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Effect of Financial Risk on the Financial Performance of Listed Deposit Money Banks in Nigeria

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Abstract

The study investigated the effect of financial risk on the financial performance of listed deposit money banks in Nigeria. The study adopted descriptive research design. The target population comprised of 13 deposit money banks listed on the Nigeria Exchange Limited (NGX) between 2006 - 2021. Secondary data were used. Financial risk was measured using credit risk, market risk, liquidity risk, and operational risk. Financial performance was measured using return on equity, while the panel data analysis technique and GMM method were used to analyse the data with the aid of STATA Version 15. The result of the study revealed that operational risk exerted the most significant negative effect on the financial performance of listed deposit money banks in Nigeria while credit risk has the least effect. Amongst others, the study recommended that management should institutionalize training and retraining of employees on operational risk awareness to proactively mitigate operational risk exposure.

Keywords*: Credit risk, Market risk, Liquidity risk, Operational risk, Deposit money banks and financial performance*.

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Background to the Study

Deposit money banks (DMBs) are one of the major financial institutions in which changes in their performance and structure will have far-reaching implications for the economy. They are the key drivers of the economy through the financial services they provide and have proven to be one of the most important segments of the economy. Their intermediation role has been recognized as the catalyst for economic growth and development across the world. The activities of DMBs have achieved great prominence in the Nigerian economic environment, especially with its predominant role in accepting deposits and credit creation. In addition, the DMBs also provide the main sources of finance to other business sectors in the economy. Therefore, the presence of an active banking system in Nigeria is a basic requirement for more efficient utilization of the available economic resources. The sector serves as an intermediary between the surplus segment of the economy and the deficit segment of the economy by accumulating fund from the surplus segment in the form of deposit and extending the fund to the deficit segment in the form of loans and advances.

In rendering these services, the deposit money banking sector is exposed to a lot of risks from both the surplus segment (investor/lender) and the deficit segment (borrower of fund) of the economy. The very nature of the banking business is so sensitive because more than 85% of their liability is deposits from investors and depositors (Adebisi & Oyedijo, 2012). The banking business in comparison to other types of human endeavour is entirely exposed to risks. Banks no longer simply receive deposits and make loans; they also operate in a rapidly innovative sector with a lot of pressure being exerted for profit which urges them for continuous product or service development to cross-sell and up-sell to satisfy customers. The nature of banking business contains an environment of high risk. So risky in the sense that it is the only business where the proportion of borrowed funds is far higher than the owners' equity (Owojori et al., 2011). Risks are much more complex, since one single activity can involve several risks. Risks contain risks (Luy, 2010). This pose myriads of challenges to these banks.

Among these challenges facing the deposit money banks are, financial risk, technological risk, and stiff competition from allied firms in the industry. Financial risk exposure is considered by researchers as a yardstick for determining failure or success of a DMB. There are various types of financial risks in deposit money banks which can impede the achievement of its performance objectives. These financial risks include, but are not limited to, those related to credit, liquidity, markets, and insolvency risks. In a financial transaction, interest rate risk, currency risk, and business risk are additional potential financial problems (Olufemi & Sunmisola, 2022). The components of financial risks adopted in this study comprise of credit risk, market risk, liquidity risk, and operational risk, which jointly, contribute to the volatility of financial performance (Dimitropoulos et al., 2010).

Credit risk is the inability of a customer to repay the principal and interest on the loan on time. Deterioration of asset quality relate to increase in credit risk which reduces the expected profit. Therefore, the risk of a trading partner not fulfilling his or her obligation

as per the contract on due date or anytime thereafter can greatly jeopardize the smooth functioning of deposit money bank's business through various forms of financial risk that is associated with such transactions. Market risk entails losses caused by unfavorable evolution of interest rates, exchange rates and market prices of primary and derivative financial instruments held by the bank in transactional portfolio. Market risk also emanate from fluctuation in interest rate and foreign exchange rate affect their return since banks accept financial instruments exposed to market price volatility as collateral for loans (Luqman, 2015). Liquidity risk is the bank's inability to procure the necessary short-term liquidity; and operational risk is the probability of loss on account of inadequate internal processes, employees, systems or external events (Adina, 2015). Liquidity risk arise due to mismatch of assets and liability as well as necessary economic conditions. Operational risk which is more paramount generates losses due to high operational cost, exposure to irregularities and fraud which reduces the expected profitability (Greuning & Bratanovic, 2020).

In Nigeria, across the banking industry, the most prominent area that erodes the mass of their profit is poor management of financial risk (Adeusi et al., 2014). Despite the tremendous growth in the sector, the financial service sector is still faced with numerous challenges with respect to financial risk exposure (Adeusi et al., 2014). The identification and management of these financial risks is an integral part of the business of a financial institution. The reasons for managing financial risk are the same as those for implementing a risk management system, as financial risk is a subcategory of the overall entity's risks. The two main objectives of managing financial risk are to reduce the volatility of earnings due to financial risk exposure, which enables the firm to perform better forecasts and to ensure that sufficient funds are available for investment and dividends; and to avoid financial distress and the associated costs (Agura & Oluoch, 2017).

Financial risk is getting increased attention after the global financial crisis and risk management tools, techniques and methods used by DMBs are certainly gaining prominence (Owojori et al., 2011). In Nigeria, risk management has become an important tool, through which DMBs try to achieve legitimacy in the eyes of the public and regulators. This triggering effect has given stakeholders in the Nigerian banking industry cause not only to consider the returns made in the sector but also to critically examine frameworks used to manage risks in the sector to safeguard their interests. This is because the failures faced by the DMBs in recent times have been blamed largely on the weaknesses of the regulatory frameworks and the risk management practices of the banking industry (Tayo-Tiwo, 2018). Existing studies on the evaluation of bank failures prior to the financial crisis of 2008 and the post crisis period revealed that ineffective management of financial risks in banks was one of the root causes of their failures in Nigeria (Ugoani et al., 2014; Adeyefa et al., 2015; Marshal, 2017).

In a bid to halt banks failure and inculcate a culture of prudence in financial risk exposure, through appropriate regulatory guidelines and stress testing, the central bank of Nigeria (CBN) ordered the recapitalization of the deposit money banks from N2b to N25b in 2005

(CBN, 2020). To date, this process remains inconclusive. Several otherwise profitable DMBs in the past began declaring losses year on year. Hence, they must either be revitalized by recapitalization, merger and acquisition or out rightly acquired by the central bank of Nigeria (CBN) in order to protect the interest of their depositors. This regulatory intervention has seen the fusion of 89 existing DMBs in 2004 to 24 in 2020 (CBN, 2020). Yet, some of these DMBs still continue faltering and failing over the years. The latest victims being the defunct Skye bank acquisition by the CBN, renamed as Polaris bank and the acquisition of Diamond bank by Access bank in 2019. Regulatory lapses in financial risk exposure intervention have remained a malignant problem hindering the performance of the Nigerian DMBs (CBN, 2020). This study in consideration of these problems, and in an effort to contribute and extend the frontiers of knowledge on how this problem can be ameliorated significantly proceeds to proffer solutions to the problems of financial performance of DMBs by investigating the effect of financial risks on financial performance by using the identified explanatory variables of financial risks such as credit risks, market risk, liquidity risks and operational risks.

Furthermore, existing studies on the effect of financial risk on the performance of DMBs have adopted a narrow approach. Akhter and Sadaqat (2011), Ogol (2011) and Said (2014) examined liquidity risk. Wachiaya (2011), Nimalathasan and Pratheepkanth (2012) and Gatsi et al. (2013) researched market risk. While Kithinji (2010), Kargi (2011) and Fredrick (2012) studied credit risk. Due to the few components of financial risk used in the study of these risks, their studies fail to provide in-depth examination of the effect of financial risk on the financial performance of deposit money banks. Similar studies to the current study abound. In their study, Olaoye et al. (2020) adopted ROA, economic value added and net profit margin as their financial performance variables. The independent variables consist of credit risk, market risk, liquidity risk and insolvency risk but exclude operational risk which is a key that threatens DMBs survival most and with a narrow scop of 12-years. Also, Isedu and Erhabor (2021) adopted Return on asset (ROA) as financial performance variable and encapsulate the major components of financial risk of DMBs in their study but with less proxies over a 19-year period.

Both studies exclude ROE as a reliable financial performance variable which is universally accepted basis for interbank and industry comparison of performance. This current study adopt return on equity (ROE) as performance variable and incorporates more proxies into the components of these key financial risk variables to ensure its robustness and inclusiveness to better assess the overall effect of financial risk on the financial performance of DMBs in Nigeria within a more recent scope. This study, therefore, takes a holistic view of the effect of financial risk on the financial performance, (proxied by return on equity, (ROE), of deposit money banks in Nigeria by incorporating credit risk, market risk, liquidity risk and operational risk as components of financial risk variables.

The hypothesis that would be tested in this study are stated in their null forms:

$H0_1$**:** Credit risk has no significant effect on the financial performance of listed deposit money banks in Nigeria,

$H0_2$: Market risk has no significant effect on the financial performance of listed deposit money banks in Nigeria,

$H0_3$: Liquidity risk has no significant effect on the financial performance of listed deposit money banks in Nigeria,

$H0_4$: Operational risk has no significant effect on the financial performance of listed deposit money banks in Nigeria.

Literature Review

Concept of Financial Risk

Risk is the objectified uncertainty regarding the occurrence of an undesired event. Risk is a condition in which there exists a quantifiable dispersion in the possible outcomes from any activity (CIMA, 2015). Risk is defined as the chance of something happening that may have an impact on the achievement of objectives, and it includes risk as an opportunity as well as a threat. Risk is the potential that events, expected or unanticipated, may have an adverse impact on the institutions' capital and earnings (Elbannan, 2017). Generally, financial risk is the unexpected variability or volatility of returns (Iyinomen et al., 2019).

Olaoye et al. (2020) defines financial risk as all risks which would generate volatility in a bank's reserves, expenses and the value of their business. If financial risk is not addressed systematically it can result into inconsistent performance and earnings for the stakeholders and impact banks' revenues and net worth sometimes with disastrous systemic consequences. According to Iyinomen et al. (2019), financial risk is the unexpected variability or volatility of returns which includes credit risk, market risk liquidity risk and operational risk which contribute to the volatility of financial performance. Mostafa et al. (2016) sees financial risk as the risk associated with financing and investment in the day-to-day activities of DMBs which stem from varied causes, including defaulting in loans repayment that results in nonperforming loans (NPL) or credit risk (CR), Liquidity risk, (LIQR), Insolvency risk (INSRK), Market risk (MKTR). Others are Interest rate risk, Currency risk, and Business risk that may arise in a financial transaction.

According to Rahman et al. (2012) financial risk in banking, refers to an exposure to unpredictability of the outcome that contains a probability of variation in the desired or expected returns. In similar vein, Ghosh (2012) defines financial risk in banking as a potential loss that may occur due to some antagonistic events such as economic downturns, adverse changes in fiscal and trade policy, unfavourable movements in interest rates or foreign exchange rates, or declining equity prices. Ishtiaq (2015) interpret risk in banking as undesirable impacts on returns due to various distinct sources of uncertainties. Moreover, both have incorporated the limitation that the banking risks depend on the real-world situations, also mainly comprising of amalgamation of situations in the external environment.

Financial risk in banking, therefore, are the uncertainties arising due to fluctuation of profits and losses which may impede on the expected financial performance of these DMBs. The possibility that the outcome of an event in banking operations could bring up unintended adverse impacts on anticipated financial performance. Such outcomes could either result in a direct loss of earnings or capital or may result in imposition of constraints on bank's ability to meet its business performance objectives. Finally, the term financial risk in banking can be summarised as the probability of any event or threat which has the potential to disturb the core earnings capacity of a bank, or to increase the volatility of earnings and cash flows caused by external or internal exposures leading to its inability in achieving the performance expectations of the deposit money bank.

According to Muriithi and Muigai (2017) financial risk threatens the financial stability and performance of financial sector. Olalere et al. (2018) opined that financial risks in DMBs is somewhat challenging and different from other risks facing banks, as it is not only systemic in nature, but asymmetric, reducing banks' financial and nonfinancial performances leading to huge losses, loss of confidence of both investors and depositors alike. DMBs are ridden with problems of huge nonperforming loans, in-house fraudulent activities, and high level of disposition of unprofessionalism among the managers, coupled with inadequate board monitoring in line with best corporate governance among the executive and non-executive directors (Oyerogba et al., 2016). Ugwu (2012) opined that most DMBs operating in Nigeria in an effort to perform, got involved in multiple risks such as credit risk, liquidity risk and underfunding which made some DMBs in Nigeria to operate with capitalization of less than $10 million.

Many banks in both developed and developing economies of the world suffered huge losses stemming from the poor response to their financial risk exposures. It was for this reason that Basel Committee on Bank Supervision (BCBS) formulated broad supervisory standards and guidelines, recommendations and best practices on issues of financial risk in banking contained in Basel I, II and III from 2008 to 2013. The deposit money banks in Nigeria are exposed to various risks which originated from both the internal and external environment as financial risk continue to threaten their financial viability and long-term sustainability. In carrying out their roles, good financial performance must be generated from which financial risk may not be unavoidable in banking (Eken et al., 2012; Ongore, 2013).

Credit Risk

Credit risk includes both the risk that an obligor or counterparty will fail to comply with their obligation to service debt (default risk) and the risk of a decline in the credit standing of the obligor or counterparty. While default triggers a total or partial loss of any amount lent to the obligor or counterparty, a deterioration of the credit standing leads to the increase of the possibility of default. In the market universe, a deterioration of credit standing of a borrower does materialise into a loss because it triggers an upward move of the required market yield to compensate the higher risk and triggers a value decline (Bessis, 2010).

Generally, credit risk is the most prominent risk in the banking industry. Hence, Greuning and Bratanovic (2020) maintain that it is the biggest threat to any bank performance and the principal cause of bank failures. More than 70 percent of a bank's balance sheet generally relates to credit risk and hence considered as the principal cause of potential losses and bank failures. Time and again, lack of diversification of credit risk has been the primary culprit for bank failures. The dilemma is that banks have a comparative advantage in making loans to entities with whom they have an ongoing relationship, thereby creating excessive concentrations in geographic and industrial sectors (Basel Committee on Banking Supervision [BCBS], 2015). In this study, credit risk is measured using asset quality (AQT), loan loss provision ratio (LPR), loan and advances ratio (LAR), and capital adequacy ratio (CAR).

(a) Asset Quality (AQT): Nonperforming loans ratio (NPR) measures the proportion of nonperforming loans as against the total loans and advances over a period. NPR represents how much of the bank loans and advances are becoming nonperforming, which measures the extent of credit default risk that the bank sustained. It measures the efficiency of the loan portfolio management for a given bank within a given period (Kolapo et al., 2012). If the ratio goes above 25%, is an indication that the bank is getting into the zone of weak credit risk control system. Deterioration in asset quality distresses the performance and survival of banks. It is a common cause of bank failure. Poor asset quality leads to nonperforming loan that can seriously damage a banks' financial position and banks operation (Siriba, 2020). The creation of adequate provisions for bad and doubtful debts can reduce the banks credit risk. However, when the level of non-performing assets is high, the assets provisions made are not adequate protection against default risk (Kwambai & Wandera, 2013).

(b) Loan Loss Provisions Ratio (LPR): DMBs use loan loss provisions to create reserves in order to cover the expected losses embedded in their loan portfolios in their profit and loss statements (Muriithi, 2016). Loan loss provisions ratio is the loan-loss provisions to total loans and advances. The objective of employing this ratio is to examine the ability of banks to build reserves for both expected and unexpected losses. A high ratio shows that banks have enough funds to cover loan losses. Hence, the higher this ratio, the lower the probability of a bank suffering problems because the bank will have enough funds to back up its losses. In this research, the LPR is used to identify the level of banks' managers' expectation about their asset quality in the Nigerian banking industry. When the amount of LPR increases, the quality of the asset will decrease and vice versa (Annor & Obeng, 2017).

(c) Loans and Advances Ratio (LAR): The loans and advances to deposits ratio assesses the role of deposits in financing loans. This ratio indicates the ability of banks to withstand deposit withdrawals and willingness of banks to meet loan demand by reducing their cash assets. If the ratio is lower than one, the bank relied on its own deposits to make loans to its customers, without any outside borrowing. If, on the other hand, the ratio is greater than 1, the bank borrowed money which it relied on at higher rates

(Muriithi, 2016). The higher the loan-to-deposit ratio, the more increase in the level of lending risk and thus reduces the quality of loans or in other words increases the rates of non-performing loans. However, the more the bank can convert deposits into high quality loans, the higher the profit margin from lending interest. Therefore, deposits have a positive effect on the banks' profitability. When the banks are more liquid, they can reduce risk of insolvency (Samuel et al., 2012).

(d) Capital Adequacy Ratio (CAR): Capital adequacy ratio is the amount of capital required for a bank as stipulated by the regulatory and supervisory authorities in order to achieve deposit money banks financial health and soundness (Muraina, 2018). The CAR also known as capital to total risk weighted assets ratio shows the internal financial strength of the bank to withstand losses during crisis and safeguard depositors against unanticipated losses (Musembi, et al., 2016; Nyarko-Baasi, 2018). Banks with good capital adequacy ratio have good profitability. With good capital adequacy, banks are able to absorb loans that have gone bad through provisions for credit losses and outright write-offs and are able to take advantage of the numerous opportunities within the banking industry (Akomeah et al, 2020). In the banking sector, CAR is measured as tier 1 capital plus tier 2 capital divided by risk adjusted assets. (Nyarko-Baasi, 2018). Tier-One capital (Share Capital) is the one, which can absorb losses without requiring the affected bank to close trading, but Tier-Two capital (preference share and subordinated debt) is the one that can absorb losses in case of bank liquidation, thereby providing depositors lesser level of protection (Muraina, 2018).

Market Risks

Odubuasi et al. (2020) defined market risk as the risk to earnings arising from changes in underlying economic factors such as interest rates or exchange rates, or from fluctuations in bond, equity or commodity prices. It is the risk of loss (or gain) arising from unexpected changes in market prices (e.g., such as security prices) or market rates (e.g., such as interest or exchange rates). Market risk refers to the risk of loss emanating from the erratic valuation in the price of assets due to the adverse movements in market prices. More precisely, market risk may occur due to reasons that disturb the general performance of the financial markets, mostly external factors. These factors include: interest rate risk, currency risk, equity risk and commodity risk. Market risk is also known as systemic risk. It is uncontrollable and cannot be avoided through diversification, but it can be hedged by financial services firms, particularly banks. For instance, larger chunks of deposit money banks (DMBs) resources are invested in instruments that have higher risk in the markets. This category of risk constitutes the source of the problems of a great number of DMBs (CBN, 2014).

Deposit money banks are subject to market risk in both the management of their balance sheets and in their trading operations. Market risk is generally considered as the risk that the value of a portfolio will decrease due to the change in value of the market risk factors. Market risks may be divided into interest rate risk and exchange rate risk (Dimitropoulos et al., 2010). Market risk which comprises of exchange rate and interest rate risks also affect

the financial performance of deposit money banks. Usually, market risks are outside the control of the banks, as they are determine by factors that affect the overall economy (Aruwa & Musa, 2014). In this study market risk is measured by degree of financial leverage (DFL), Interest rate risk (IRR) and Gearing ratio.

(a) Degree of Financial Leverage (DFL): A DMB is described as leveraged if it is financed partly through debt simply because of the tax shield element of debt. But debt carries a fixed cost, which means that if the company increases its debt the degree of financial leverage also increases. The degree of financial leverage measures the ratio of earnings before interest and taxes (EBIT) to earnings before taxes (EBIT – Interest expenses) which shows the debt amount that a business is obligated to pay back. This mode of computation focuses directly on the impact of interest on income before taxes (Gatsi et al., 2013). Banks could prosper by taking reasonable leverage risk or could become insolvent if the risk is out of control. The degree of financial leverage is practically a measure of the degree of financial risk, thus the higher the ratio is, the riskier the business is considered to be as it relies too much on debts and any changes within the economic environment or in interest rates may have an extremely negative impact on how the business evolves (Isedu & Erhabor, 2021).

(b) Interest Rate Risk (IRR): Interest rate risk (IRR) is the risk associated with bank lending or deposit interest rate volatility. It is the potential loss to the income or economic value of the bank's equity due to adverse movement in interest rates. When the deposit money bank lending interest rate is less than the deposit rate, when the lending interest rate of the bank is greater than the market rate, or when the deposit interest rate is less than the market rate, banks may face interest rate risk (Dimitropoulos et al., 2010).

Most of the loans and receivables of the balance sheet of banks and term or saving deposits, generate revenues and costs that are driven by interest rates, and since interest rates are unstable, so are such earnings (Bessis, 2010). Though interest rate risk is obvious for borrowers and lenders with variable rates, those engaged in fixed-rate transactions are not exempt from interest rate risks because of the opportunity cost that arises from market movements (Bessis, 2010). Interest rate risk also includes those that occur due to the change or fluctuation of the interest rate on assets such as bonds or loans. For example, as interest rises, the value of the bond falls and if the interest rate falls, the price of the bond rises. Generally, interest rate risk is commonly measured by the duration of the bond (Bessis, 2010).

According to Greuning and Bratanovic (2020), the combination of a volatile interest rate environment, deregulation, and a growing array of on and off-balance-sheet products have made the management of interest rate risk a growing challenge. At the same time, informed use of interest rate derivatives - such as financial futures and interest rate swaps - can help banks manage and reduce the interest rate exposure that is inherent in their business. Bank regulators and supervisors therefore place great emphasis on the evaluation of bank interest rate risk management, particularly since the Basel Committee

recommends the implementation of market risk-based capital charges.

(c) Gearing Ratio (GER): The gearing ratio is an indicator of financial leverage that shows how creditor financing or equity capital supports deposit money bank's activities. It indicates a financial ratio that compares borrowed funds to the owner's equity capital. In this study, the gearing ratio is measured by debt to asset ratio. The debt-to-assets ratio is determined by dividing a firm's total debts by its total assets (Kassi et al., 2019). Total debt-to-total assets is a leverage ratio that defines how much debt a company owns compared to its assets. Furthermore, it reveals the percentage of total assets that were financed by debts. Using this metric, analysts can compare one company's leverage with that of other companies in the same industry. This information can reflect how financially stable a company is. The higher the ratio, the higher the degree of leverage (DoL) and, consequently, the higher the risk of investing in that company (Hayes, 2023).

Investors use the ratio to evaluate whether the company has enough funds to meet its current debt obligations and to assess whether the company can pay a return on its investment. Creditors use the ratio to see how much debt the company already has and whether the company can repay its existing debt. This will determine whether additional loans will be extended to the firm. A high gearing ratio typically indicates a high degree of leverage, although this does not always indicate a company is in poor financial condition (Kenton, 2022). Instead, a company with a high gearing ratio has a riskier financing structure than a company with a lower gearing ratio. Regulated entities typically have higher gearing ratios as they can operate with higher levels of debt. In addition, companies in monopolistic situations often operate with higher gearing ratios as their strategic marketing position puts them at a lower risk of default. Industries that use expensive fixed assets typically have higher gearing ratios, as these fixed assets are often financed with debt (Kenton, 2022).

A ratio greater than 1 show that a considerable portion of the assets is funded by debt. In other words, the company has more liabilities than assets. A high ratio also indicates that a company may be putting itself at risk of defaulting on its loans if interest rates were to rise suddenly. A ratio below 0.5, meanwhile, indicates that a greater portion of a company's assets is funded by equity. This often gives a company more flexibility, as companies can increase, decrease, pause, or cancel future dividend plans to shareholders. Alternatively, once locked into debt obligations, a company is often legally bound to that agreement (Hayes, 2023).

Liquidity Risk

Liquidity risk in DMBs is the risk of being unable to either meet their obligations to depositors or to fund increases in assets as they fall due without incurring unacceptable costs or losses. It indicates the ability of the bank to deal with deposit withdrawals and loan demands (Million et al., 2014). The higher amount of loans against per dollar deposit increases bank liquidity risk (Samad, 2015). Liquidity mismatch risk or liquidity mismatch is one way of measuring the organization's level of financial risk. Liquidity

mismatch is also called liquidity gap. The liquidity gap is the difference between a bank's assets and a bank's liabilities. This gap can be positive or negative. This depends on whether or not the firm has more assets than liabilities. A negative gap means that the bank is netting less income than the amount of liabilities assumed. When the gap is positive, the bank has liquid assets left over after all of the liabilities have been fulfilled (Brunnermeier & Yogo, 2009).

Apart from the above maturity mismatch, liquidity risk arises due to recessionary economic conditions, causing less resource generation. This increases the demand of depositors creating liquidity risk. This may cause the failure of a given bank or even the entire banking system due to contagion effect. High liquidity increases the leverage and a highly leveraged bank may turn into the consumer of liquidity from the provider. Liquidity risk may arise due to the breakdown or delays in cash flows from the borrowers or early termination of projects (Muffee, 2020).

These deposit money banks need to maintain regular and irregular demand for liquidity of the depositors. Regular demand of the depositors is a result of the daily business activities of the depositors, whereas irregular demand is the outcome of predictable and unpredictable demand for liquidity from depositors. This arises due to irregular business activities of depositors. E.g., withdrawals from fiscal operations by the government, and execution of immature time deposits (BCBS, 2008b). The risk of regular demand of liquidity can be mitigated; firstly, by the bank investing in more liquid assets that can easily be converted into cash; secondly, the bank should maintain expanded sources of funds from different depositors, for diversification; Thirdly, by resorting to the central bank as a lender of last resort to meet the regular demand of liquidity (Bouwman, 2013). In this study, liquidity risk is measured using loan-to-deposit ratio (LDR), loan-to-asset ratio (LTR), and cash reserve ratio (CRR).

(a) Loan-to-Deposit-Ratio (LDR): Loan-to-deposit ratio (LDR) is measured as total loans relative to the total liabilities. A higher ratio indicates less liquidity position which may affect bank lending while a lower ratio signifies a good liquidity position which enables banks to lend and invest. Loan to deposit ratio measure of liquidity has been criticized for ignoring the quality and maturity of bank assets and for treating bank assets as having an equal degree of liquidity and maturity. Recently, financial analysts argued that off-balance sheet funding which offers better benefits has made the loan-to-deposit ratio of liquidity measure unpopular. Other forms of loan ratios include loan to liabilities, loan losses to net loans, and reserve for loan losses to net loans (Edem, 2017).

(b) Loan to Asset Ratio (LTR): Loan to total asset ratio (LTR) measures the exposure level of the banks to liquidity risk. It measures the total loans outstanding as a percentage of total assets. The higher ratio indicates a bank is loaned up and its liquidity is low, and hence, the riskier a bank may be to higher defaults (Isedu & Erhabor, 2021). Banks that have a relatively higher loan-to-assets ratio derive more of their income from loans and investments, while banks with lower levels of loan-to-assets ratios derive a relatively

larger portion of their total incomes from more diversified, noninterest-earning sources, such as asset management or trading. Banks with lower loan-to-assets ratios may fare better when interest rates are low or credit is tight. They may also fare better during economic downturns (Erhabor & Ofiafoh, 2020). Loans are a larger percentage of interest-earning assets of a bank. Therefore, when the LTR ratio increases, a bank's profits increase, and the exposure to liquidity risk also increases (Isedu & Erhabor, 2021).

(c) Cash Reserve Ratio (CRR): Cash reserved to total deposits ratio is another measure of bank liquidity risk. It has an advantage over other variables in that the liquid assets are directly related to deposits rather than to loans and advances which form the most illiquid of banks' assets. The cash reserve ratio is particularly effective for sterilizing excess liquidity in the banking system as it can be effectively monitored by the regulatory authorities (Edem, 2017). The main measures of liquidity in Nigeria are the cash reserve ratio (CRR), the loan-to-deposit ratio (LDR), and the loan-to-total asset ratio (LTR). These are also called liquidity ratios. Hence, these three variables are included in the measuring variables to further appreciate their effect on DMBs in Nigeria (Isedu & Erhabor, 2021).

Operational Risk

The Basel Accord defines operational risk as the risk of direct or indirect loss resulting from inadequate, non-performance, or failed internal processes, people, and systems or from external events. These risks arise from human error and fraud, model risk, business and system disruptions, inadequate controls, failure or malfunctions of information systems, reporting systems, internal risk monitoring rules, and internal procedures designed to implement timely corrective actions or compliance with the internal risk policy rules. Operational risk was conceived as a composite term for a wide variety of organizational and behavioural risk issues that were traditionally excluded from formal definitions of market and credit risk. Operational risks, therefore, appear at different levels, such as human errors, processes, and technical and information technology (Bessis, 2010).

Operational risk is the risk that stems from the failure of people and processes within an organization. It arises as a result of the breakdown of internal procedures, people, policies, and systems. In other words, operational risk could result from insufficient or botched systems, processes, and people as well as from external developments. It is a consequential risk – that is, it arises when another, specific risk develops. These specific risks include human error; system failure or the possible breakdown of a computer system; lack of backup or disaster recovery plan and external events. Examples of operational risk include fraud related to ATM and internet fraud, etc. Operational risk is difficult to measure and is often seen as a "residual" risk after all the other risks have been identified. It is a source of worry for both banks and monetary authorities. For instance, scams, weak IT infrastructure, and corporate governance, among others, constitute serious challenges to DMBs in Nigeria (CBN, 2014).

Operational risk may materialize directly, for instance in electronic fund transfer (transfer of funds to the wrong person) or could result indirectly as a credit or market loss. Since there is a close linkage of operational risk with other types of risks, it is very important for every institution to first have a clear understanding of the concept of operational risk before designing the appropriate operational risk measurement and management framework (Epetimehin & Fatoki, 2015). Goldmann and Kaufman (2009) explained that research shows that internal fraud is committed by both employees and management and accounts for 50-80% of frauds committed in organizations. Employees have access to information, processes, systems and assets, making it easier for them to device ways of committing fraud without being detected. In this study, operational risk in deposit money banks is measured by cost income ratio (CIR), operating cost ratio, and net interest margin to operating cost ratio.

(a) Cost Income Ratio (CIR): Cost income ratio (CIR) is the ratio of operating cost to income. It is also known as efficiency ratio. A reduction in cost for a given level of income is expected to increase profits and vice versa. Cost income ratio is measured by the ratio of operating expenses to net interest income (Isedu & Erhabor, 2021). The cost-to-income ratio components of the ratio are cost and income and, hence, the measure is indirectly related to bank profitability. A reduction in costs for a given level of income will reflect increased profits and vice versa. Increased profits, in turn, will result in improved return on equity and share prices of the bank which is of great interest to investors. Further, most bank costs have been reducing in response to margin squeezes, thus lowering both costs and income. Hence, volatility in a bank's cost to income ratio might be a better measure of volatility in a bank's cost performance. The cost to income ratio is the ratio of non-interest (operating) costs excluding bad and doubtful debt to the net interest income plus non-interest income of the bank. Non-interest costs are perceived as those costs which are most amenable to management decisions and considered to be that part of a bank's costs which can be controlled. The use of the net interest income term in the denominator will reduce the volatility that could arise from fluctuations in the general level of interest rates (Muriithi, 2016).

(b) Operating Cost Ratio (OPR): The operating cost ratio is also an indicative of operational risk variable. It is measured by the ratio of operating expenses to total assets. It is expected that when a bank has higher operating expenses per Naira assets, the profitability of the bank declines. On the other hand, when the operating expenses are directed toward loans recovery, loan defaults, and asset management, it is quite possible that the higher the operating cost ratio, the higher the profitability of a bank (Isedu & Erhabor, 2021).

(c) Net Interest Margin Ratio (NOR): The net interest margin to operational cost ratio is an operational risk variable. The index measures net interest margin (NIM) as a percentage of total operating expenses. The NIM is estimated by interest income minus interest expenses. It is generally expected that an efficient bank has a higher NIM to operational-cost ratio than an inefficient bank (Isedu & Erhabor, 2021).

Concept of Financial Performance

The concept of financial performance is an appraisal measure of the level of an organization's policies in yielding the desired financial objective in monetary terms (Olaoye et al., 2020). Adina (2015) opined that financial performance is a measure of a company and the managers of such establishment's performance and overall operational efficiency and its ability to optimally utilize the resources available to it. Performance also includes an evaluation of the manner the DMBs are efficiently using their assets and other resources to generate revenues, which affect firm's overall financial condition for a given period and can be used to compare one sector with the other (Pinto et al., 2017). Shrivastava, Kumar and Kumar (2018) posited that financial performance is the measure of how well a firm uses its assets to generate revenues. This definition is used as a general measure of a firm's overall financial soundness over a given period of time and can be used to compare similar firms in the same industry and across industry in aggregate. Financial performance measures are directed at reviewing the efficient and effective utilization of resources available to a firm aiming at maximizing returns of an organization as presented in financial statements.

Financial performance is used as a general measure of a firm's overall financial status over a given period of time. The financial performance of DMBs is measured using accounting key performance indicators such as earnings before interest and tax (EBIT), economic value added (EVA), Net operating income (NPI),, profit after taxes (PAT) and net asset value (NAV), return on assets (ROA), and return on equity (ROE). The advantage of these measurements is their general availability, since every profit-oriented organization produces these figures for their yearly financial statements (Bodie, Kane, & Marcus, 2011). Hence, the financial performance of a DMBs could reflect the trends in the banks return on assets, profitability, economic value added, return on equity, liquidity, solvency, riskiness of the bank and many others like how fast it concludes a loan facility request and ability to manage the loan facilities, the low level of non-performing loans (El-Ansary, 2019). Pinto et al. (2017) stressed that the financial performance of DMBs is essentially required in the economic policy formulation and a tool in the analysis of the outcomes of a firm's policies, performance, efficiency, and effectiveness in monetary terms of the country where they operate.

This study adopted return on equity (ROE) as an indication of a deposit money bank's overall financial health. Financial performance is measured using return on equity (ROE) which value the overall profitability of the fixed income per naira of equity. It is the amount of net income returned as a percentage of shareholders equity invested in banks. ROE is commonly used to measure the profitability of banks. Return on equity measures profitability by revealing how much profit a bank can generates with the money shareholders have invested. Thus, ROE measures how much the bank is earning on their equity investment. In many banking literatures, it was agreed that bank performance is represented mainly by quantifiable financial indicators. In general, financial analysts consider return on equity ratios in the range of 15-20% as representing attractive levels of investment quality (Richard, 2015).

The efficiency of the banks can be evaluated by applying ROE, since it shows that banks reinvest its earnings to generate future profit. The growth of ROE may also depend on the capitalization of the banks and operating profit margin (Muriithi, 2016). However, the increase of the operating margin can smoothly enhance the ROE. ROE also hinges on the capital management activities. If the banks use capital more efficiently, they will generate a better financial leverage and consequently a higher ROE. Because a higher financial leverage multiplier indicates that banks can leverage on a smaller base of stakeholder's fund and produce higher interest-bearing assets leading to the optimization of the earnings (Hosna et al., 2009; Muriithi & Waweru, 2017; Muriithi, 2016).

In particular, stockholders of deposit money banks prefer higher ROE, for the reason that ROE looks at how effectively a bank is using shareholders' equity (Hosna et al., 2009). ROE tends to tell us how effectively an organization is taking advantage of its base of equity, or capital. This has gained in popularity for several reasons and has become the preferred measure at larger deposit money banks that need to meet more sophisticated capital reporting requirements. One huge reason for the growing popularity of ROE is, simply that it is not asset-dependent. ROE can be applied to any line of business or any product. This flexibility allows deposit money banks with differing asset structures to be compared to each other, or even for banks to be compared to other types of businesses. The asset-independency of ROE also allows a bank to compare internal product line performance to each other. Perhaps most importantly, these permits looking at the comparative profitability of lines of business-like deposit services. This would be difficult, if even possible, using ROA (Hosna et al., 2009).

Since ROE uses shareholder equity as its divisor, and the equity is financial risk-based capital, the result is, more or less, automatically risk-adjusted. In addition to the risk adjustments in its numerator, net income, ROE can use an economic capital amount. The result is a risk-adjusted return on capital (RAROC). RAROC takes ROE to a fully risk-adjusted metric that can be used at the entity level and that can also be broken down for any and all lines of business within the organization. This is being practiced by deposit money banks as they get more interested in risk-adjusted monitoring as a performance measurement. The better bank leadership is at measuring risk-adjusted performance, using ROE or RAROC, the better leadership it can become at pricing for all risk at the client relationship and product levels. ROE and RAROC help a bank get to the point where they are more fully accounting for risk or unpredictable variability. Therefore, for the purpose of this study, ROE shall be used to evaluate the effect of financial risk on the financial performance of listed DMBs in Nigeria (Hosna et al., 2009).

Empirical Review

Empirical Literature Review

The empirical literature review is based on findings from existing studies on the variables for the study. These are financial performance, credit risk, market risk, liquidity risk and operational risk.

Financial Risk and Financial Performance of DMBs

Al-Khouri (2011) examined the impact of banks specific risk characteristics, and the overall banking environment on the performance of 43 commercial banks operating in the Gulf Cooperation Council (GCC) countries from 1998 to 2008. Empirical results was obtained using fixed effect regression analysis. The results showed that credit risk, liquidity risk and capital risk are the main significant variables influencing the performance of the selected banks when profitability is measured by return on assets (ROA). However, on the other hand, he revealed that liquidity risk was the only risk that has significant relationship with profitability when measured by return on equity (ROE). The study recommended that management of commercial banks in GCC countries should concentrate on the management of credit risk, liquidity risk and capital risk in the management of their assets in order to maximize profit, and that, to maximize shareholders' return, management should prioritize liquidity risk management. However, Al-Khouri (2011) did not consider operational risk, which is a major banking risk, both in the internal and external environment. In addition to the variables in Al-Khouri's study, this study incorporated operational risk variables in order to establish the resultant effect on return on equity of listed deposit money banks in Nigeria.

Adeusi et al. (2014) assessed risk management and financial performance of banks in Nigeria. Secondary data sourced was based on a four (4) year progressive annual reports and financial statements of ten (10) banks from 2006 to 2009 and a panel data estimation technique adopted. Profitability was measured by the return on equity (ROE), return on asset (ROA) and return on capital employed (ROCE). The independent variables used as proxy for liquidity, credit, and capital risks are cost of bad and doubtful loans, non-performing loan and liquidity. The result of their study indicates an inverse relationship between financial performance of banks and doubtful loans, and capital asset ratio was found to be positive and significant. The study concludes that there is a significant relationship between banks performance and risk management. Better risk management in terms of managed fund, reduction in cost of bad and doubt loans and debt equity ratio results in better bank performance. Hence, the need for banks to practice prudent risks management in order to protect the interests of investors. Adeusi et al. (2014) did not consider market risk and operational risk, which are very critical to banking sector performance in their study. This study incorporates both with the predictor variables and introducing GMM to check the dynamism that exist in the banking sector and how the performance of the immediate previous period affects the current period performance. This is because, the management of banks do protect the performance of the current period by using the information of the previous period.

Aruwa and Musa (2014) studied the effects of risk components on the financial performance of deposit money banks in Nigeria, from the year 1997 to 2011. The secondary data collected was analysed using descriptive statistic and ordinary least square regression analysis. The financial performance of the banks is measured by Return on Asset (ROA) which is the dependent variable. The independent variable is proxied by credit risk which is the ratio of non-performing loan to loan and advances and ratio of loan

and advances to total deposit, number of frauds committed in the banks, and Net Interest Margin (NIM). Their findings indicated that strong relationship exists between risk components and the financial performance of the banks in Nigeria. However, credit risk and the rate of capital to total weighted risk asset have positive relationship while operational and interest rate risk affects the profitability of the banks negatively. They recommended that, DMBs should diversify the management of the other components of risk like minimising frauds instead of over concentrating on credit risk, and exposure to other risk. This Aruwa and Musa (2014) research covered a wider range of risks that are encountered in financial institutions. But their study also excludes liquidity risk which is key to deposit money banks performance. This current study included liquidity risk variable and use ROE as the performance variable to further examine the effect of these variables on the performance of listed deposit money banks in Nigeria.

Adedeji and Depo-Mogaji (2017) explored risk management and profitability in Nigerian deposit money banks. They researched 8 out of 21 deposit money banks in Nigeria over a 6-year period from 2009 to 2014. Survey research design was employed. Secondary data was obtained from the annual reports and accounts the banks. Return on asset (ROA) and return on equity (ROE) are the dependent variables, while the independent variables are capital adequacy ratio (CAR), cost per loan (CPL), non-performing loan ratio (NPLR), leverage ratio (LR), and default loan ratio (DR) represented credit risk management indicators. Multiple regression and panel data were used to test the relationship between risk management and profitability. The findings showed that there is a significant relationship between bank performance and credit risk management. Loans and advances and nonperforming loans are major variables in determining the asset quality of a bank. They concluded that risk management positively affects the profitability of Nigerian deposit money banks.

Badawi (2017) assessed the effect of credit risk, liquidity risk, and market risk on the profitability of foreign exchange banks in Indonesia from 2013 to 2015. They adopted causal research method. Secondary data was retrieved from their annual financial. The performance predictor was the return on equity (ROE). While the independent variables are market risk proxied by net interest margin (NIM), liquidity risk was proxied by loan to deposit ratio (LDR) and credit risk was proxied by non-performing loan (NPL). Analysis of data in this study using SPSS 21 software. Multiple regression results showed that NPL variable, and LDR variable does not significantly affect ROE, NIM variable in this study has significant effect on the ROE. The study further buttress that, the higher the NIM, the more effective the bank is in the placement of its assets in the form of credit. And the more credit that is distributed translates to higher interest income earned from the loan disbursed. Also, increase in interest income implies that the profit earned by the bank will likely increase. Therefore, higher earnings will have an impact on increasing ROE ratios. This Badawi (2017) study is one of the most comprehensive studies of financial risk but it did not consider operational risk which is very important financial risk variable to the banking sector performance. This study includes operational risk with the predictor variables in Badawi's study to examine their effect on the return on equity of listed deposit money banks in Nigeria.

Olalekan et al. (2018) analyzed financial risk and the profitability of commercial banks in Nigeria from 2011 - 2016. They measured profitability by return on Asset (ROA) while financial risk was measured using ratio of loan and advance to deposit as proxy for liquidity risk (LR), ratio of non-performing loans to total loans as proxy for credit risk (CR) and ratio of total equity to total asset as proxy for capital adequacy risk (CAR). The study adopts the ex-post facto research design. The sample for the study was 14 of the 15 commercial banks listed on the Nigerian Stock Exchange as of 2017. Secondary data were obtained from the audited annual financial reports of the banks. Multiple regression technique was employed. STATA 13 was used as tool of data analysis. The findings revealed that liquidity risk has a positive effect on profitability but insignificant. Also, the credit risk revealed a significant negative effect on the bank profitability, while the capital adequacy risk was also found to have a positive and significant effect on profitability of the commercial banks in Nigeria.

Iyinomen et al. (2019) examined financial risk and performance of deposit money bank: Evidence from West African Countries. A sample of 20 deposit money banks was obtained over 10 years period from 2009 to 2018. Ex-post facto research design with secondary data was employed. Pearson correlation analysis and panel regression analysis were used for analysis. Financial risk was measured by liquidity risk, operational risk and interest rate risk, while performance was measured by return on assets (ROA) and return on equity (ROE). The result revealed that liquidity risk has negative and significant effect on performance of banks in both Ghana and Nigeria using ROA while using ROE the negative effect of credit risk on banks performance was found to be statistically insignificant. Operational risk was discovered to have positive and significant effect on performance of banks in West Africa having recorded a positive coefficient value across Nigeria and Ghana banks while liquidity risk was found to have insignificant effect in both Ghana and Nigeria banks.

Kioko et al. (2019) assessed effect of financial risk on the financial performance of commercial banks in Kenya. Financial performance was measured by return on assets (ROA). The independent variables in this study were credit risk (proxied by non-performing loans to total loans ratio), market risk (proxied by Value at risk), liquidity risk (proxied by total assets to liquid assets ratio) and operational risk (proxied by operating expenses to net operating income ratio). They purposively sampled 11 out of the 44 listed commercial banks in the Nairobi Stock Exchange over a 5-year period from 2014 to 2018. The research design used during the study was descriptive. Secondary data was obtained from published bank's financial statements and annual reports. Multiple regression was used to analyzed the data. The analysis tool was SPSS. The findings of the research indicate that credit risk, market risk and operational risk had a significant negative effect on financial performance, while liquidity risk had a negative insignificant effect on financial performance.

Kamchira (2020) examined the effects of managing financial risk on the financial performance of listed banks in Kenya. The study uses 11 listed commercial banks in

Kenya. A descriptive research design was used along with quantitative research data by collecting panel data over a ten (10) year period from 2009 to 2018. The secondary data was obtained from audited annual accounts. The financial risk variables for the study are credit risk, liquidity risk and interest rate risk, while both ROA and ROE of the banks were used for the measure of financial performance. The tool for analysis was SPSS 24. Correlation and regression were used to test the hypothesis. The findings indicate that management of financial risk positively impacts the financial results of banks and that this is instrumental in strengthening the profitability of banks. The result indicates that managing credit risk, liquidity risk and interest rate risk bring about changes on the financial performance of banks. It was further recommended that; the regulator should enact new guidelines to ensure that banks have better monitoring mechanisms to avoid breaching their capital reserve requirements. And that, listed banks should design more robust credit analysis policies and loan administration. This will allow the commercial banks to expand their lending activities to individuals and small businesses. This study by Kamchira (2020) overlooked the critical role of operational risk in a dynamic global e-banking environment which is crucial to the banking sector financial risk. The current study has a broader scope, incorporating important variables of credit, market, liquidity, and operational risks that were omitted by Kamchira (2020) study. This makes the study more comprehensive. From survey of relevant literature, it has been found that there are few studies specific to Nigeria on a holistic view of the link of financial risk and performance of deposit money banks. This study is poised to fill the gap.

Sathyamoorthi et al. (2020) evaluated impact of financial risk on financial performance of commercial banks in Botswana. The study population was the 10 commercial banks over an 8-year period from 2011 to 2018. Secondary data was obtained from Bank of Botswana financial database. The study adopted a panel data methodology and descriptive research design. SPSS was used as the tool for data analysis. The study used return on assets (ROA) and return on equity (ROE) as financial performance variables. Financial risk proxies are, market risk (proxied by inflation and Interest rates), credit risk (proxied by ratio of total debt to total assets and total debt to total equity) and liquidity risk (proxied by total equity to total assets and loan to deposit ratio) was used. Regression results showed that interest rates had negative and significant impact on ROA and on ROE. Total debt to total assets showed a negative and insignificant effect on ROA and a positive and insignificant effect on ROE. The loan deposit ratio indicated a negative and significant impact on ROA and on ROE.

Theoretical Framework

The relevant theories on which the study is anchored in establishing relationships between financial risk and financial performance include;

(i) Institutional theory,
(ii) Agency theory, and
(iii) Extreme Value Theory

Institutional Theory

Institutionalization refers to, the process through which components of formal structure become widely accepted, as both appropriate and necessary, and serve legitimate organisations (Tolbert & Zucker, 1983). A number of branches are involved in institutional theory (Collier & Woods, 2011). However, several studies are more related to the business and organizational studies (Meyer & Rowan, 1977; Tolbert & Zucker, 1983; DiMaggio & Powell, 1983; Scott, 1995; Powell & DiMaggio, 1991; Collier & Woods, 2011; Hudin & Hamid, 2014). Institutional theory focuses on the rules and regulations which are forced on institutions by the outsiders, particularly by the government regulatory bodies; and all the norms and values which are incorporated in roles by means of a part of socialisation processes or procedures (Meyer & Rowan, 1977; DiMaggio & Powell, 1983; Scott, 1995; Powell & DiMaggio, 1991).

Several studies use the institutional theory in explaining the phenomenon of financial risk management implementation (Collier and Woods, 2011; Hudin and Hamid, 2014). They propose that institutionalization prevails when the financial risk management activities in most of the institutions becomes highly homogeneous. This homogeneity can be attained via the coercive isomorphic mechanism by which political, legitimacy or regulatory pressures are exercised on firms in the forms of persuasion, direction or invitation (DiMaggio & Powell, 1983; Powell & DiMaggio, 1991; Scott, 1995; Hudin & Hamid, 2014). For instance, in Nigeria context, all the deposit money banks have been directed by the central bank to develop an active framework for their financial risk management. Considering the homogeneity assumption of institutional theory, the fundamental principles relating to financial risk management are applied by every banking institution irrespective of their sizes and complexities. For that reason, the current theory provides an important insight into promising rationale for liquidity and credit risk management in deposit money banks.

Agency Theory

Ross and Mitnick (1973) originally propounded the Agency Theory to establish the conflict of interest between agents and their principal. Over the years, different researchers have used agency theory in their studies to provide theoretical base for financial risk exposure (Smith & Stulz, 1985; Fite & Pfleiderer, 1995; Tufano, 1998; Fatemi & Luft, 2002). This theory helps to examine a social phenomenon from a principal-agent (investor-manager) perspective. Jensen and Meckling (1976) describe this agency relationship as, a contract under which one or more persons (the principals) engage another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent. According to Jensen and Meckling (1976), this theory has two fundamental assumptions. Firstly, the principal as well as agent aim at maximising their own interest. Secondly, the interest of agent may diverge from the interest of the principle as the agent is not likely to perform in the best interest of the principal. Hence, a conflict of interests may emerge between principal and agent.

Smith and Stulz (1985) have applied agency issues in corporate financial risk management and indicate the managers (agents) attitudes toward risk taking and hedging. Afterwards, Fite and Pfleiderer (1995) have also applied agency theory and describe the significance of hedging policies on firm value. Tufano (1998) has also made an argument for financial risk management based on agency theory. He argues that managers go for hedging as much as they can without considering the interest of their shareholders. The rationale behind such conduct is the difference between the levels of risk aversion of managers and shareholders. The level of managerial risk aversion is generally more advanced than the risk aversion level of the shareholders as managers have more exposure to the market threats (Tufano, 1998). However, the proponents of agency theory consider that wealth of shareholders transfers to managers because of much extensive hedging and oppose such financial risk management practices (Fatemi & Luft, 2002). Tufano (1998) states that the financial risk management in firms somewhat enhances agency problems and costs between its managers and shareholders. The agency theory provides the rationale into operational risk management in deposit money banks.

Extreme Value Theory

Extreme value theory (EVT) is a tool used to determine probabilities (Risks) associated with extreme events. It is used by investors in situations where there is expectation of occurrence of higher stress on investment portfolios. The EVT is also used to model the behaviour of tips (Maxima) and or dips (Minima) in a series of asset returns. Bernoulli (1709), discussed the mean largest distance from the origin when N points lie at random on a straight line of length (Johnson et al., 1995). A century later Fourier stated that, in the Gaussian case, the probability of a deviation being more than three times the square root of two standard deviations from the mean is about 1 in 50,000, and consequently could be omitted (Kinnison, 1985).The financial institutions with significant amounts of trading activity proved to be very vulnerable to extreme market movements and, in time, the measurement of market risk became a primary concern for regulators and also for internal risk control. This calls for indicators showing the risk exposure of firms and the effect of risk reducing measures.

Value-at-Risk (VaR) approach was the standard measure of financial risks and other risks such as industrial risk management. Basically, it is used to measure the expected loss over a period of time for known distribution of known probability and under normal market conditions. Value-at-Risk (VaR) has been established as a standard tool among financial institutions to depict the downside risk of a market portfolio. It measures the maximum loss of the portfolio value that will occur over some period at some specific confidence level due to risky market factors (Jorion, 1997). Deposit money banks and banks holding companies with an important trading portfolio are subject to market risk requirements. They have been required to hold capital against their defined market risk exposures, and, the necessary capital is a function of banks' own risk estimates.

As a result, several alternative methods have been proposed for estimating VaR, one of which being the Extreme Value Theory (EVT). EVT methods make VaR estimations based

only on the data in the tails as opposed to fitting the entire distribution and can make separate estimations for left and right tails (Diebold et al., 2000). Proper estimation of VaR is necessary in that it needs to accurately capture the level of risk exposure that the firm is exposed to, but if it overestimates the risk level, then the firm will unnecessarily set aside excess capital to cover the risk, when that capital could have been better invested elsewhere (Hull, 2012). Extreme value theory helps in determining the minimum and the maximum capital that should be set aside to cover the market risks. To achieve this goal the banks need to manage the market risk by managing the financial leverage. Recently, Portfolio managers, Investors, Risk managers, claim managers etc, have become more concerned over occurrences under extreme market conditions.

Methodology

This study adopted the ex-post facto research design. The population of this study comprised of all the thirteen (13) DMBs listed on the floor of the Nigerian Exchange Limited (NGX) as of December 31, 2021 (CBN, 2022). These thirteen (13) DMBs are currently trading on the floors of the NGX. The data obtained covered the period of 16 years from 2006 to 2021 post consolidation period. Hence, the expected financial year observation is 208 (i.e., 13 x 16 = 208). This study employed secondary data which were sourced from the audited annual financial statement and reports of the listed DMBs and Nigerian Exchange Limited (NGX). The Panel data was employed because it helps to study the behaviour of each bank over time and across space (Gil-García & Puron-Cid, 2013). The balanced panel data collected was analysed quantitatively using panel data analysis technique. The specified static panel regression model is essentially estimated using the pooled regression method, fixed effects (FE) method or random effects (RE) method using the Hausman specification test to decide the appropriateness between fixed and random effects that best fits the panel regression data. The short run model was estimated using Generalized Method of Moments (GMM) estimator to check the dynamism and how the performance of the immediate previous period affects the current period performance. The formulated model was then estimated using the ordinary least squares (OLS) and panel data analysis technique. The statistical tool for analysis was done using STATA Version 15 software.

The first hypothesis seeks to establish whether credit risk affects the financial performance of deposit money banks in Nigeria. Return on equity was considered as a measure for financial performance (FPERF) and therefore, was used as the dependent variable. The independent and dependent variables have a general multiplicative Cobb Douglas functional relationship shown in equation 1.

$$FPERF = f(AQT, LPR, LAR, CAR) \quad (1)$$

Upon linearization and parametization, panel model (3.1) becomes:

$$FPERF_{it} = \beta_0 + \beta_1 AQT_{i,t} + \beta_2 LPR_{i,t} + \beta_3 LAR_{i,t} + \beta_4 CAR_{i,t} + \alpha_i + \varepsilon_{i,t} \quad (2)$$

Where $i = 1,\ldots,13$ represents the number of deposit money banks in the study
$t = 1, 2\ldots\ldots16$ represents the number of years covered in the study

The subscript i represents cross-sectional dimension and t denotes the time series dimension. In which $FPERF_{i,t}$ represents the financial performance of bank i at time t, β_0 stands for the model intercept, β_i stands for the coefficients of the independent variables. $AQT_{i,t}$ is the asset quality of bank i at time t, $LPR_{i,t}$ stands for loan loss provision ratio of bank i at time t, and $LAR_{i,t}$ is the loan and advances ratio of bank i at time t and $CAR_{i,t}$ is the capital adequacy ratio of bank i at time t. α_i is the bank specific effect that is assumed to be normally distributed with a constant variance and $\varepsilon_{i,t}$ is the error term which is assumed to have a normal distribution.

The second hypothesis seek to establish whether market risk affects the financial performance of deposit money banks in Nigeria. The independent and the dependent variables have a general multiplicative Cobb Douglas functional relationship shown in equation 3.

$$FPERF = f(DFL, NIM, GER) \quad (3)$$

Upon linearization and parametization, panel model (3) becomes:

$$FPERF_{it} = \alpha_0 + \alpha_1 DFL_{i,t} + \alpha_2 NIM_{i,t} + \alpha_3 GER + \theta_i + \varepsilon_{i,t} \quad (4)$$

In which $FPERF_{it}$ represents the performance of bank i at time t, α_0 stands for the model intercept, $DFL_{i,t}$ is the degree of financial leverage of bank i at time t, interest rate risk is proxied by net interest margin $NIM_{i,t}$ for bank i at time t, $GER_{i,t}$ is gearing ratio for bank i at time t. θ_i is the bank specific effect that is assumed to be normally distributed with a constant variance. $\varepsilon_{i,t}$ is the error term which is assumed to have a normal distribution.

The third hypothesis seek to establish whether liquidity risk affects the financial performance of deposit money banks in Nigeria. The independent and the dependent variables have a general multiplicative Cobb Douglas functional relationship shown in equation (5).

$$FPERF = f(LDR, LTR, CRR) \quad (5)$$

Upon linearization and parametization, panel model (3.5) was specified as:

$$FPERF_{it} = \lambda_0 + \lambda_1 LDR_{i,t} + \lambda_2 LTR_{i,t} + \lambda_3 CRR_{i,t} + \theta_i + \varepsilon_{i,t} \quad (6)$$

In which $FPERF_{it}$ represents the performance of bank i at time t, λ_0 stands for the model constant or intercept, $\lambda_1 - \lambda_3$ stands for the coefficients of the independent variables. $LDR_{i,t}$ is the loan to deposit ratio of bank i at time t, $LTR_{i,t}$ is the loan to asset ratio of bank i at time t, and $CRR_{i,t}$ is the cash reserve ratio of bank i at time t. θ_i is the bank specific effect that is assumed to be normally distributed with a constant variance. $\varepsilon_{i,t}$ is the error term which is assumed to have a normal distribution.

The fourth hypothesis seek to establish whether operational risk affects the financial performance of deposit money banks in Nigeria. The independent and the dependent variables have a general multiplicative Cobb Douglas functional relationship shown in equation (7).

$$FPERF = f(CIR, OPR, NOR) \quad (7)$$

Upon linearization and parametization, panel model (3.7) was specified as:

$$FPERF_{it} = \lambda_0 + \lambda_1 CIR_{i,t} + \lambda_2 OPR_{i,t} + \lambda_3 NOR_{i,t} + \theta_i + \varepsilon_{i,t} \quad (8)$$

In which $FPERF_{it}$ represents the performance of bank i at time t, λ_0 stands for the model constant or intercept, $\lambda_1 - \lambda_{3stands}$ for the coefficients of the independent variables. $CIR_{i,t}$ is the cost to income ratio of bank i at time t, $OPR_{i,t}$ is the operating cost ratio of bank i at time t, $NOR_{i,t}$ is the net interest margin to operating cost ratio of bank i at time t. θ_i is the bank specific effect that is assumed to be normally distributed with a constant variance. $\varepsilon_{i,t}$ is the error term which is assumed to have a normal distribution.

The confidence levels for this research have been set at 95% with a margin of error of +/- 5%. Consequently, the statistically significance levels are 5%. These levels indicate the strength of the significance with 5% being the strength of reliability for inference (Muriithi, 2016; Muriithi et al., 2016b; Muriithi & Waweru, 2017; Madhuwanthi & Morawakage, 2019). At this confidence and statistical significance levels, the variables are expected to produce statistically significant values that can be relied upon to explain the effect of financial risk on the financial performance of listed deposit money banks in Nigeria. The panel data regression of the independent variables on the dependent variable is said to be statistically significant if the corresponding ρ-value is less than the critical values. That is, $\rho < 0.05$ for the critical values.

Table 1: Measurement of study Variables

Variable	Proxy	Measurement	Source	Study replicate
Financial performance	Return on equity (FPERF)	Net income / Total equity capital	DMBs Annual financial reports	Muriithi (2016), Iyinomen et al. (2020), Siriba (2020).
Credit risk	Asset quality (AQT)	Non-performing loans / Total loans and advances	DMBs Annual financial reports	Kargi (2011), Hamisu (2012), Harcourt (2017).
	Loan-loss provision ratio (LPR)	Loan-loss provision / Total loan and advances	DMBs Annual financial reports	Yimka et al.(2015), Annor and Obeng (2017).
	Loan and advances ratio (LAR)	Total loan and advance / Total deposit	DMBs Annual financial reports	Hamisu (2012), Kolapo et al. (2012), Harcourt (2017).
	Capital adequacy ratio (CAR)	Tier 1 + tier 2 capital / Total risk weighted assets	DMBs Annual financial reports	Muriithi (2016), Akomeah at al. (2020), Munangi (2020).
Market risk	Degree of financial leverage (DFL)	EBIT / EBIT – interest	DMBs Annual financial reports	Muriithi et al. (2016b), Isedu and Erhabor (2021).
	Interest rate risk (NIM)	Net interest income / Total assets	DMBs Annual financial reports	Aruwa and Musa (2014), Fadun and Oye (2020)
	Gearing ratio (GER)	Total debt / Total assets	DMBs Annual financial reports	Siyanbola et al. (2015), Le and Phan 2017), Kassi et al., (2019).
Liquidity risk	Loan-to-deposit-ratio (LDR)	Total Loan / Total deposit	DMBs Annual financial reports	Ebenezer et al. (2019), Sathyamoorthi et al. (2020).
	Loan to asset ratio (LTR)	Total loan / Total asset	DMBs Annual financial reports	Isedu and Erhabor (2021). Erhabor and Ofiafoh (2020)
	Cash Reserve Ratio (CRR)	Cash Reserve / Total deposit	DMBs Annual financial reports	Edem (2017), Mukolu and Adeleke (2020).
Operational risk	Cost income ratio (CIR)	Operating costs / Net interest income	DMBs Annual financial reports	Ahmadu et al. (2019), Fadun and Oye, (2020).
	Operating cost ratio (OPR)	Operating expenses / Total assets	DMBs Annual financial reports	Ahmadu et al. (2019), Isedu and Erhabor (2021).
	NIM to operating cost ratio (NOR)	Net interest margin / Operating expenses	DMBs Annual financial reports	Ahmadu et al. (2019), Isedu and Erhabor (2021).

Source: Author, 2024.

Results and Discussions

This section presents the results of the various statistical analyses carried out to achieve the purpose of this study. While descriptive statistics reveal mean, standard deviation, minimum, and maximum values of all variables of the study, the correlation analysis and unit root test seek to find the nature of the relationship and stationarity of the variables. The panel data and OLS analyses depict the impact of each of the explanatory variables on DMBs' financial performance (Measured by return on assets ROE) in Nigeria.

Descriptive Statistics

The descriptive statistics of all variables used are presented in Table 2. This summarizes the data used, mean as a measure of central tendency and standard deviation, minimum and maximum as a measure of variability. Out of the fourteen (14) variables used, gearing ratio has the highest yearly mean of 90.50 and interest rate risk has the lowest yearly mean of -1.34. The mean value of Return on Equity is 8.52; this show on the average the Return on Equity value of the firms used in the study. From the standard deviation which measure the dispersion of the data relative to its mean shows that larger number of variables have low deviation from their mean while only few have high deviation from their mean. Also, the minimum and maximum of each variable are summarized, and their essence is to tell the lowest and the highest values of an observation. From the outcomes, all the observations fall within their minimum and maximum. The maximum value is 22.19 and the minimum value is -358.57. This suggests that the value for ROE varies across the firms with a standard deviation figure of 39.36.

Table 2: Descriptive Statistics

Variables	Mean	Std. Dev.	Min.	Max.
ROE	8.52	39.36	-358.57	122.19
AQT	11.07	20.93	0.00	133.16
LPR	1.79	3.71	-11.26	22.39
LAR	66.02	41.65	0.00	575.96
CAR	14.44	32.21	-201.59	44.00
DFL	3.16	49.96	-47.03	672.14
NIM	-1.34	0.18	-2.31	-0.49
GER	90.50	31.11	-1.60	108.08
LDR	62.37	40.92	0.07	575.96
LTR	38.11	11.21	0.10	60.70
CRR	27.56	33.77	0.00	406.77
CIR	0.72	1.51	-3.29	14.58
OPR	3.28	4.08	-8.56	14.48
NOR	0.99	2.64	-2.52	25.23

Source: Author's computation (2024).

Pairwise Correlation

This section on correlation discussed the degree of association between the financial performance (ROE) of the deposit money banks and each of the risk components examined, namely, Credit risk, market risk, liquidity risk and operational risk.

Table 3: Correlation Matrix

	ROE	AQT	LPR	LAR	CAR	DFL	NIM	DAR	LDR	LTR	CRR	CIR	OPR	NOR
ROE	1													
AQT	0.0074	1												
LPR	-0.0302	0.2555	1											
LAR	0.0983	0.043	-0.1377	1										
CAR	0.1167	-0.018	-0.1742	0.1443	1									
DFL	0.0375	-0.0392	-0.0304	-0.0221	0.0243	1								
NIM	-0.1868	-0.0521	0.0732	-0.1006	-0.1643	0.0137	1							
GER	-0.0753	-0.1029	0.1213	-0.1361	-0.7946	-0.0234	0.1103	1						
LDR	0.0668	-0.0127	-0.1787	0.9369	0.1292	-0.0157	-0.0791	-0.1885	1					
LTR	0.0845	-0.0347	0.0197	0.28	0.1789	-0.0032	-0.1547	-0.3196	0.3944	1				
CRR	0.1109	-0.0231	-0.295	0.6407	0.0605	0.0341	-0.1313	-0.0881	0.6877	-0.0888	1			
CIR	0.0113	0.0747	0.3061	-0.0413	-0.0096	-0.0284	-0.2308	-0.02	-0.0949	-0.0119	-0.0923	1		
OPR	0.0144	0.0849	0.3692	-0.0682	-0.1197	-0.0387	0.1639	0.1767	-0.143	-0.1104	-0.2056	0.6391	1	
NOR	-0.3955	-0.0047	0.0797	-0.0524	-0.0189	0.0039	0.0208	0.0012	-0.0484	0.0161	-0.0673	0.0724	0.1382	1

Source: Author's Computation using STATA (2024)

The results indicate that ROE is positively correlated with asset quality, as evidenced by a correlation coefficient of 0.0074. This means that an increase in asset quality, which is represented by a lower proportion of non-performing loans, tends to positively influence ROE. This finding aligns with the expectation that a better-quality loan portfolio is more likely to generate higher profitability. Additionally, there is a negative correlation

between ROE and the loan-loss provision ratio (LPR), with a correlation coefficient of -0.0302. This suggests that as LPR increases, indicating a higher level of provisions for loan losses, ROE tends to decrease. This can be attributed to the fact that higher provisions reflect an increase in credit risk, potentially leading to lower profitability. The relationship between ROE and capital adequacy ratio (CAR) is positively correlated with a coefficient of 0.1167. This implies that a higher CAR is associated with higher ROE, indicating the importance of maintaining a strong capital base for profitability.

Market risk is assessed through degree of financial leverage (DFL), net interest margin (NIM), and gearing ratio. The results show that ROE is insignificantly positively correlated with DFL while insignificantly negatively correlated with NIM and GER. DFL, as indicated by a correlation coefficient of 0.0375, has an insignificant positive relationship with ROE. This suggests that increased borrowing or leverage by banks might lead to improved performance, though this relationship is not statistically significant. On the other hand, NIM has an insignificant negative correlation of -0.1868 with ROE, indicating that changes in lending rates, reflected in NIM, may not strongly correlate with bank performance. Also, GER has an insignificant negative correlation of -0.0753 with ROE, indicating that more liabilities than assets may be putting a DMB at risk of defaulting on its loans if interest rates were to rise suddenly which may not correlate with bank performance. Lastly, there is an insignificant negative correlation between DFL, NIM and GER, implying that they move in different directions, which is consistent with expectations.

The analysis includes liquidity risk components such as loan-to-deposit ratio (LDR), loan-to-asset ratio (LTR), and cash reserve ratio (CRR). ROE is significantly positively correlated with LTR (correlation coefficient of 0.085) and insignificantly positively correlated with LDR (correlation coefficient of 0.067) and CRR (correlation coefficient of 0.111). The significant positive correlation with LTR suggests that a higher proportion of loans to total assets can positively impact ROE. However, the insignificantly positive correlations with LDR and CRR indicate that these ratios may not strongly influence ROE. There is a significant positive correlation between LDR and LTR (correlation coefficient of 0.394) and CRR (correlation coefficient of 0.688), emphasizing the interplay between these liquidity risk components. However, LTR shows an insignificant negative correlation with CRR (correlation coefficient of -0.089), indicating a limited relationship between LTR and CRR.

Operational risk factors consist of Cost-Income Ratio (CIR), Operating Cost Ratio (OPR), and NIM to Operating Cost Ratio (NOR). The analysis indicates that ROE is insignificantly positively correlated with NIM to Operating Cost Ratio and insignificantly negatively correlated with both CIR and OPR. There is a significant positive correlation between CIR and OPR (correlation coefficient of 0.639), suggesting that these two operational cost-related ratios are closely related. However, CIR shows an insignificant positive correlation with NIM to Operating Cost Ratio, while OPR displays a significant positive correlation with NIM to Operating Cost Ratio (correlation coefficient of 0.138). Finally, the correlation

analysis provides valuable insights into the relationships between financial variables and their influence on ROE. These findings are essential for understanding the dynamics of credit risk, market risk, liquidity risk, and operational risk within Nigerian deposit money banks, ultimately guiding strategic decision-making and risk management practices in the banking sector.

Empirical Findings

Panel Regression Results

This section shows the panel regression results for each model stated in the methodology and various post-estimation tests done on them. The study estimates and presents the GMM specification while presenting the instruments used and discussing the post-estimation diagnostics of the GMM model. Table 4 represents the general objective of the study.

The Generalized Method of Moments (GMM) regression analysis was conducted to investigate the relationship between various financial risks and Return on Equity (ROE) for Nigerian deposit money banks. The results show that the lagged ROE variable (ROE_{L1}) has a significant negative impact on the current ROE, with a coefficient of -0.33746 and a p-value of 0.000, suggesting that if the ROE in the previous period was lower, it tends to have a negative effect on the current ROE. The significance is a requirement for the GMM to be suitable for interpretation.

Table 4: GMM Regression Output

ROE	Coef.	Std.Err	Z	P>z	[95% Conf.Interval]	
ROE_{L1}	-0.33746	0.082245	-4.1	0.000	-0.49866	-0.17627
CAR	-0.183	0.181849	-1.01	0.314	-0.53941	0.17342
AQT	0.071091	0.132151	0.54	0.591	-0.18792	0.330102
LPR	1.050314	0.780071	1.35	0.178	-0.4786	2.579225
LAR	0.445144	0.209591	2.12	0.034	0.034353	0.855935
DFL	-0.00254	0.050667	-0.05	0.96	-0.10185	0.096765
NIM	-47.9582	14.45196	-3.32	0.001	-76.2835	-19.6329
DAR	0.012217	0.26444	0.05	0.963	-0.50608	0.53051
LDR	-0.84297	0.268951	-3.13	0.002	-1.37011	-0.31584
LTR	1.319557	0.423719	3.11	0.002	0.489083	2.150031
CRR	0.575516	0.188258	3.06	0.002	0.206538	0.944495
CIR	-1.85916	4.634657	-0.4	0.688	-10.9429	7.224604
OPR	2.710678	1.331435	2.04	0.042	0.101114	5.320241
NOR	-7.9345	1.141787	-6.95	0.000	-10.1724	-5.69664
_cons	-96.9366	36.55456	-2.65	0.008	-168.582	-25.2909
Wald chi2(14)= 87.83				Prov>Chi2=0.000		

The study also found that changes in the Capital Adequacy Ratio (CAR) variable do not have a significant impact on ROE, with a coefficient of -0.183 and a p-value of 0.314.

Similarly, the Asset Quality (AQT) variable has a coefficient of 0.071091 and a p-value of 0.591, indicating that variations in asset quality do not significantly affect ROE. The Loan-Loss Provision Ratio (LPR) variable has a coefficient of 1.050314, although it is not statistically significant with a p-value of 0.178, suggesting that changes in the loan-loss provision ratio do not significantly influence ROE. In contrast, the Loan and Advances Ratio (LAR) variable exhibits a coefficient of 0.445144 and is statistically significant with a p-value of 0.034, indicating that an increase in the LAR is associated with an increase in ROE for Nigerian deposit money banks.

The Degree of Financial Leverage (DFL) variable has a coefficient of -0.00254, but it is not statistically significant with a p-value of 0.96, implying that changes in the degree of financial leverage do not significantly impact ROE in this context. The Net Interest Margin (NIM) variable has a substantial coefficient of -47.9582 and is highly statistically significant with a p-value of 0.001, suggesting that a decrease in net interest margin is associated with a significant decrease in ROE. The gearing ratio (GER) variable has a coefficient of 0.012217 and a p-value of 0.963, indicating that variations in the GER do not significantly affect ROE. The Loan-to-Deposit Ratio (LDR) variable exhibits a coefficient of -0.84297 and is highly statistically significant with a p-value of 0.002, implying that an increase in the LDR is associated with a decrease in ROE for Nigerian deposit money banks. The Loan-to-Asset Ratio (LTR) variable has a coefficient of 1.319557 and is statistically significant with a p-value of 0.002, indicating that an increase in the LTR is linked to an increase in ROE. The Cash Reserve Ratio (CRR) variable shows a coefficient of 0.575516 and is statistically significant with a p-value of 0.002, implying that an increase in the CRR is associated with an increase in ROE for Nigerian deposit money banks.

The Cost-Income Ratio (CIR) variable has a coefficient of -1.85916, but it is not statistically significant with a p-value of 0.688, suggesting that variations in the CIR do not significantly impact ROE. The Operating Cost Ratio (OPR) variable exhibits a coefficient of 2.710678 and is statistically significant with a p-value of 0.042, indicating that an increase in the OPR is associated with an increase in ROE. The NIM to Operating Cost Ratio (NOR) variable has a coefficient of -7.9345 and is highly statistically significant with a p-value of 0.000, suggesting that a decrease in the NOR is associated with a substantial decrease in ROE for Nigerian deposit money banks. The overall model has an F-statistic of 87.83 with a p-value of 0.0000, indicating that, the model is statistically significant, which means that financial risk has a significant effect on the financial performance of deposit money banks in Nigeria in the period under review.

Table 5: Diagnostic Tests

Estimation test	**Coefficient**	**p-value**
Heteroscedasticity (Breusch-Godfrey test) Test	351.43	0.1211
Autocorrelation (Breusch -Godfrey Serial Correlation LM) Test	7.533	0.1780
Normality Test	23.74	0.1218

Heteroskedasticity Test

H_0: Errors are Homoscedastic.

H_1: Errors are Heteroscedastic.

Breusch-Godfrey test was 351.43 with *p*-value of 0.1211 and this means that the null hypothesis of errors is homoscedastic will be accepted and alternative hypothesis of errors are heteroscedastic will be rejected.

Autocorrelation Test

H_0: Errors are not autocorrelated.

H_1: Errors are autocorrelated.

Breusch-Godfrey Serial Correlation LM Test was 7.533 with a *p*-value of 0.1780 means that null hypothesis of errors is not autocorrelated will be accepted and alternative hypothesis of errors are autocorrelated will be rejected.

Normality Test

H_0: Joint hypothesis of skewness and kurtosis are zero

H_1: Joint hypothesis of skewness and kurtosis are not zero

The Jarque-Bera was 23.74 with a *p*-value of 0.1218 implies that the null hypothesis should be accepted, which mean that the null hypothesis of the Jarque-Bera test is a joint hypothesis of the skewness being zero and the excess kurtosis being zero, the data are consistent and they are normally distributed.

Hausman Test

Table 5 shows the result of the Hausman test and the test statistics have a chi statistic of 7.362 with three degrees of freedom and a corresponding *p*-value of 0.000.

Table 6: Hausman Test

Test Statistic Chi2(3)	***p*-value**
7.362	0.000***

Therefore, the null hypothesis that the regressors and individual heterogeneity are strictly exogenous is rejected at five percent (5%) level of significance. Therefore, the fixed effect is preferred over random effect. The interpretation will be done on fixed effect.

Hansen J Test of Over-Identification Restrictions

The Hansen J statistic is 9.66 with a corresponding *p*-value greater than 0.1. Therefore, the null hypothesis of the validity of the overidentifying restrictions for the instruments is not rejected at a five percent (5%) level of significance. Therefore, the instruments employed by the model are appropriate and lead to precise consistent estimates.

Hypotheses Test

Table 7 shows the summary of the hypotheses test result for the effect of financial risk on the financial performance of listed deposit money banks in Nigeria in the period under review.

Table 7: Hypotheses Test

Hypotheses	F-statistics	P-value	Acceptance/Rejection
Credit Risk	8.97	0.0619	Accepted
Market Risk	11.2	0.0107	Rejected
Liquidity Risk	13.28	0.0041	Rejected
Operational Risk	51.01	0.0000	Rejected

Source: Extracted from STATA Output

(i) From the result in table 7 it depicts the value of the F-statistics and the p-value which is used for the acceptance or rejection of the null hypotheses stated in chapter one. With respect to credit risk model, the ρ-value of 0.0619 is greater than 0.05. That is, ($\rho = 0.0619 > 0.05$). The overall effect of credit risk on the financial performance of deposit money banks in Nigeria is therefore accepted. Therefore, credit risk has no significant effect on the financial performance of listed deposit money banks in Nigeria. This result agrees with the results of the studies by Kithinji (2010), NevineSobhy (2013), Gambo (2019), Erhaboh and Ofiafoh (2020), and Al-Ali (2020).

(ii) The market risk model indicated a ρ-value of 0.0107 which is less than 0.05. That is, ($\rho = 0.0107 < 0.05$). The overall effect of market risk on the financial performance of deposit money banks in Nigeria is therefore rejected. Therefore, market risk has significant effect on the financial performance of listed deposit money banks in Nigeria. This finding agrees with the results of Eke et al. (2015), Muriithi (2016), and Yuksel and Zengin (2016).

(iii) The liquidity risk model indicated a ρ-value of 0.0041 which is less than 0.05. That is, ($\rho = 0.0041 < 0.05$). The overall effect of liquidity risk on the financial performance of deposit money banks in Nigeria is therefore rejected. Therefore, liquidity risk has significant effect on the financial performance of listed deposit money banks in Nigeria. This result is in line with the results of studies by Erhabor and Ofiafoh (2020), Musembi et al. (2016), and Edem (2017) that liquidity risk has a positive relationship with profitability.

(iv) The Operational risk model indicated a ρ-value of 0.0000 which is less than 0.05. That is, ($\rho = 0.0000 < 0.05$). The overall effect of operational risk on the financial performance of deposit money banks in Nigeria is therefore rejected. Therefore, operational risk has a significant effect on the financial performance of listed deposit money banks in Nigeria. This finding aligns with the results of Kamau et al. (2018), Okeke et al. (2018), Olalere et al. (2018), and Hassan et al. (2020). This therefore calls for better management of operational risks in a manner that improves financial performance and boosts depositors' confidence.

The overall F-test hypothesis that financial risk has a significant effect on financial performance is not rejected at a five percent (5%) level of significance, indicating that, the components of financial risk jointly influence the financial performance of listed deposit money banks in Nigeria. Therefore, the variables of financial risk are jointly significant in explaining the variations in financial performance of listed deposit money banks in Nigeria. The result is consistent with the earlier hypothesis that financial risk influenced the financial performance of listed deposit money banks. The findings corroborated the work of Mathuva (2009), Aruwa and Musa (2014), Amin et al. (2014), Muriithi (2016), Kioko et al. (2019) and Al-Ali (2020), that market risk, liquidity risk, and operational risk exerted significant negative effects on the financial performance of listed deposit money banks, with operational risk exerting the most profound effect on financial performance. While credit risk has no significant effect on the financial performance of listed deposit money banks in Nigeria.

Conclusion and Recommendations

The findings revealed that credit risk has no significant effect on the financial performance of listed deposit money banks in Nigeria. Therefore, the combined effect of the coefficients of the financial ratios of capital adequacy ratio, asset quality, loan loss provision ratio, and loan and advance ratio in the regression model which are indicators of the level of credit risk have no significant effect on the financial performance of listed deposit money banks in Nigeria. The analysis of the market risk shows that interest rate risk has a significant negative effect on the financial performance of listed DMBs in Nigeria. Conclusively, interest rate risk exposure has an adverse impact on deposit money bank's performance in Nigeria. This situation explains that banks, which have higher amounts of deposits are exposed to a higher amount of interest rate risk.

The study indicated that liquidity risk has a positive and significant effect on the financial performance of listed deposit money banks in Nigeria. The conclusion of the study is that liquidity problems if unchecked may adversely affect a given deposit money bank's profitability, capital, and under extreme circumstances, it may cause the collapse of an otherwise solvent bank. The study found that operational risk exerted a significantly negative impact on the financial performance of listed deposit money banks in Nigeria. The study indicated that there is the existence of operational risk which is mainly related to costs leading to uncertainty regarding a financial bank's earnings. This may be due to cyber-attacks, human error, misconduct by employees, or risk of loss due to increasing operating expenses.

Recommendations

Based on the findings and hypothesis formulated, the following recommendations were reached:

(i) The management of listed deposit money banks in Nigeria should ensure that regulatory prudential guideline lines are adhered to in loan approval and develop rigorous and robust credit policies to enable banks to assess the creditworthiness of their customers effectively. Management of listed deposit money banks in

Nigeria should establish a proper credit risk environment, sound credit granting processes, appropriate credit administration, measurement, monitoring, and control over credit risk policy, as well as strategies to mitigate the risk of default in repayment.

(ii) The managers of listed deposit money banks in Nigeria should leverage on the utilization of financial instruments such as financial derivatives and asset securitization and be active in derivatives markets to reduce their interest rate risk exposure. Additionally, the Central Bank of Nigeria should collaborate with DMBs in Nigeria to emphasize the need to put in place alternative business gateways for financial institutions. By doing so, DMBs will earn revenue using non-interest avenues. The result is that there will be a decrease in market interest rates since DMBs will not be required to increase interest rates to generate more returns. If the market interest rates are reduced, Nigerians can afford loans and therefore improve businesses and economic development.

(iii) The study also recommends that managers of listed deposit money banks in Nigeria should exercise prudence over their liquidity position in different product segments and establish a tradeoff between resilience to liquidity shocks and the cost of holding lower-yielding liquid assets that may impact listed deposit money banks' ability to generate revenues, increase capital and extend credit. This will help in enhancing their investment portfolio and providing a competitive edge in the market. Listed deposit money bank liquidity risk may be mitigated by maintaining sufficient cash reserves, recapitalization, raising the deposit base, and thereby decreasing the liquidity gap.

(iv) The management of deposit money banks in Nigeria should institutionalize training and retraining of all their operations employees on operational risk awareness to identify, avoid and proactively mitigate operational costs. Banks are enjoined to develop viable internal approaches to recognize, control and mitigate operational risks, which should cover the design, implementation, and review of operational risk methodology. This is in line with the proposal in the new Basel Capital Accord, as also encapsulated in the Extreme value theory that listed deposit money banks are required to provide capital against their defined operational risk exposure.

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Appendix A: Listed Deposit Money Banks in Nigeria

1. Access Bank Plc
2. Ecobank Nigeria Plc
3. Fidelity Bank Plc
4. First Bank of Nigeria Plc
5. First City Monument Bank Plc
6. Guaranty Trust Bank Plc
7. Stanbic IBTC Bank Ltd.
8. Sterling Bank Plc
9. Union Bank of Nigeria Plc
10. United Bank for Africa Plc
11. Unity Bank Plc
12. Wema Bank Plc
13. Zenith Bank Plc

Appendix B: Data Presentation

SN	DMBs	YR	CAR	ROE	QTR	LPR	LAR	DFL	NIM	GER	LDR	LTR	CRR	CIR	OPR	NOR
1	ACCESS	2006	0.00	2.55	9.66	1.25	54.96	-0.30	-1.55	83.45	48.80	31.00	41.72	1.72	4.80	0.58
2	ACCESS	2007	0.00	21.43	9.16	0.87	57.64	-3.79	-1.51	91.36	52.50	32.79	77.20	1.29	3.99	0.78
3	ACCESS	2008	0.00	9.22	3.73	1.10	72.69	-5.15	-1.67	83.56	70.94	24.00	165.57	0.92	1.97	1.09
4	ACCESS	2009	32.00	-2.61	19.51	3.77	93.53	0.09	-1.28	75.73	87.52	55.77	14.61	0.99	5.18	1.01
5	ACCESS	2010	26.00	6.31	8.10	0.93	95.56	-0.58	-1.26	78.21	92.92	56.22	5.22	1.10	6.04	0.91
6	ACCESS	2011	22.00	8.48	9.52	0.99	54.76	-0.50	-1.43	87.95	52.64	35.50	12.63	1.22	4.54	0.82
7	ACCESS	2012	23.00	17.79	0.00	-0.90	53.44	-0.87	-1.26	86.19	50.28	34.61	24.65	0.91	5.01	1.10
8	ACCESS	2013	19.00	14.85	2.74	0.46	60.14	-1.37	-1.37	86.68	59.27	43.00	33.01	0.42	1.77	2.39
9	ACCESS	2014	18.00	15.49	2.21	0.80	77.66	-1.08	-1.32	86.82	76.35	52.77	27.85	-0.94	-4.46	-1.07
10	ACCESS	2015	20.00	17.91	1.70	5.42	82.85	-2.47	-1.39	85.81	81.14	52.71	28.42	-1.27	-5.16	-0.79
11	ACCESS	2016	20.77	15.72	0.00	1.05	86.61	-1.85	-1.40	86.95	86.61	51.94	34.17	1.07	4.28	0.93
12	ACCESS	2017	20.06	12.03	0.00	1.54	88.91	-0.96	-1.40	87.43	88.91	48.66	42.49	1.07	4.25	0.94
13	ACCESS	2018	20.78	19.36	0.00	0.57	77.73	-1.47	-1.46	90.10	77.73	40.24	28.89	1.02	3.59	0.98
14	ACCESS	2019	20.02	15.98	0.00	0.47	68.41	-0.71	-1.41	91.46	68.41	40.74	41.79	0.82	3.19	1.22
15	ACCESS	2020	20.61	14.12	0.00	-11.26	575.96	-0.92	-1.52	91.35	575.96	37.08	406.76	-1.10	-3.33	-0.91
16	ACCESS	2021	24.52	15.26	0.00	-1.20	59.83	-1.42	-1.59	91.05	59.83	35.47	21.39	-1.09	-2.80	-0.92
17	ECO	2006	0.00	-17.05	3.09	0.24	65.07	1.00	0.00	125.48	2.51	2.57	13.33	0.00	11.17	0.00
18	ECO	2007	0.00	21.39	9.34	0.64	54.30	1.00	0.00	88.82	52.13	37.31	24.42	0.00	5.64	0.00
19	ECO	2008	10.00	6.71	41.82	4.02	53.42	0.05	-1.37	92.66	46.64	33.51	6.04	1.41	6.01	0.71
20	ECO	2009	24.00	-6.24	39.95	6.60	92.00	0.20	-1.18	79.56	75.35	51.81	3.91	1.32	8.63	0.76
21	ECO	2010	23.00	2.18	24.31	3.05	78.06	-0.08	-0.89	170.09	0.07	0.10	5.71	1.07	13.66	0.94
22	ECO	2011	12.00	25.67	97.07	1.71	48.04	-4.38	-1.69	93.05	46.06	37.80	9.76	0.47	0.96	2.13
23	ECO	2012	18.00	5.08	0.00	-1.18	54.57	-0.08	-1.26	88.41	52.42	41.26	10.77	0.21	1.17	4.75
24	ECO	2013	17.00	7.44	5.93	2.92	59.08	-0.14	-1.22	89.28	55.96	42.85	20.42	-0.40	-2.40	-2.52
25	ECO	2014	16.00	14.99	4.68	2.64	74.42	-0.41	-1.25	88.81	71.36	50.35	20.17	0.20	1.14	4.91
26	ECO	2015	19.00	4.96	11.03	4.58	67.13	-0.10	-1.16	87.31	67.13	45.55	20.90	0.78	5.44	1.28
27	ECO	2016	16.72	-9.78	9.62	-2.01	21.13	0.11	-1.34	91.40	68.60	45.14	18.24	2.15	9.74	0.47
28	ECO	2017	16.00	7.56	14.49	-5.45	83.59	-0.21	-1.20	85.39	78.24	46.96	12.15	-0.62	-3.93	-1.62
29	ECO	2018	14.30	10.97	26.39	-2.13	37.46	-0.47	-1.36	87.35	68.81	45.12	12.08	-0.90	-3.97	-1.11
30	ECO	2019	16.31	0.48	26.92	-0.20	59.91	-0.06	-1.72	86.73	59.91	40.76	36.08	-1.86	-3.56	-0.54
31	ECO	2020	21.44	2.71	19.86	-0.65	70.13	-0.17	-1.56	86.34	62.25	40.32	39.03	-1.11	-3.09	-0.90
32	ECO	2021	11.48	3.50	16.35	-0.42	66.42	-0.35	-1.78	88.74	60.61	41.03	41.48	-1.48	-2.43	-0.68
33	FIDEL	2006	0.00	2.66	17.07	0.38	58.92	-4.27	-1.43	78.66	49.06	32.09	15.43	1.05	3.92	0.96
34	FIDEL	2007	0.00	2.16	11.32	1.67	88.68	-1.37	-1.35	94.57	39.86	35.41	20.21	1.06	4.73	0.94
35	FIDEL	2008	0.00	9.71	10.31	-0.54	81.48	-0.48	-1.26	71.72	48.83	33.13	7.81	1.12	6.20	0.89
36	FIDEL	2009	0.00	0.28	19.72	5.21	68.55	-0.13	-1.18	74.38	60.41	42.45	7.00	0.81	5.34	1.23
37	FIDEL	2010	44.00	1.27	21.79	1.09	63.36	-0.48	-1.26	71.72	48.83	33.13	7.81	1.12	6.20	0.89
38	FIDEL	2011	30.00	0.72	7.20	0.80	45.85	-0.36	-1.41	81.44	45.85	34.67	14.68	1.34	5.25	0.75
39	FIDEL	2012	29.00	11.27	0.00	0.64	50.07	-1.42	-1.40	82.34	48.20	37.79	16.36	-1.38	-5.55	-0.73
40	FIDEL	2013	21.77	4.72	3.11	0.95	54.90	-0.41	-1.55	84.88	52.84	39.41	25.78	-1.78	-5.07	-0.56
41	FIDEL	2014	24.00	7.97	3.19	0.53	68.18	-0.47	-1.39	85.42	66.06	45.63	31.48	0.56	2.31	1.78
42	FIDEL	2015	19.00	7.58	3.40	0.75	77.83	-0.30	-1.31	85.10	75.13	46.94	24.08	0.45	2.20	2.24
43	FIDEL	2016	17.00	5.25	0.00	1.09	93.71	-0.22	-1.32	85.72	90.60	55.34	26.11	1.02	4.84	0.98
44	FIDEL	2017	16.03	9.27	0.00	1.46	102.58	-0.40	-1.29	85.26	99.16	55.74	34.78	0.86	4.44	1.17
45	FIDEL	2018	16.65	11.79	0.00	0.43	86.77	-0.56	-1.39	88.70	86.77	49.41	39.30	0.95	3.83	1.06
46	FIDEL	2019	18.29	12.15	99.82	0.43	91.98	-0.58	-1.41	8.89	91.98	53.31	37.01	0.92	3.62	1.08
47	FIDEL	2020	18.18	9.74	0.00	-0.99	78.05	-0.37	-1.42	90.08	78.05	48.08	38.53	-0.74	-2.81	-1.34
48	FIDEL	2021	20.08	11.95	4.02	-0.35	81.90	-0.67	-1.54	90.95	81.90	50.42	2.11	-0.80	-2.32	-1.24
49	FBN	2006	19.69	29.01	9.05	0.89	42.70	-1.31	-1.30	89.87	39.50	28.84	11.36	1.15	5.74	0.87
50	FBN	2007	23.35	24.43	2.71	0.34	37.54	-1.74	-1.34	90.57	36.35	24.58	10.34	1.12	5.08	0.90
51	FBN	2008	23.20	10.27	1.38	0.87	66.98	-1.27	-1.25	76.72	65.61	30.07	12.73	0.80	4.43	1.26
52	FBN	2009	15.80	1.03	7.53	3.03	85.24	-0.14	-1.35	85.75	80.53	49.64	5.25	0.81	3.61	1.23
53	FBN	2010	20.40	9.81	7.57	0.00	84.31	-0.55	-1.28	85.22	78.84	49.61	5.21	0.96	5.05	1.04

54	FBN	2011	20.47	12.25	2.65	2.30	65.24	-0.38	-1.19	87.13	63.44	43.52	10.23	0.80	5.19	1.24
55	FBN	2012	19.08	17.24	21.32	-0.51	65.85	-0.70	-1.15	86.23	64.21	48.39	12.52	0.85	6.03	1.17
56	FBN	2013	17.73	14.97	2.96	0.69	61.94	-0.66	-1.23	87.81	6.04	4.57	20.29	0.47	2.78	2.14
57	FBN	2014	22.47	15.84	2.70	0.85	73.31	-0.62	-1.25	87.96	71.42	50.18	22.88	0.59	3.30	1.70
58	FBN	2015	24.85	2.62	17.31	4.02	65.87	-0.09	-1.20	86.11	61.17	43.62	24.10	0.30	1.93	3.30
59	FBN	2016	22.59	2.10	0.00	7.28	77.15	-0.08	-1.19	87.70	67.79	44.42	22.23	0.67	4.30	1.49
60	FBN	2017	15.73	5.90	0.00	4.79	72.55	-0.21	-1.20	87.05	64.22	38.55	20.42	0.66	4.17	1.52
61	FBN	2018	17.26	11.24	0.00	2.49	48.29	-0.30	-1.29	90.47	48.29	30.24	18.74	0.85	4.33	1.18
62	FBN	2019	28.25	11.14	0.00	1.27	48.04	-0.40	-1.33	89.34	46.08	29.86	25.51	0.97	4.54	1.03
63	FBN	2020	15.97	11.73	0.00	-1.03	45.30	-0.50	-1.49	90.05	45.30	28.84	33.34	-1.06	-3.47	-0.94
64	FBN	2021	19.46	17.17	0.00	-1.57	49.27	-2.71	-1.59	90.15	49.27	32.26	27.13	-1.34	-3.42	-0.75
65	FCMB	2006	0.00	11.26	31.37	0.03	37.43	4.15	-1.59	76.42	27.13	17.88	106.69	1.71	4.44	0.58
66	FCMB	2007	0.00	19.13	3.16	0.81	46.26	-3.77	-1.44	88.17	44.53	31.80	13.51	1.13	4.12	0.88
67	FCMB	2008	39.00	11.30	2.74	1.26	76.98	-47.0	-1.35	71.40	74.29	39.94	10.72	0.95	4.26	1.05
68	FCMB	2009	31.00	0.44	8.75	0.99	96.78	-0.06	-1.45	72.05	89.74	51.49	3.39	1.25	4.40	0.80
69	FCMB	2010	30.30	5.89	3.02	9.40	103.40	-0.70	-1.39	74.98	97.63	60.70	4.00	1.44	5.84	0.70
70	FCMB	2011	28.18	-8.42	2.89	7.93	81.04	0.26	-1.27	80.44	78.06	53.08	8.54	1.02	5.46	0.98
71	FCMB	2012	23.00	11.45	2.49	1.96	56.46	-0.60	-1.32	85.47	55.37	39.38	28.06	0.43	2.04	2.34
72	FCMB	2013	18.00	11.13	3.99	1.12	62.99	-0.48	-1.25	85.75	62.99	44.68	38.19	0.43	2.40	2.32
73	FCMB	2014	19.25	13.80	3.72	-1.45	84.22	-0.49	-1.21	86.29	84.22	52.85	37.12	0.38	2.38	2.61
74	FCMB	2015	16.88	2.93	4.28	2.15	84.68	-0.14	-1.26	86.00	84.68	51.14	43.77	0.00	0.00	0.00
75	FCMB	2016	16.54	8.02	3.86	5.40	100.35	-0.31	-1.23	84.75	100.35	56.27	37.65	0.88	5.23	1.13
76	FCMB	2017	16.88	4.98	5.11	3.29	94.19	-0.19	-1.23	84.07	94.19	54.78	30.95	0.90	5.35	1.11
77	FCMB	2018	14.17	8.16	6.35	1.72	77.04	-0.34	-1.29	87.18	77.04	44.23	40.36	1.02	5.15	0.98
78	FCMB	2019	15.37	8.64	3.67	1.46	75.91	-0.36	-1.34	87.97	75.91	42.91	45.86	0.50	2.30	1.98
79	FCMB	2020	16.10	8.63	3.47	-1.77	65.45	-0.32	-1.36	88.97	65.45	39.97	42.38	-0.85	-3.73	-1.18
80	FCMB	2021	16.24	8.58	4.32	-0.98	68.42	-0.33	-1.44	90.22	68.42	42.66	23.33	-0.97	-3.54	-1.03
81	GTB	2006	0.00	22.72	2.78	0.83	40.68	-8.16	-1.42	89.61	39.02	27.30	34.53	1.13	4.31	0.89
82	GTB	2007	0.00	26.40	1.57	-0.25	40.34	-6.86	-1.43	90.65	39.30	23.79	43.25	1.07	3.97	0.93
83	GTB	2008	28.10	15.56	1.57	0.86	90.62	-3.30	-1.32	81.09	88.67	43.50	59.78	0.93	4.42	1.08
84	GTB	2009	25.99	12.32	11.38	5.26	87.56	-0.55	-1.13	81.97	82.49	52.84	5.25	0.71	5.27	1.41
85	GTB	2010	25.73	18.19	7.33	1.09	83.68	-1.44	-1.15	81.70	77.98	51.52	3.79	0.78	5.54	1.29
86	GTB	2011	23.03	20.89	3.42	1.84	71.77	-1.82	-1.20	85.19	69.30	44.42	11.29	0.69	4.38	1.44
87	GTB	2012	23.00	30.58	0.00	-0.06	69.53	-3.73	-1.12	83.66	67.85	44.91	28.13	0.14	1.08	6.94
88	GTB	2013	21.00	27.09	3.58	0.20	70.22	-3.59	-1.19	84.20	70.22	47.67	49.66	0.34	2.24	2.90
89	GTB	2014	21.40	26.37	3.18	0.44	78.83	-4.48	-1.22	84.11	78.83	54.15	15.26	0.38	2.27	2.66
90	GTB	2015	18.17	24.04	5.30	0.77	85.19	-3.07	-1.20	83.62	85.19	54.34	15.81	0.52	3.27	1.94
91	GTB	2016	19.79	26.20	0.00	3.29	80.02	-5.46	-1.20	83.80	80.02	51.00	22.95	0.50	3.11	2.01
92	GTB	2017	25.50	27.27	0.00	0.62	73.53	-4.31	-1.13	81.34	70.25	43.23	31.13	0.43	3.17	2.32
93	GTB	2018	27.35	32.08	0.00	2.44	55.37	-31.4	-1.17	82.49	55.37	38.30	29.77	0.49	3.33	2.03
94	GTB	2019	22.51	28.64	0.00	0.19	59.25	672.1	-1.21	81.71	59.25	39.92	46.24	0.47	2.88	2.14
95	GTB	2020	21.89	24.73	0.00	-0.56	47.38	-15.2	-1.29	83.53	47.38	33.63	21.25	-0.46	-2.35	-2.18
96	GTB	2021	25.43	19.80	0.00	-0.21	44.93	250.3	-1.39	83.75	44.93	33.16	23.27	-0.58	-2.34	-1.74
97	IBTC	2006	0.00	12.15	21.59	0.35	101.27	1.00	0.00	70.99	86.73	42.52	11.28	0.00	2.65	0.00
98	IBTC	2007	0.00	9.98	12.26	2.86	127.51	1.00	0.00	75.88	111.31	25.22	18.26	0.00	3.04	0.00
99	IBTC	2008	41.46	14.74	14.28	5.27	114.20	-1.89	-1.20	76.83	103.29	28.01	12.16	1.02	6.50	0.98
100	IBTC	2009	36.80	9.99	14.32	2.87	73.04	-0.70	-1.13	76.12	65.31	32.38	4.59	1.14	8.39	0.88
101	IBTC	2010	32.58	11.11	6.89	0.33	92.64	-1.05	-1.16	77.86	87.93	42.64	5.39	1.30	8.91	0.77
102	IBTC	2011	20.80	8.78	7.11	1.22	82.32	-0.61	-1.27	84.71	78.91	41.63	10.29	1.36	7.32	0.73
103	IBTC	2012	22.30	-42.61	1.70	1.80	87.37	-0.52	-1.29	104.02	69.71	40.93	20.14	1.45	7.50	0.69
104	IBTC	2013	19.90	21.28	3.49	0.64	92.21	-2.04	-1.31	87.29	69.59	37.97	28.90	1.56	7.57	0.64
105	IBTC	2014	19.10	28.06	4.41	0.58	73.53	-6.08	-1.31	100.00	71.94	42.20	25.84	2.24	11.07	0.45
106	IBTC	2015	21.30	14.65	7.65	3.03	71.63	-1.17	-1.33	86.24	71.63	37.71	42.85	1.42	6.62	0.71
107	IBTC	2016	22.80	20.26	5.07	3.53	65.64	-1.80	-1.26	86.64	62.92	33.50	53.72	1.19	6.55	0.84

108	IBTC	2017	23.50	26.12	8.52	3.39	49.37	-2.73	-1.22	86.64	49.37	26.84	53.25	1.03	6.20	0.97
109	IBTC	2018	24.70	31.06	4.24	22.39	53.57	8.87	-1.33	85.59	53.57	26.01	56.43	1.22	5.75	0.82
110	IBTC	2019	24.60	24.83	3.94	0.26	83.43	6.94	-1.38	83.89	83.43	28.36	71.55	1.21	5.01	0.83
111	IBTC	2020	24.70	21.98	4.24	-1.21	76.24	4.62	-1.53	84.77	76.24	25.14	76.48	-1.27	-3.79	-0.79
112	IBTC	2021	21.10	15.12	102.8	0.13	81.76	0.00	-1.56	86.26	81.76	33.58	57.97	-1.41	-3.89	-0.71
113	STERL	2006	0.00	4.02	24.82	0.81	69.18	-0.26	-1.51	76.89	55.91	34.02	26.09	2.16	6.65	0.46
114	STERL	2007	0.00	6.87	25.64	3.66	56.61	-3.08	-1.74	79.15	47.48	29.02	49.43	3.68	6.68	0.27
115	STERL	2008	17.40	20.94	8.78	1.77	42.09	-3.92	-1.40	87.42	37.80	26.77	57.06	1.66	6.66	0.60
116	STERL	2009	11.98	-42.80	23.61	7.77	59.99	0.46	-1.22	90.64	48.60	35.42	5.32	1.65	9.97	0.61
117	STERL	2010	13.00	19.31	11.54	1.03	54.98	-0.54	-1.29	90.57	49.56	36.32	3.28	1.12	5.70	0.89
118	STERL	2011	17.00	11.34	4.93	0.81	41.05	-0.25	-1.54	91.92	39.29	31.67	8.86	1.40	4.05	0.71
119	STERL	2012	14.60	14.91	0.00	0.05	50.92	-0.46	-1.39	91.96	49.47	39.54	13.72	0.84	3.45	1.20
120	STERL	2013	14.00	13.04	2.10	1.45	57.61	-0.35	-1.30	91.03	56.40	45.46	16.98	1.04	5.26	0.96
121	STERL	2014	1.40	10.63	3.10	1.13	58.07	-0.33	-1.28	89.73	56.60	45.02	26.64	0.46	2.40	2.17
122	STERL	2015	17.49	10.77	4.80	1.38	59.99	-0.39	-1.31	88.05	57.32	42.37	19.62	0.31	1.51	3.27
123	STERL	2016	11.16	6.03	0.00	2.00	49.92	-0.12	-1.17	89.73	80.08	56.13	18.45	0.83	5.56	1.21
124	STERL	2017	12.12	8.28	0.00	1.79	87.33	-0.21	-1.33	90.40	87.33	55.78	17.91	0.95	4.43	1.06
125	STERL	2018	13.35	9.43	0.00	0.77	81.65	-0.21	-1.30	91.13	81.65	56.31	15.47	1.11	5.55	0.90
126	STERL	2019	14.74	8.87	0.00	0.65	69.31	-0.20	-1.26	89.89	69.31	52.32	17.48	0.98	5.34	1.02
127	STERL	2020	18.03	8.28	0.00	-0.83	62.77	-0.25	-1.32	89.55	62.77	45.94	31.90	-1.02	-4.87	-0.98
128	STERL	2021	27.08	9.55	0.00	-0.81	58.90	-0.28	-1.39	91.31	58.90	43.70	30.68	-0.54	-2.18	-1.85
129	UNION	2006	0.00	10.74	18.96	1.16	36.32	1.00	0.00	84.85	30.91	19.05	74.33	0.00	4.27	0.00
130	UNION	2007	0.00	12.91	6.85	1.97	42.23	-0.88	-1.27	84.65	37.11	22.90	6.91	1.00	5.36	1.00
131	UNION	2008	0.00	21.44	21.34	0.85	41.07	-1.50	-1.31	88.90	37.95	22.94	6.88	0.78	3.81	1.28
132	UNION	2009	(13.3)	122.88	50.10	2.89	74.16	0.89	-1.53	119.73	49.06	40.46	9.07	1.97	5.88	0.51
133	UNION	2010	(9.51)	-91.95	32.31	2.78	45.24	0.33	-1.32	111.57	31.33	20.22	3.78	1.68	8.12	0.59
134	UNION	2011	20.79	-46.53	14.42	5.26	37.95	0.82	-1.60	81.60	31.70	14.85	0.00	-3.29	-8.33	-0.30
135	UNION	2012	22.00	3.70	4.93	-0.13	129.15	-0.16	-1.19	81.18	31.57	15.97	0.00	-0.44	-2.87	-2.27
136	UNION	2013	25.00	1.92	6.36	2.50	47.55	-0.07	-1.24	80.12	50.95	24.53	2.09	0.69	3.95	1.45
137	UNION	2014	16.40	12.07	5.41	8.92	59.28	-1.15	-1.29	77.98	59.28	31.00	23.12	1.07	5.49	0.94
138	UNION	2015	15.30	5.73	7.07	6.27	64.26	-0.35	-1.27	76.70	64.26	35.03	14.41	0.54	2.87	1.85
139	UNION	2016	13.30	5.67	7.30	2.41	77.03	-0.32	-1.28	78.34	77.03	40.50	20.68	0.88	4.56	1.14
140	UNION	2017	17.80	4.23	21.45	3.16	64.45	-0.30	-1.34	76.25	64.45	35.53	27.74	0.89	4.06	1.13
141	UNION	2018	16.40	8.02	9.60	0.39	55.21	-0.50	-1.42	84.59	55.21	32.34	27.24	1.23	4.65	0.81
142	UNION	2019	19.73	7.88	6.31	0.02	62.13	-0.63	-1.55	86.52	62.13	29.41	36.14	1.21	3.38	0.83
143	UNION	2020	17.46	7.06	4.25	0.20	61.51	-0.52	-1.58	87.94	61.51	31.62	24.04	-1.23	-3.23	-0.81
144	UNION	2021	14.61	6.34	4.45	-0.02	64.08	-0.87	-1.77	89.72	64.08	33.47	30.03	-1.60	-2.74	-0.62
145	UBA	2006	0.00	23.65	12.61	0.72	15.43	-0.71	-1.46	94.48	14.16	12.43	60.75	1.47	5.10	0.68
146	UBA	2007	11.07	12.76	4.37	0.41	37.03	-1.90	-1.42	85.89	35.37	26.90	14.34	1.06	3.99	0.95
147	UBA	2008	20.20	20.95	3.51	0.20	34.63	-3.07	-1.35	88.35	33.57	26.76	15.06	0.91	4.11	1.10
148	UBA	2009	16.30	1.13	8.34	3.06	51.66	-0.13	-1.12	87.93	48.70	39.18	5.48	1.10	8.40	0.91
149	UBA	2010	21.70	0.04	3.78	1.44	53.20	-0.29	-1.36	88.91	49.62	38.87	5.37	1.47	6.43	0.68
150	UBA	2011	23.50	-5.67	3.70	1.57	49.45	0.27	-1.41	91.25	47.73	35.50	12.34	1.43	5.54	0.70
151	UBA	2012	23.50	26.75	0.00	0.27	39.23	-1.31	-1.39	91.53	38.31	28.99	41.52	1.12	4.51	0.89
152	UBA	2013	22.60	19.83	1.20	0.61	44.28	-1.19	-1.41	91.10	43.38	35.49	33.17	0.49	1.92	2.04
153	UBA	2014	16.00	18.05	1.60	0.30	50.49	-1.13	-1.42	90.39	49.40	38.80	37.44	0.65	2.48	1.55
154	UBA	2015	20.00	17.93	1.70	0.24	51.04	-0.99	-1.30	87.92	49.80	37.66	31.48	-0.52	-2.59	-1.94
155	UBA	2016	20.00	16.13	0.00	1.11	60.56	-1.22	-1.33	87.21	60.56	42.95	30.61	0.87	4.10	1.15
156	UBA	2017	20.00	14.84	0.00	1.20	60.40	-1.03	-1.29	86.99	60.40	40.57	32.86	0.86	4.39	1.16
157	UBA	2018	24.00	15.64	0.00	0.14	51.22	-1.08	-1.37	89.68	51.22	35.22	36.45	0.90	3.81	1.11
158	UBA	2019	23.43	14.90	0.00	0.00	53.78	-1.01	-1.40	89.33	53.78	36.78	36.43	-0.57	-2.26	-1.75
159	UBA	2020	22.00	15.71	0.00	-0.48	45.01	-1.03	-1.47	90.59	45.01	33.19	33.03	-0.89	-2.99	-1.13
160	UBA	2021	24.90	14.75	105.6	-0.20	42.09	-0.94	-1.43	90.58	42.09	31.38	28.56	-0.81	-3.00	-1.24
161	UNITY	2006	0.00	4.46	0.00	0.00	0.00	1.00	0.00	76.52	46.69	28.39	54.06	0.00	0.00	0.00

162	UNITY	2007	0.00	2.25	0.00	0.00	0.00	1.00	0.00	84.24	25.10	18.00	28.88	0.00	0.00	0.00
163	UNITY	2008	0.00	-66.87	0.00	0.00	0.00	1.00	0.00	94.71	16.20	14.18	6.19	0.00	0.00	0.00
164	UNITY	2009	0.00	-233.1	0.00	0.00	0.00	1.00	0.00	97.22	40.85	34.05	4.35	0.00	0.00	0.00
165	UNITY	2010	0.00	28.20	15.26	3.07	58.01	-4.12	-1.26	85.50	51.41	37.31	7.84	1.93	10.51	0.52
166	UNITY	2011	12.01	5.47	5.76	1.04	46.03	-0.17	-1.25	88.17	42.58	30.23	10.38	1.53	8.63	0.65
167	UNITY	2012	13.35	12.01	5.00	0.50	70.00	-0.34	-1.19	87.00	70.00	47.77	15.27	1.17	7.50	0.85
168	UNITY	2013	(13.81)	-80.04	25.50	13.05	64.37	0.53	-1.13	93.01	64.37	48.37	3.20	1.72	12.85	0.58
169	UNITY	2014	2.02	14.02	17.60	21.62	79.18	-0.43	-0.96	81.55	79.18	53.07	2.46	0.00	0.00	0.00
170	UNITY	2015	(21.46)	5.68	98.04	11.72	106.35	-0.06	-1.01	81.37	106.35	55.52	11.92	0.33	3.25	2.99
171	UNITY	2016	(46.98)	2.63	133.2	13.61	104.93	-0.04	-1.00	83.13	104.93	56.27	19.35	0.49	4.96	2.03
172	UNITY	2017	(198.1)	6.16	0.00	17.54	3.55	0.22	-0.49	254.75	3.55	5.72	2.25	0.44	14.48	2.26
173	UNITY	2018	(198.6)	-0.52	0.00	0.07	18.05	-0.11	-1.23	203.27	18.05	18.50	3.66	1.35	7.98	0.74
174	UNITY	2019	(201.6)	-1.21	0.00	0.75	40.37	-0.28	-1.25	195.16	40.37	35.49	5.51	1.08	6.08	0.93
175	UNITY	2020	(101.5)	-0.76	0.00	0.00	56.67	-0.14	-1.44	155.98	56.67	41.07	27.84	-1.21	-4.37	-0.83
176	UNITY	2021	(86.00)	-1.15	0.04	0.00	83.55	-0.20	-1.43	151.25	83.55	49.97	21.29	-1.15	-4.29	-0.87
177	WEMA	2006	0.00	-32.14	19.12	11.99	88.06	0.92	-2.31	82.90	62.73	44.71	33.83	14.58	7.10	0.07
178	WEMA	2007	0.00	10.14	23.13	6.46	72.91	-0.80	-1.59	84.75	54.83	41.67	28.03	2.60	6.67	0.38
179	WEMA	2008	0.00	-32.59	0.00	5.14	0.00	0.67	-1.55	100.00	31.90	19.88	6.76	3.37	9.53	0.30
180	WEMA	2009	30.32	16.43	74.12	4.56	101.28	0.67	-1.54	130.37	31.90	19.88	6.76	3.34	9.53	0.30
181	WEMA	2010	27.00	110.69	49.98	17.80	61.51	1.80	-1.57	92.73	40.96	22.82	5.43	3.57	9.61	0.28
182	WEMA	2011	43.83	-73.09	49.98	3.05	61.51	0.43	-1.24	92.73	40.96	22.82	5.43	1.71	9.82	0.59
183	WEMA	2012	(16.0)	-365.7	14.20	2.84	48.05	0.30	-1.32	99.44	42.31	30.00	11.26	0.04	0.21	23.18
184	WEMA	2013	27.00	3.86	3.87	0.61	47.17	-0.18	-1.42	87.49	45.30	29.81	26.17	0.04	0.15	25.23
185	WEMA	2014	18.22	5.42	2.49	0.03	58.81	-0.20	-1.31	88.56	57.65	39.02	47.19	0.53	2.59	1.88
186	WEMA	2015	15.09	5.05	2.67	0.03	65.98	-0.21	-1.35	88.39	65.13	46.78	38.59	0.00	0.00	0.00
187	WEMA	2016	11.07	5.28	0.00	0.15	80.13	-0.21	-1.36	88.57	80.13	53.53	9.75	1.21	5.30	0.83
188	WEMA	2017	14.32	4.55	0.00	0.86	84.82	-0.18	-1.29	87.22	84.82	55.61	8.81	1.24	6.30	0.81
189	WEMA	2018	18.01	6.54	0.00	0.95	68.31	-0.22	-1.26	89.59	68.31	51.59	27.13	1.11	6.13	0.90
190	WEMA	2019	13.60	9.43	7.38	1.06	52.20	-0.35	-1.44	92.29	50.10	40.40	35.23	1.31	4.75	0.76
191	WEMA	2020	15.01	7.74	4.89	-0.70	44.74	-0.24	-1.50	93.96	44.74	36.76	42.80	-1.07	-3.37	-0.94
192	WEMA	2021	11.71	12.73	5.08	-0.23	45.16	-0.45	-1.47	94.03	45.16	35.63	45.67	-1.02	-3.47	-0.98
193	ZENITH	2006	0.00	12.25	1.13	0.33	51.94	-1.30	-1.36	84.59	50.83	32.82	91.71	1.17	5.14	0.86
194	ZENITH	2007	0.00	16.13	1.39	0.29	46.37	-1.36	-1.34	88.03	45.41	29.61	90.62	1.08	4.97	0.92
195	ZENITH	2008	36.00	14.90	103.1	0.00	37.60	-1.72	-1.30	80.94	37.60	24.94	99.19	1.04	5.16	0.96
196	ZENITH	2009	29.00	6.10	6.47	0.00	63.67	-0.47	-1.18	79.65	59.49	42.08	10.80	1.03	6.83	0.97
197	ZENITH	2010	31.79	10.22	5.93	0.00	56.60	-1.20	-1.32	80.81	55.83	38.83	10.75	1.07	5.16	0.94
198	ZENITH	2011	27.24	11.70	4.17	0.00	50.37	-0.94	-1.26	83.53	52.98	37.93	13.53	0.94	5.12	1.06
199	ZENITH	2012	30.00	21.59	3.23	-0.47	51.31	1.18	-2.22	82.22	51.31	38.00	17.24	7.56	4.55	0.13
200	ZENITH	2013	26.00	11.78	3.00	0.49	54.96	-1.41	-1.22	83.80	54.96	39.81	26.52	0.72	4.34	1.39
201	ZENITH	2014	20.00	18.00	1.80	0.51	68.16	-1.38	-1.26	85.28	68.16	46.06	29.66	0.75	4.10	1.34
202	ZENITH	2015	21.00	17.78	2.20	0.61	77.77	-1.27	-1.25	85.17	77.77	49.65	29.77	0.40	2.24	2.50
203	ZENITH	2016	23.00	18.40	3.13	1.08	76.73	-1.88	-1.30	85.14	76.73	48.30	22.42	0.68	3.45	1.47
204	ZENITH	2017	27.00	21.66	5.04	2.86	61.09	-3.73	-1.34	85.32	61.09	37.54	27.86	0.82	3.80	1.21
205	ZENITH	2018	25.00	23.71	5.51	0.50	49.40	-3.63	-1.30	86.30	49.40	30.61	25.86	0.70	3.47	1.43
206	ZENITH	2019	22.00	22.17	5.60	0.56	54.09	-10.2	-1.38	85.16	54.09	36.33	21.97	0.78	3.27	1.29
207	ZENITH	2020	23.00	20.63	0.00	-0.74	52.04	-5.84	-1.45	86.82	52.04	32.77	29.81	-0.76	-2.68	-1.32
208	ZENITH	2021	21.00	19.11	0.00	-0.93	51.85	-6.93	-1.47	86.46	51.85	35.52	23.00	-0.81	-2.76	-1.23

Appendix C: Descriptive Statistics

```
. xtset id year
      panel variable:  id (strongly balanced)
       time variable:  year, 2006 to 2021
             delta:  1 unit

. summarize roe1 aqt lpr lar car dfl nim ger ldr ltr crr cir opr nor


    Variable |       Obs       Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
         roe |       208    8.522332    39.36163  -358.5691   122.1896
-------------+--------------------------------------------------------
         aqt |       208    11.07283    20.93339          0   133.1604
         lpr |       208    1.793267    3.705354   -11.2562   22.38638
         lar |       208    66.01668    41.64644          0    575.956
         car |       208    14.43587    32.21081    -201.59         44
-------------+--------------------------------------------------------
         dfl |       208    3.161861    49.96063   -47.0322    672.139
         nim |       208   -1.344073    .1794137  -2.312707  -.4854594
         ger |       208    9050008    3.11e+07  -1.60e+08   1.08e+08
-------------+--------------------------------------------------------
             Ldr        208    62.37138    40.92301   .0679436    575.956
         ltr |       208    38.1102     11.20939   .1034679   60.69534
         crr |       208    27.56023    33.76939          0   406.7646
-------------+--------------------------------------------------------
             cir        208    .7205847    1.505854   -3.29096   14.58257
         opr |       208    3.277139    4.078196  -8.556233   14.48095
         nor |       208     .989673    2.641911  -2.520716   25.23266
```

Appendix D: Pairwise Correlation Matrix

. correlate roe aqt lpr lar car dfl nim ger ldr ltr crr cir opr nor
(obs=208)

	roe	aqt	lpr	lar	car	dfl	nim	ger	ldr	ltr	crr	cir	opr	nor
roe	1.0000													
aqt	0.0074	1.0000												
lpr	-0.0302	0.2555	1.0000											
lar	0.0983	0.0430	-0.1377	1.0000										
car	0.1167	-0.0180	-0.1742	0.1443	1.0000									
dfl	0.0375	-0.0392	-0.0304	-0.0221	0.0243	1.0000								
nim	-0.1868	-0.0521	0.0732	-0.1006	-0.1643	0.0137	1.0000							
ger	-0.0753	-0.1029	0.1213	-0.1361	-0.7946	-0.0234	0.1103	1.0000						
ldr	0.0668	-0.0127	-0.1787	0.9369	0.1292	-0.0157	-0.0791	-0.1885	1.0000					
ltr	0.0845	-0.0347	0.0197	0.2800	0.1789	-0.0032	-0.1547	-0.3196	0.3944	1.0000				
crr	0.1109	-0.0231	-0.2950	0.6407	0.0605	0.0341	-0.1313	-0.0881	0.6877	-0.0888	1.0000			
cir	0.0113	0.0747	0.3061	-0.0413	-0.0096	-0.0284	-0.2308	-0.0200	-0.0949	-0.0119	-0.0923	1.0000		
opr	0.0144	0.0849	0.3692	-0.0682	-0.1197	-0.0387	0.1639	0.1767	-0.1430	-0.1104	-0.2056	0.6391	1.0000	
nor	-0.3955	-0.0047	0.0797	-0.0524	-0.0189	0.0039	0.0208	0.0012	-0.0484	0.0161	-0.0673	0.0724	0.1382	1.0000

Appendix E: GMM Regression Output

xtabond roe car aqt lpr lar dfl nim ger ldr ltr crr crr cir opr nor,

Arellano-Bond dynamic panel-data estimation Number of obs = 208
Group variable: id Number of groups = 13
Time variable: yr
Obs per group: min = 16
avg = 16
max = 16

Number of instruments = 118 Wald chi2(13) = 87.83
Prob > chi2 = 0.0000
One-step results

roe	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
car	-.1829972	.1818489	-1.01	0.314	-.5394144	.17342
aqt	.0710914	.1321508	0.54	0.591	-.1879193	.3301022
lpr	1.050314	.7800712	1.35	0.178	-.478598	2.579225
lar	.4451441	.2095912	2.12	0.034	.034353	.8559352
dfl	-.002541	.050667	-0.05	0.960	-.1018465	.0967645
nim	-47.95821	14.45196	-3.32	0.001	-76.28352	-19.6329
ger	.0122165	.2644403	0.05	0.963	-.5060769	.53051
ldr	-.8429718	.2689508	-3.13	0.002	-1.370106	-.3158378
ltr	1.319557	.423719	3.11	0.002	.4890831	2.150031
crr	.5755164	.1882579	3.06	0.002	.2065377	.9444951
cir	-1.859157	4.634657	-0.40	0.688	-10.94292	7.224604

```
       opr |   2.710678   1.331435     2.04   0.042     .1011138    5.320241
       nor |    -7.9345   1.141787    -6.95   0.000    -10.17236   -5.696638
     _cons |  -96.93655   36.55456    -2.65   0.008    -168.5822   -25.29093
------------------------------------------------------------------------------
Instruments for differenced equation
      GMM-type: L(2/.).roe
      Standard: D.car D.aqt D.lpr D.lar D.dfl D.nim D.ger D.ldr D.ltr
            D.crr D.cir D.opr D.nor
Instruments for level equation
      Standard: _cons
```

Appendix F: Chow Test for Individual Hypotheses Test

```
testparm aqt lpr lar car (Model 1)
 ( 1)  car = 0
 ( 2)  aqt = 0
 ( 3)  lpr = 0
 ( 4)  lar = 0
         chi2(  4) =    8.97
       Prob > chi2 =    0.0619

. testparm dfl nim ger (Model 2)
 ( 1)  dfl = 0
 ( 2)  nim = 0
 ( 3)  ger = 0
         chi2(  3) =   11.20
       Prob > chi2 =    0.0107

. testparm ldr ltr crr (Model 3)
 ( 1)  ldr = 0
 ( 2)  ltr = 0
 ( 3)  crr = 0
         chi2(  3) =   13.28
       Prob > chi2 =    0.0041

. testparm cir opr nor (Model 4)
 ( 1)  cir = 0
 ( 2)  opr = 0
 ( 3)  nor = 0
         chi2(  3) =   51.01
       Prob > chi2 =    0.0000
```