a few Nigerian banks between 1994 and 2014, analysing the effect of non-performing loans (NPLs) on bank performance through the use of multiple regression and descriptive statistics. The results showed that large amounts of non-performing loans hurt banks' performance, especially in the long run. Nwosu, Okedigba, and Anih (2020) and Nyarko-Baasi (2018) also used descriptive and regression analysis to examine the non-performing loan portfolio and its impact on bank profitability in Nigeria for particular commercial banks. The results demonstrated the negative impact nonperforming loan have on bank profitability. That being said, Catherine (2020) examined the relationship between Bank of Africa (U) Ltd.'s financial performance and credit risk management. The research demonstrated how the indicator of nonperforming loans positively impacted banks' profitability as measured by return on equity (ROE) and return on assets (ROA).

There are several inconsistencies in establishing the negative influences of ERM on the Performance of a business organization by past researchers like Markowitz (1952), Aobi, Sabato and Schmid (2012), Li et al. (2014) just to mention a few against the likes of McShane, Nair and Rustambekov (2011), Suttipen (2018), Annamalah, Murali, Govindan and Aravindan (2018), Silva, Juliano, Fernades da Silva and Chan, (2019) who had contrary views based on the results of their findings have provided argument to question these claims. According to these authors, ERM is a significant positive determinant of performance. The study investigates if the relationship with ERM will increase performance (return on equity) of the DMBs. The rest of the paper is structured as section 2 literature review, data and method, section 3 results and discussion section 4 discussion, section 5 conclusion.

2. Literature Review, Data and Method

2.1 Conceptual Review

Risk management is not a new term in various disciplines. It ranges from economic to military or environmental or health or sport or production. The conventional method to risk management in insurance and financial institutions has been used for many years in many risk management roles, such as market risk management, credit risk management, auditing, and so on. As opposed to the business-wide strategy known as enterprise risk management, which was implemented by certain organisations, these various risks were managed in silos (Committee of Sponsoring Organisations of the Treadway Commission, 2021).

The introduction of ERM and its wide adoption for use at the strategic level and decision-making in the management of risk has changed the narratives. The idea of enterprise risk management (ERM) is no longer viewed as a way to protect the assets that businesses have created; rather, it is seen as a method or procedure that adds value to the business and aids in seizing of opportunities (Saeidi et al., 2020). The Organisation for Economic Co-operation and Development (OECD) cited this example from their current Risk Management and Corporate Governance report to illustrate the attention that the international community and governments have paid to enterprise risk management and the cumulative effect that it has on risk management at the enterprise level that transforms into general economic uncertainties: "Perhaps one of the greatest shocks from the financial crisis has been the widespread failure of risk management" (OECD, 2020). The risk was frequently not handled on an enterprise level. Rebecca (2021) and the OECD (2020). The current credit default issue serves as an illustration of poor risk management.

The selection of performance variables has been done in a number of research using various methods. A few of them chose metrics related to value generation; Tobin's Q ratio, return on equity (ROE), and different accounting tools like return on assets (ROA) are a few examples of these metrics (Bui, T., N., Nguyen, X., H. & Pham, 2023; Hall, 2023). Almost all ERM studies use these metrics in addition to others, such as stock price variability or earnings variability. To assess a company's internal financial performance, two accounting metrics that are frequently employed are ROE and ROA (Ali, Murtaza, Hedvicakova, Jiang, and Naeem, 2022).

The ethical goal of ERM implementation is to maximise shareholder wealth. The technique raises the firm's potential return by helping management respond to risk more skillfully. Risk-based resource allocation by the organisation can increase the likelihood of earning a profit and accomplishing the company's goals (Mohammed et al., 2018). As a result, a company's financial performance can be improved by implementing ERM successfully. Companies that use ERM in conjunction with risk management get higher returns, which suggests that using ERM helps stabilise earnings (Muhammed et al., 2018). The consistency of earnings suggests that the

businesses are performing well, which increases demand for the stock of the company. The company's performance will increase if resources in the form of these investments are devoted towards the development of operations and technologies. Therefore, the company's ROE (Return on Equity), which shows how the stockholders fared over the year, will improve with the application of ERM (Ross, Westerfield & Jordan, 2013).

Effect of ERM on ROE

Particularly when comparing the performance of businesses in the same industry, ROE is utilised. A ROE is a gauge of management's capacity to produce income from the equity at its disposal, much like return on capital. ROEs between 15 to 20% are typically seen as favourable (Onyefulu,
Emma, & Orjinta, 2019). Along with other financial factors, ROE is taken into consideration while valuing stocks. Because profits per share (EPS) have a significant impact on stock prices, a company's stock with a 20% ROE will typically be twice as expensive as one with a 10% ROE. Reinvesting earnings to support business expansion is the advantage of low ROEs. In addition, a dividend on common shares or a mix of dividends and corporate reinvestment may be received as the benefit. According to Onyefulu, Emma, and Orjinta (2019), ROE is less significant if earnings are not reinvested.

Earnings growth slows down when companies pay dividends, as demonstrated by the sustainable growth model. The projected increase will only equal 80% of the ROE rate if the dividend payout is 20%. Using earnings to repurchase shares will result in a slower growth rate. The incremental earnings returns (ROE/x) will be less if the shares are purchased at a multiple of book value (a factor of x times book value). For ordinary shareholders, ROE is typically calculated. According to Kong, Li, and Zhang (2022), a company's performance is more efficiently managed when its ROA and ROE are higher. Operational and financial hazards are two categories of risk to which firms are subject. The product marketplaces in which a company works have an impact on operational risks, also known as business risks. These risks are related to the uncertainty surrounding the firm's investments and investment prospects. Unexpected fluctuations in interest rates, exchange rates, and oil prices, for example, pose financial risks for specific organisations in addition to operational hazards. Stated differently, this index quantifies the effectiveness of a
company in making a profit with the capital of its shareholders. The ROE was a popular instrument employed by many of the earlier academics who conducted studies of a similar nature to gauge business performance. As mentioned by Nyeadi, Sare, Aawaar, & McMillan, (2018) and Najaf, (2021), two examples of this are Nur and

Rayenda, (2022) and Muhammad & Petr, (2021). The influence of an ERM-supportive internal environment on business performance can be calculated using ROE.
Even then, there are differing opinions about the results of other researches who discovered that an internal environment that is supportive of ERM has a favourable and noteworthy effect on ROE. For example, Kinyua (2015) discovers a substantial correlation between the internal control environment and financial performance and the value added by an ERM-supportive internal environment within the company. A company's financial information serves as the foundation for investors' decision-making, and the idea of Signalling Theory regards financial performance as a component of such information (Kurniati, 2019). Financial performance is an important indication for making investment selections. Operations inside the company are reflected in profitability.Over time, the company's performance is evaluated in part by its capacity to turn a profit on its capital assets (Reschiwati, R., Syahdina, A., & Handayani, 2019; Oladipo, Adegboyo, & Olugbamiye, 2020).
The ability of the business to generate profits from its activities is the main emphasis of return on equity, or ROE. The ratio of net income before taxes to total equity is used to calculate the return on equity (ROE ratio), as stated in Bank Indonesia Circular Letter No. 6/23/DPNP dated May 31, 2004 (Fahrul, Rio, Halim, Dedy, Sujono, Wahyuniati, Nuryamin, 2019; Deni, 2022). Two common accounting metrics used to assess a company's internal financial performance are ROE and ROA (Ali, Murtaza, Hedvicakova, Jiang, and Naeem, 2022).

Theoretical Review

Numerous empirical studies have been conducted in an effort to provide evidence for the various risk management philosophies. A wave of fresh studies conducted in this area in the late 1990s revealed that not many studies had contributed to our understanding of risk management. Interestingly, the most important studies conducted in the last few years focused on methodological problems, such as the endogeneity issue (Xinrui, Hanqing, Junsheng, & James, 2021), the inclusion of non-derivative hedging (Davies et al., 2006), and presumptions regarding the use of derivatives (Oliver & George, 2019). The theory examined includes risk management models that have been established and are supported below;

Enterprise Risk Management Theory

According to Fernando and Basnayak (2022), risk management has gained significant importance as a business driver, and stakeholders' concerns around risk have escalated. When an organisation adopts an enterprise-wide approach to risk management, it may take into account the possible effects of various risks on all of its stakeholders, products, services, processes, and activities. The integrated approach

to risk management used by an organisation and its extended networks is known as enterprise risk management, ERM.

The degree to which a company's corporate strategy produces results that are different from those stated in its corporate objectives is known as enterprise risk (Demidenko & Sidorenko, 2019; Ryszard, 2019). It may also be described as the extent to which a company's corporate strategy fails to produce the desired outcomes. Due to the numerous variables that could affect the decisions made on the activities, procedures, and resources to be used in implementing the plan, the approach chosen to meet these corporate goals carries a particular risk profile. Over the past ten years, risk management has evolved from the conventional silo approach used by different departments and functions within an organisation to a comprehensive, more coordinated, and integrated process that manages risk across the board (Buczkowski, 2021; Mojca, Marika, & Darja, 2023). Enterprise Risk Management (ERM) has become the term for this comprehensive and integrated strategy. The implementation of Enterprise Risk Management (ERM) across diverse regions would enable the sharing of risk data amongst international groupings.

As per the widely accepted COSO framework (2021), ‘‘Enterprise risk management is a process that the board of directors, management, and other staff members of an entity implement when developing strategies and throughout the enterprise. Its goal is to identify potential events that could have an impact on the entity and manage risk to be within its risk appetite in order to give a reasonable assurance that the entity's objectives will be met. Fundamentally, enterprise risk management is simply the most recent moniker for a comprehensive risk management strategy that addresses business hazards and advocates for managing the organization's whole risks collectively as opposed to separately (OECD, 2020). Under enterprise risk management, the chief executive officer or board of directors, who are prepared to handle any kind of risk, takes over decision-making authority from the insurance risk manager. The following are the categories of risk that are covered by enterprise risk management: financial, operational, strategic, and hazard.

Hazardous risks: These are risks such as fire, theft, windstorm, liability, interruption of business, pollution, health, and pensions that have historically been covered by insurance.

Financial risks: These include interest rate, foreign exchange, commodity price, liquidity, and credit risks, as well as possible losses resulting from movements in the financial markets.

Operational risks: These include a broad range of scenarios, such as those involving corporate leadership, information technology, managerial fraud, trademark protection, product development, failure, and customer satisfaction.

Strategic risks: Risks related to competitiveness, client preferences, technical innovation, and political or regulatory barriers.

Empirical Review

Winarto and Chariri (2022) analyzed the effect of enterprise risk management on firm financial performance in manufacturing companies quoted on the Indonesia stock exchange. The sample period spans from 2016 to 2019, about seventy-four manufacturing companies were used. And the data for the study were sourced from these companies' annual financial reports and accounts. The researchers used return on assets as a proxy for firm performance and this served as the dependent variable. The independent variables used are factors of enterprise risk management and they are risk map, risk committee, COSO implementation framework, and ISO 31000 implementation framework. The researchers documented that risk committee and COSO implementation framework have a negative impact on return on assets. While risk map and ISO 31000 implementation framework have a positive influence on return on assets.

In the research work of Jawad et. al (2021), the impact of enterprise risk management on the performance of financial sectors in Pakistan was evaluated. The researchers used data from different financial institutions for their study. The financial firms are Housing Finance Companies, Investment Banks, Commercial Banks, Development Finance Institutions, Mutual Funds, Insurance Companies, Leasing Companies, Foreign Banks, and Modaraba Companies. Data were collected from these firms' annual financial reports and accounts from 2008 to 2016 via the statistics and DWH Department of State Bank in Pakistan. The dependent variable used by these researchers is debt to asset ratio, to present performance. Meanwhile, the independent variables are enterprise risk management, return on capital employed, cost-to-income ratio, enterprise value-to-asset value, return on equity, leverage, and equity-to-asset ratio. Ordinary Least Square estimator was adopted by the authors to test their stated hypotheses. The researchers discovered that there is a long-run link among the variables used. All the independent variables have a positive influence on the performance of the financial institutions selected in this study. Furthermore, they declared that the relationship between the dependent variable and the independent variables is significant except for cost to income ratio which has an insignificant influence on performance.

Candy (2021) conducted a study, impact of the best practice of enterprise risk management on

Rurals' bank performance in Riau Island provinces. The author claimed to use both primary and secondary data. The primary data were sourced from the use of questionnaires. Questions relating to the practices of enterprise risk management were structured and distributed to the researcher's targeted population. And about

sixty-three (63) responses were processed for running the analysis. The dependent variables used by Candy are financial and non-financial performance. The financial performance indicators are return on equity and return on assets, while the non-financial performance indicators used are productivity, quality, development of personnel, and delivery of service. The financial data were collected from the yearly financial reports of the selected companies. The independent variables used are three components of ERM that include governance, structure, and process. The size of the bank and age were the control variables used by the researcher. The author documented that the practices of enterprise risk management favourably influence the financial performance of the firm as well as its non-financial performance.

González, Santomil, and Herrera (2020) analyzed the effect of enterprise risk management on both the performance and financial stability of non-financial companies in the Spanish stock market. Their study covered a period of four years from 2012 to 2015. The data used for their study were on performance, financial stability, and ERM indicators. The data on performance and financial stability were sourced from the Morningstar Direct and Iberian Balance Sheet Analysis System (SABI). Data on performance are Tobin-q, return on assets and return on equity. While data on financial stability are value at risk, distance to default, beta, and z-score. Data on ERM were sourced from the firms' annual reports and accounts and reports on corporate governance. ERM indicators used are risk map, risk committee, chief risk officer, and factors that are related to derivatives and hedging of risk (hedging credit risk, hedging interest risk, hedging exchange rate risk, and hedging price risk) and implementation of ISO and COSO. Financial leverage, firm size, and liquidity are the control variables.

The authors adopted both the random effect model and the Generalized Method of Moment to analyze their models. The results of the random effect model revealed that chief risk officer has a negative impact on Tobin-q, return on assets, return on equity, and distance to default, while it has a positive impact on the other three financial stability variables. Risk committee is observed to have a positive link with Tobin-q, return on assets, return on equity, and all the financial stability variables except for distance to default. Risk map has a direct relationship with Tobin-q, distance to default, and beta. But it has an indirect relationship with return on equity, return on asset, value at risk, and z-score. The variable derivative of hedging interest risk has a negative influence on Tobin-q, return on assets, return on equity, and distance to default, however, it has a positive influence on value at risk and z-score. Hedging of exchange rate risk is positively related to all three performance indicators and all the financial stability indicators except for value at risk. The relationship between hedging of exchange rate risk, return on assets, and return on equity is significant. Hedging of price risk has a negative impact on return on assets, return on equity, z-score, and distance to default. While a positive relationship exists

between hedging of price risk, Tobin-q, and value at risk. Hedging of credit risk has a negative effect on Tobin-q, return on assets and return on equity and all the financial stability variables excluding value at risk. The implementation of COSO has a positive impact on Tobin-q and return on assets but a negative on return on equity.

Asamoah and Arkoh (2019) focused on rural and community banks in Ghana as their case study to examine how enterprise risk management practices influence their financial performance. The authors employed both primary and secondary data in their investigation, for the primary data seventy-five questionnaires were used and it were distributed across the twenty-five rural and community banks in the region of Ashanti. The secondary or published data were obtained from these banks' annual books of account. Pearson correlation method was used via the SPSS statistical package. Financial performance was proxied by asset turnover, leverage ratio, return on asset, asset quality and liquidity ratio. It was noted by the researchers that there is a positive linear association between the financial performance (asset quality, leverage ratio, and liquidity ratio) of these selected banks and enterprise risk management. Nonetheless, it was observed by the researchers that enterprise risk management has a weak linear and negative influence on both asset turnover and return on asset the other two indicators of performance used in this study. Lastly, the authors documented that enterprise risk management has a positive and significant impact on the overall financial performance of these banks.

Odigbo, Yusuf, and Shuaibu (2022) evaluated the effect of enterprise risk management on deposit money banks' financial performance. They based their study on Nigerian deposit money banks. Tobin-q and Earnings per share are the independent variables used and they are proxies for financial performance. Enterprise risk management served as the independent variable. Data on these variables were collected from five banks' annual reports for the period of six years from 2015 to 2020. Ordinary Least Square method of estimation was adopted to analyze the multiple regression models. From the findings of the researchers, it is seen that enterprise risk management and Tobin-q are both significantly and positively linked. In the same manner, enterprise risk management has a positive and significant influence on earnings per share. Thus, they concluded that enterprise risk management has a direct and substantial effect on the financial performance of the selected deposit money banks in Nigeria.

The research Enterprise risk management and firm performance: Empirical evidence from Ghana equity market was published in 2020 by Horvey, Sylvester, and Jacob. The study's findings demonstrated how ERM improves the performance of listed companies in Ghana, both financial and non-financial, in terms of ROE (return on assets and equity) and Tobin Q (market performance). They also provided additional evidence that suggested there might be a non-linear link between performance and ERM. A non-linear inverted U-shape is thus seen when the

return on equity is used as a performance indicator, whereas a non-linear direct U-shape is seen when Tobin Q and the return on assets are used as performance indicators.

Sithipolvanichgul (2016) conducted an investigation on enterprise risk management and firm performance in Thailand. The author used the developed risk management measurement in accounting practice in his study. All the registered firms in the Stock Exchange of Thailand were used. The author used three methods which are principal component analysis, cluster analysis, and partial least squares methods. The independent variable is ERM scoring, the dependent variables are Tobin-q, return on equity (ROE), and return on asset (ROA), four control variables were used which are economic factors, firm size, firm characteristics, industry effect, and environmental uncertainty. The author employed both primary and secondary data, the primary data were collected through self-administered questionnaires. While the secondary data were sourced from the companies' annual reports and accounts. The results of the researcher revealed that ERM scoring is positively correlating with Tobin-q and return on equity. Also, ERM scoring and return on assets are positively and significantly related. Also, the impact of ERM on Tobin-q, return on equity (ROE), and return on asset (ROA) is positive and significant. Thus, the researcher concluded that ERM and firm performance are statistically related.

2.2 Data

The study employs data on variables for a panel of banks. These variables are return on equity (dependent variable), and (independent variables); credit hedging, exchange hedging, price hedging, risk map, risk committee and chief risk officer. These data are collected across the cross-section of the ten banks from the annual statement of accounts published by these banks. The time dimension of the data is 11 years, while the individual dimension is 10 units. This gives a total observation of 110; and a better degree of freedom than only the time series.

2.3 Method

Farrell and Gallagher (2014), McShane et al. (2011), the researchers introduced a panel data econometric equation with little modification to address the research questions for this study. Orlovska (2014), & González, Otero, Santomil, and Aracely (2020) the researchers introduce panel data econometric equations with little modification to address the research questions for this study. Thus, by definition.

$$roe_{it} = b_0 + b_1 cro_{it} + b_2 cr_{it} + b_3 rm_{it} + b_4 ph_{it} + b_5 ch_{it} + b_6 exh_{it} + \mu_{i2} + \varepsilon_{it2} \quad 1$$

Where roe-return on equity (ratio of net income to equity capital), is an element of Performance for Deposit Money Banks while cro-chief risk officer, cr-risk committee and rm-risk map are proxies for Enterprise Risk Management in this study, and they

are dummy variables that take 1 when present otherwise 0. ch-derivative instruments for hedging credit risk, ph-derivative instruments for hedging price risk, exh-derivative instruments for hedging exchange rate risk. They are also dummies taking 1 when they are available in the bank, otherwise 0. $\mu_{i1},\ldots,\mu_{i6}$ are the heterogeneity or specific errors, which are either fixed or random and $\varepsilon_{it1},\ldots,\varepsilon_{it6}$ are the unconditional time invariant disturbance term with Gaussian properties.

Justification of Choice of Study Variables

The variables used in this study could be traced to the studies by Farrell and Gallagher (2014), González et al. (2020) and McShane et al. (2011). In their studies return on asset, and return on equity are used as proxies for performance, while bankruptcy risk, risk officer, risk committee and risk map are proxies for enterprise risk management.

However, this study augmented their studies to include additional variables; Risk Committee (CR), Risk Map (RM), Credit Risk (CH), Price Risk (PH), and Exchange Rate Risk (EXH) and Return on Equity (ROE). Chief Risk Officer as a measure of ERM implementation was employed by Hoyt and Liebenberg (2011) in their investigation of the relationship between ERM and firm value for insurance companies. This idea is similar to the research design by González, Santomil and Herrera (2020) in their study when ERM was a proxy with nine indicators. Horvey & Ankamah (2020) in their research study Enterprise risk management and firm performance: Empirical evidence from Ghana equity market where three ERM indicators were used to check for the performance. Jawada, Munazza, Nauman, Sohail & Shamsi (2021) in their research analysis of the different performance indicators of the firm, enterprise risk management and their effect on firm performance proxy ERM with six indicators.

Since the research made used of a data set collected over time and across a set of units (variables), Pooled (OLS), Within Group Estimated Techniques, (WGET) and Flexible Generalized Least Square, (FGLS) was used as estimation techniques but the nature and behaviour of the dataset will determine the best fit for the research analysis (González, Santomil and Herrera, 2020; Breitung, Bruggemann, & Luetkepohl, 2021).

Studies in the past mostly preferred the use of primary data by adopting a structured questionnaire or qualitative research strategy to get their information regarding the Performance of Deposit Money Banks which invariably could miss vital points and needs couple with inability of the respondents to divulge certain information which might be useful for the research and not make the data biased. The study will be making use of a secondary data which was collected over time and in the cautious of this, the true intention is not violated since it was just for record purposes not to expose their shortcomings.

3. Results and discussion

In this study, the author hypothesizes that return on equity is linearly dependent on enterprise risk management indicators. This hypothesis is tested using three estimation methods. The results of the test are reported in tables 1, 2 and 3 respectively.

Table 1
Test based on Random Effect Model for Enterprise Risk-ROE Nexus

Regressor	Coef.	Std. Err.	Z-stat	P-value
cro	-0.10211	0.1089595	-0.94	0.349
rcm	-0.1082405	0.2032779	-0.53	0.594
rmp	0.1679211	0.0868728	1.93	0.053
diferr	0.0100579	0.2618606	0.04	0.969
dihcr	-0.0027862	0.2503642	-0.01	0.991
cons	0.1662317	0.1899602	0.88	0.382

Note: dipr omitted because of collinearity

The output of the hypothesis of this study is reported in Table 1. This test relates enterprise risk management with return on equity. For the first method (random GLS) used to analyze this relationship, the coefficient of chief risk officer, risk committee member, risk mapping, derivative instruments for hedging foreign exchange rate risk, and derivative instrument for hedging credit risk are approximately -0.10, -0.11, 0.17, 0.01 and -0.003 respectively. This outcome indicates that three of the explanatory variables (chief risk officer, risk committee member, and derivative instrument for hedging credit risk) of enterprise risk management have a significant influence on return on equity. Although, risk mapping, and derivative instruments for hedging foreign exchange rate risk are positively related to return on equity with risk mapping possessing a stronger statistical significance in terms of the influence. Also, this reveals that risk mapping, which is among the enterprise risk management indicators has a stronger significant impact on influencing an increase in the performance return on equity in Deposit Money Banks.

Robustness Checks for the Random Effect Model Results based on Enterprise Risk-ROA Nexus

Robustness checks are used to confirm the accuracy of parameters across various techniques. In this regard, two additional methodologies confirm the above-tested hypothesis' findings. Tables 2 and 3 display the outcomes of these analyses.

Table 2
Test based on WG-VC Estimation Methodfor Enterprise Risk-ROE Nexus

Regressor	Coef.	Std. Err.	Z-stat	P-value
cro	-0.1587939	0.5410273	-0.29	0.776
rcm	0.8277291	0.7332906	1.13	0.288
rmp	-0.8280555	0.5613488	-1.48	0.174
diferr	0.5207124	0.3433847	1.52	0.164
dihcr	-0.0640029	0.0686769	-0.93	0.376
cons	-0.5449008	0.3535509	-1.54	0.158

Note: dipr omitted because of collinearity

The result of the random GLS on the relationship between enterprise risk management and return on equity is further confirmed by the test of WG-VC method and the results are reported in Table 2. The coefficient of chief risk officer, risk committee member, risk mapping, derivative instruments for hedging foreign exchange rate risk, and derivative instrument for hedging credit risk are approximately -0.158, 0.827, -0.828, 0.521 and -0.064 respectively. The coefficient of chief risk officer, risk mapping, and derivative instrument for hedging credit risk are significant but with a weak (not a positive relation) effect on return on equity. This suggests that chief risk officer, risk mapping, and derivative instrument for hedging credit risk did not have a positive impact on return on equity. While risk committee member, and derivative instruments for hedging foreign exchange rate risk have positive coefficients which reveals a statistical significance and strength on return on equity. Here derivative instruments for hedging foreign exchange rate risk continued to show the influence on ROE while risk committee member showed positive influence displacing risk mapping which initially was proven to have shown a strong and statistically significance on ROE. By implication, these two variables are having a direct impact on the performance variable (ROE).

Table 3
Test based on Flexible GLS Method forEnterprise Risk-ROA Nexus

Regressor	Coef.	Std. Err.	Z-stat	P-value
cro	-0.0681235	0.2510653	-0.27	0.786
rcm	0.1933134	0.4655721	0.42	0.678
rmp	-0.219759	0.2044731	-1.07	0.282
diferr	0.5021619	0.6166462	0.81	0.415
dihcr	-0.0808093	0.5924323	-0.14	0.892
cons	-0.2954901	0.4350438	-0.68	0.497

Note: dipr omitted because of collinearity

In Table 3, the test result of flexible GLS is reported. It is seen that coefficient figure of chief risk officer, risk committee member, risk mapping, derivative instruments for hedging foreign exchange rate risk, and derivative instrument for hedging credit risk are rounded up to be -0.07, 0.19, -0.22, 0.50, and -0.08 correspondingly. The variables coefficient of chief risk officer, risk mapping, and derivative instrument for hedging credit risk have continue to show lack of positive impact on return on equity even after the three methods used. This is supported by the result of both WG-VC and flexible GLS. Therefore, it is clear that these variables are not increasing performance (ROE). Also, the three models reveal that there is a relationship between derivative instruments for hedging foreign exchange rate risk and return on equity due to it being strong and statistically significant. In the same manner, the direction of relationship between risk committee member (twice), risk mapping showed statistical significance with return on equity for WG-VC and flexible GLS models are the same. Test for the model fitness and the outcome reported in the next table. However, none of the enterprise risk management indicators have a statistically significant impact on performance variable (ROE).

Table 4
Post Estimation Tests based on Enterprise Risk-ROA Nexus

Model	R-sq	BP LM Test	Wald Test	Modified Wald Test
Enterprise Risk-ROE Nexus:				
Random Effect	0.03	94.080(0.00)	4.06(0.54)	-
WG-VC Estimation	0.01	68.237(0.01)	-	3.09(0.98)
Flexible GLS	-	68.428(0.01)	5.51(0.36)	2.16(0.99)

Note the figures in parentheses are the probability values.

The hypotheses used to test the interaction or the connectivity between enterprise risk management and return on equity were subjected to some tests to see which of these models efficiently explain the relationship between enterprise risk management and return on equity. This test is referred to as post estimation test. The tests used here are R-Sq, BP LM test, Wald test, and Modified Wald test. The R-Sq produced by the random GLS and WG-VC estimation techniques for the enterprise risk-ROE nexus are 0.03 and 0.01 respectively. This implies that the two methods have weak explanatory power. Also, for the BP LM test the probability value of the three methods is not strong suggesting that the successive residuals are autocorrelated. Nevertheless, the Wald's test statistics for random GLS and flexible GLS shows statistical significance, inferring that the models have a good fit. Similarly, the modified Wald test reveals the presence of homoscedasticity in the model of WG-VC and flexible GLS.

4. Discussion

Building a solid connection with the body of current literature requires an understanding of the research work's conclusions and their consequences. The study's conclusions provide insightful clarification on the fundamental arguments around business risk management and performance. Oluwafemi and Simeon (2010) assert that improved risk management, including financial management, cutting back on wasteful expenses such dubious advances and obligation value proportion analysis, results in improved financial performance. Thus, a proper enterprise risk management is capable of affecting performance positively. One more essential aspect of this discussion of findings is the explanation on the relationship between enterprise risk management and return on equity. Findings from the study affirm the relationship between return on equity and two or more enterprise risk management indicators (derivative instruments for hedging foreign exchange rate risk,risk committee member (twice), and risk mapping) to be positive (strong influence) and statistically significant. On this explanation, this is similar to documentations from Mohd and Salina (2010) asserted that there is a positive association between return on equity and enterprise risk management indictors. This also support the hypotheses and not empirical stand a of negative relationship between return on equity and enterprise risk management. This means that the enterprise risk management is an important factor that is required to boost (increase) performance of return on equity in Deposit Money Banks when applied. This is because an increase in enterprise risk management indicators causes return on equity to rise simultaneously. The positive position between performance and enterprise risk management is further supported by the study of Edem, Ekwe and Azubike (2018). These authors revealed that ERM have a significant and positive association with

performance that was proxy by stock prices of money deposit banks. However, our finding is contrary to this.

In the study of González, Santomil, and Herrera (2020), it was documented that risk committee, and derivative instruments for hedging foreign exchange rate risk have positive impact on return on equity (ROE). Which means that an increase in risk committee members and derivative instruments for hedging foreign exchange rate risk will increase the performance indicator (return on equity). This is in similar with a-prior expectation and reports from this study. It was also seen from their study that chief risk officer, risk mapping, and derivative instrument for hedging credit risk all have a negative influence on return on equity. Findings from this present study corroborates with the findings of González, Santomil, and Herrera (2020) as regarding the relationship between return on equity, and enterprise risk management indicators (chief risk officer, risk committee member, risk mapping, derivative instruments for hedging foreign exchange rate risk, and derivative instrument for hedging credit risk).

5. Conclusion

The study provides a fresh investigation on how the relationship with ERM increase performance (return on equity) of the Deposit Money Banks. Enterprise risk management indicators used in the study showed their significant improvement on the performance of deposit money banks. This, therefore, revealed intuitively, how the indicators maintain direct relationship with performance.

The result obtained shows that chief risk officer, risk mapping, and derivative instrument for hedging credit risk are inversely associated with return on equity. While, the association between risk committee members, and derivative instruments to hedge against fluctuations in foreign exchange rates, and return on equity is positive. The relationship between enterprise risk management and return on equity has a positive expected and theoretical sign. Our research leads us to the conclusion that, since more than two ERM indicators have a positive impact on return on asset, the expected or theoretical sign of the relationship between enterprise risk management and return on asset is maintained. Thus, our finding is in tandem with the studies of Edem, Ekwe and Azubike (2018), González, Santomil, and Herrera (2020). In regard to this, we derive this implication, the proper management of enterprise risk will increase performance. This is because any increase in enterprise risk management causes return on equity to rise simultaneously. The study concludes that return on equity increase with an increase in risk committee member and derivative instrument for hedging foreign exchange risk, while the other three ERM indicators and return on equity move in a different direction, that is a negative relationship is evident. Financial institutions should weigh the risk vs the potential

rewards to decide whether the risk is worthwhile. They can benefit from risks that are worthwhile taking as a result.

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