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. Banks continued to fail, owing to high levels of non-performing loans, poor corporate governance, careless credit administration, and failure to meet liquidity and capital ratio prudential ratios. The results from the study revealed that the chief risk officer, risk committee member, and derivative instruments for hedging foreign exchange rate risk have positive impact on return, while risk mapping, and derivative instrument for hedging credit risk maintain positive relationship with return on equity. 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).
Nwosu, Okedigba and Anih (2020) examined the impact of non-performing loans on the performance of some selected commercial banks in Nigeria. The study used secondary data from three banks from 2000 to 2013 and multiple regression techniques for its analysis. The outcomes of the study revealed that return on asset and return on equity have an inverse relationship with non-performing loans and loan loss provision, respectively. A similar study was done by Nyarko-Baasi (2018) for some banks in Nigeria for the period 1994-2014, using descriptive statistics and multiple regression techniques to analyse the impact of NPLs on Bank Performance. Findings revealed that high level non-performing loans diminishes the performance of banks, and that its occurrence was particularly in the long-run. Nwosu, Okedigba, and Anih (2020) and Nyarko-Baasi (2018) also studied non-performing loans portfolio and its effect on bank profitability in Nigeria for selected commercial banks, using descriptive and regression analysis. The findings showed that nonperforming loans portfolio have a negative effect on bank profitability. Although, Catherine (2020) in the research study measured the relationship between credit risk management and financial performance of Bank of Africa (U) Ltd. The report showed how the indicator of Nonperforming loans had positive impact on 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, section 3 data and method, section 4 results, section 5 conclusion and recommendation.

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. Although, the traditional risk management approach in financial institutions and insurance was applied for decades in different risk
management functions like audit, credit risk management, market risk management, etc. Whereas, these different risks were managed in organizations using the silos approach but not in the enterprise-wide approach so-called Enterprise risk management, (Committee of Sponsoring Organizations 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 concept of ERM on risk management is no longer seen as a safeguard of companies’ generated assets but as a process or practice generating additional value for the company that helps to seize its opportunities (Saeidi et al., 2020). The international community and governmental attention to Enterprise risk management and its cumulative effect on risk management at the enterprises level which transform into general economic uncertainties could be traced to an illustration by Organisation for Economic Co-operation and Development, (OECD) citation from their current Risk Management and Corporate Governance report: “Perhaps one of the greatest shocks from the financial crisis has been the widespread failure of risk management (OECD, 2020). In many cases, the risk was not managed on an enterprise basis” (OECD, 2020) and Rebecca (2021). The recent credit default crisis is an example of risk mismanagement.

Several studies have used different approaches to the selection of performance variables. Some of them selected the measures of value creation, return on equity (ROE), Tobin's Q ratio, and various accounting tools such as return on assets (ROA) are examples of such measures (Bui, T., N., Nguyen, X., H. & Pham, 2023; Hall, 2023). These measures besides others like earnings variability or stock price variability are included in almost all ERM studies. ROE and ROA are often used as two accounting tools to measure the internal financial performance of a firm (Ali, Murtaza, Hedvicakova, Jiang, and Naeem, 2022).

ERM’s implementation is to maximize the shareholders’ wealth ethically. The method enables the management to respond to the risk more effectively, thus increasing the potential return of the firm. The company's resource allocation based on risk can maximize the probability of gaining a return and achieving the business objectives (Mohammed et al., 2018). Therefore, effective implementation of ERM can increase the company's financial performance, Firms which implement ERM under their risk management have a higher return, which means the application of ERM can stabilize earnings (Muhammed et al., 2018). The stability of earnings indicates the firms have good performance thus creating demand for the company's stock. Resources in the form
of such investments can be allocated to develop operations and technologies, hence will improve the company’s performance. Therefore, the implementation of ERM will enhance the company's ROE, (Return on Equity) which indicates how the stockholders fared during the year (Ross, Westerfield & Jordan, 2013).

**Effect of ERM on ROE**

ROE is especially used for comparing the performance of companies in the same industry. As with return on capital, a ROE is a measure of management's ability to generate income from the equity available to it. ROEs of 15-20% are generally considered good (Onyefulu, Emma, & Orjinta, 2019). ROE is also a factor in stock valuation, in association with other financial ratios. In general, stock prices are influenced by earnings per share (EPS), so that stock of a company with a 20% ROE will generally cost twice as much as one with a 10% ROE. The benefit of low ROEs comes from reinvesting earnings to aid company growth. The benefit can also come as a dividend on common shares or as a combination of dividends and company reinvestment. ROE is less relevant if earnings are not reinvested (Onyefulu, Emma, & Orjinta, 2019).

The sustainable growth model shows that when firms pay dividends, earnings growth lowers. If the dividend payout is 20%, the growth expected will be only 80% of the ROE rate. The growth rate will be lower if earnings are used to buy back shares. If the shares are bought at a multiple of book value (a factor of x times book value), the incremental earnings returns will be reduced by that same factor (ROE/x). Most of the time, ROE is computed for common shareholders. The higher ROA and ROE reflects higher managerial efficiency of the company’s performance and vice versa (Kong, Li, & Zhang, 2022). Firms are exposed to different sources of risk, which can be divided into operational risks and financial risks. Operational risks or alternatively business risks relate to the uncertainty regarding the firm’s investments and investment opportunities, and are influenced by the product markets in which a firm operates. In addition to operational risks, unexpected changes in e.g., interest rates, exchange rates, and oil prices create financial risks for individual companies. In other words, this index measures a firm's efficiency in gaining profit from shareholders’ money. Many of the prior researchers who engaged in similar studies used the ROE as a tool for measuring firm performance. For example, Nur, and Rayenda, (2022) and Muhammad & Petr, (2021) as cited by Nyeadi, Sare, Aawaar, & McMillan, (2018) and Najaf, (2021). ERM supportive internal environment impact on firm performance can be measured by the ROE.
Although, there are contradicting views concerning these findings of some prior researchers who found that ERM supportive internal environment has a positive and significant impact on ROE. For instance, Kinyua (2015) find that the ERM supportive internal environment adds value to the firm and there is a significant association between the internal control environment and financial performance. To the concept of Signalling Theory, financial performance is a part of a company's financial information which forms the basis of investors’ decision-making (Kurniati, 2019). Financial performance becomes a significant signal in determining investment decisions. Profitability is a reflection of the company's operational activities. Its ability to generate profits based on owned capital assets becomes a part of the company's performance assessment in a period (Reschiwati, R., Syahdina, A., & Handayani, 2019; Oladipo, Adegboy, & Olugbamiye, 2020).

Return on Equity (ROE) focuses on the company’s ability to obtain earnings in its operations. ROE ratio according to Bank Indonesia Circular Letter No. 6/23/DPNP on May 31 of 2004, is measured by comparing the ratio between net income before taxes with total equity (Fahrul, R., Halim, Dedy, Sujono, Wahyuniati, Nuryamin, 2019; Deni, 2022). ROE and ROA are often used as two accounting tools to measure the internal financial performance of a firm (Ali, Murtaza, Hedvicakova, Jiang, and Naeem, 2022).

**Theoretical Review**

There have been many empirical studies aiming at finding support for the various theories of risk management. A spate of new research in this field in the late 90s showed that there have been few studies that added to research knowledge about risk management. Incidentally, the most valuable pieces of research in recent years concentrated on methodological issues: the endogeneity problem (Xinrui, Hanqing, Junsheng, & James, 2021), inclusion of non-derivative hedging, Davies et al., (2006), and assumptions about the purpose of derivative use (Oliver & George, 2019). The theory considered include risk management models developed.

**Enterprise Risk Management Theory**

Risk management is an increasingly important business driver and stakeholders have become much more concerned about risk (Fernando & Basnayak, 2022). An enterprise-wide approach to risk management enables an organisation to consider the potential impact of all types of risks on all processes, activities, stakeholders, products and services. Enterprise Risk Management (ERM) is an integrated approach to managing risk across an organisation and its extended networks.
Enterprise risk simply put the extent to which the outcomes from the corporate strategy of a company differ from those identified in its corporate objectives (Demidenko & Sidorenko, 2019; Ryszard, 2019). Similarly, it can also be defined as the degree to which the results from a company’s corporate strategy fail to meet its stated objectives. The strategy selected to achieve these corporate objectives embodies a certain risk profile, which arises from the various factors that might impact the activities, processes and resources chosen to implement the strategy. In the last decade, risk management has transformed from the traditional silo approach practised by individual departments and functions in an organisation to a holistic, more coordinated and integrated process which manages overall risk throughout the organization (Buczkowski, 2021; Mojca, Marika, & Darja, 2023). This holistic and integrated approach has become known as Enterprise Risk Management (ERM). The adoption and practices of ERM across various climes will facilitate the exchange of risk information across formations from different nations.

According to the COSO, (2021) which is the most popular framework, enterprise risk management is the process effected by an entity’s board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite to provide reasonable assurance regarding the achievement of entity objectives. Enterprise risk management is, in essence, the latest name for an overall risk management approach to business risks supporting that the overall risks of the organization should be managed in aggregate, rather than independently (OECD, 2020). The level of decision-making under enterprise risk management is also shifted, from the insurance risk manager to the chief executive officer, or board of directors, who would be willing to address all forms of risk. The types of risk subject to enterprise risk management are enumerated as hazard, financial, operational and strategic.

**Hazard risks:** These are those risks that have traditionally been addressed by insurers, including fire, theft, windstorm, liability, business interruption, pollution, health and pensions.

**Financial risks:** Financial risks cover potential losses due to changes in financial markets, including interest rates, foreign exchange rates, commodity prices, liquidity risks and credit risks.

**Operational risks:** Operational risks cover a wide variety of situations, including customer satisfaction, product development, product failure, trademark protection, corporate leadership, information technology, management fraud and information risk.
Strategic risks: This includes such factors as competition, customer preferences, technological innovation and regulatory or political impediments.

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.

Horvey, Sylvester and Jacob (2020) reported in the study Enterprise risk management and firm performance: Empirical evidence from Ghana equity market. The results from the study revealed that ERM propels firm performance at both the firm level ROE, (return on assets and equity) and Tobin Q (market level) performance of financial and non-financial listed firms in Ghana. Second, they further showed that a non-linear relationship may exist between ERM and performance. Thus, a non-linear inverted U-shape is observed when the return on equity is employed as a performance indicator while a non-linear direct U-shape is observed when the return on assets and Tobin Q are employed 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.

\[
roe_a = b_0 + b_1cro_a + b_2cr_a + b_3rm_a + b_4ph_a + b_5ch_a + b_6exh_a + \mu_{t2} + \varepsilon_{a2}
\]

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. \(\mu_{t1}, \ldots, \mu_{t6}\) are the heterogeneity or specific errors, which are either fixed or random and \(\varepsilon_{a1}, \ldots, \varepsilon_{a6}\) 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). Hoyt and Liebenberg (2011), who studied the relationship between ERM and firm value for insurance companies used the Chief Risk Officer as an indicator for ERM implementation. 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 asset 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>
<thead>
<tr>
<th>Regressor</th>
<th>Coef.</th>
<th>Std. Err.</th>
<th>Z-stat</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>cro</td>
<td>-0.10211</td>
<td>0.1089595</td>
<td>-0.94</td>
<td>0.349</td>
</tr>
<tr>
<td>rcm</td>
<td>-0.1082405</td>
<td>0.2032779</td>
<td>-0.53</td>
<td>0.594</td>
</tr>
<tr>
<td>rmp</td>
<td>0.1679211</td>
<td>0.0868728</td>
<td>1.93</td>
<td>0.053</td>
</tr>
<tr>
<td>diferr</td>
<td>0.0100579</td>
<td>0.2618606</td>
<td>0.04</td>
<td>0.969</td>
</tr>
<tr>
<td>dihcr</td>
<td>-0.0027862</td>
<td>0.2503642</td>
<td>-0.01</td>
<td>0.991</td>
</tr>
<tr>
<td>cons</td>
<td>0.1662317</td>
<td>0.1899602</td>
<td>0.88</td>
<td>0.382</td>
</tr>
</tbody>
</table>

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 influence on return on equity. Although, risk mapping, and derivative instruments for hedging foreign exchange rate risk are positively related to return on equity but only risk mapping is statistically significant. Also, risk mapping has a significant impact on return on equity.

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

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

Note: dipr omitted because of collinearity
The result of the random GLS on the relationship between enterprise risk management and return on equity is confirmed by the test of WG-VC method and the results are reported in Table 2. The coefficient of chief risk officer, risk mapping, and derivative instrument for hedging credit risk are all negative. 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. By implication, these two variables are having a direct impact on the performance variable (ROE). However, none of the enterprise risk management indicators have a statistically significant impact on performance variable (ROE).

### Table 3

Test based on Flexible GLS Method for Enterprise Risk-ROA Nexus

<table>
<thead>
<tr>
<th>Regressor</th>
<th>Coef.</th>
<th>Std. Err.</th>
<th>Z-stat</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>cro</td>
<td>-0.0681235</td>
<td>0.2510653</td>
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<td>0.786</td>
</tr>
<tr>
<td>rcm</td>
<td>0.1933134</td>
<td>0.4655721</td>
<td>0.42</td>
<td>0.678</td>
</tr>
<tr>
<td>rmp</td>
<td>-0.219759</td>
<td>0.2044731</td>
<td>-1.07</td>
<td>0.282</td>
</tr>
<tr>
<td>diferr</td>
<td>0.5021619</td>
<td>0.6166462</td>
<td>0.81</td>
<td>0.415</td>
</tr>
<tr>
<td>dihcr</td>
<td>-0.0808093</td>
<td>0.5924323</td>
<td>-0.14</td>
<td>0.892</td>
</tr>
<tr>
<td>cons</td>
<td>-0.2954901</td>
<td>0.4350438</td>
<td>-0.68</td>
<td>0.497</td>
</tr>
</tbody>
</table>

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 chief risk officer and derivative instrument for hedging credit risk have no positive impact on return on equity. 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. In the same manner, the direction of relationship between risk committee member, risk mapping and 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>
<thead>
<tr>
<th>Model</th>
<th>R-sq</th>
<th>BP LM Test</th>
<th>Wald Test</th>
<th>Modified Wald Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise Risk-ROE Nexus:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random Effect</td>
<td>0.03</td>
<td>94.080(0.00)</td>
<td>4.06(0.54)</td>
<td>-</td>
</tr>
<tr>
<td>WG-VC Estimation</td>
<td>0.01</td>
<td>68.237(0.01)</td>
<td>-</td>
<td>3.09(0.98)</td>
</tr>
<tr>
<td>Flexible GLS</td>
<td>-</td>
<td>68.428(0.01)</td>
<td>5.51(0.36)</td>
<td>2.16(0.99)</td>
</tr>
</tbody>
</table>

*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**

According to Oluwafemi and Simeon (2010) better risk management such as management of funds, reducing unnecessary costs such as doubtful advances and obligation value proportion examination brings about higher 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 also affirm the relationship between return on equity and two or more enterprise risk management indicators to be positive and significant. On this explanation, Mohd and Salina (2010) asserted that there is a positive association between return on equity and enterprise risk
management indictors. This is in support to hypotheses and not our empirical stands 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 return on equity. This is because any increase in enterprise risk management 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 will increase performance (return on equity) of the Deposit Money Banks. Enterprise risk management indicators are expected to improve performance of deposit money banks. Therefore, intuitively, they 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 expected and theoretical sign on the link between enterprise risk management and return on equity is positive. Based on our findings, we conclude that the expected/theoretical sign on the link between enterprise risk management and
return on asset is upheld since more than two of ERM indicators influence return on asset positively. 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.

Reference


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