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EFFECT OF ENTERPRISE RISK ON FINANCIAL PERFORMANCE OF NATIONAL MICROFINANCE BANKS IN NIGERIA

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Abstract

Microfinance banks' (MFBs) operation has been contributing its quota to the economic development of Nigeria. Nevertheless, onward revocation of 224 MFBs licensed by Central Bank of Nigeria (CBN) and eventual closure of 103 MFBs by Nigerian Deposit Insurance Corporation (NDIC) in 2010, and another 83 MFBs in 2014 put to question the practice of enterprise risk management by MFBs in the country. Therefore, this study examined the effect of enterprise risk on the financial performance of national microfinance banks in Nigeria and specifically assessed the effect of credit risk, liquidity risk and solvency risk on the financial performance of national microfinance banks in the country. Using ex-post facto research design, this study used audited financial statements of five (5) out of the total of seven (7) national microfinance banks operating in Nigeria as at December 31, 2015. The data obtained for this study were analysed using both descriptive statistics as well as panel least square regression analysis. The study revealed that credit risk (with coefficient of -0.2276 and P-value 0.012) has inverse and significant effect at 5% level of significance, while both liquidity risk (with coefficient of 0.0153 and P-value 0.319) and solvency risk (with coefficient of 0.0241 and P-value 0.418) have positive correlation with the return on asset of national microfinance banks in Nigeria but statistically insignificant at 5% level of significance. The study concludes that enterprise risk has a significant effect on the financial performance of national microfinance banks in Nigeria. Hence, this study recommends that CBN and NDIC should continually ensure strict adherence of microfinance banks' board of directors to its prudential guidelines to possibly forestall instances of distressed MFBs and their sudden insolvency.

Keywords: *Risk appraisal, Microfinance banks, Performance, Solvency*

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Introduction

Microfinance has been accepted not only as a financial means targeted at specific people (economically active poor), but also a social contributor to poverty reduction, women empowerment, economic development and job creation (Iezza, 2010; Boateng & Boateng, 2014; Abebaw, 2014). Similarly, in a bid to enhance the flow of financial services to micro, small and medium enterprises (MSMEs) in the country, the Federal Government of Nigeria launched the new Microfinance Policy Regulatory and Supervisory Framework (MPRSF) in December 2005. The policy among other things, addresses the problem of lack of access to credit by small business operators who do not have access to regular bank credits; strengthens the weak capacity of these entrepreneurs; raise the capital base of microfinance institutions and bring the existing informal institutions under supervisory purview of Central Bank of Nigeria (CBN). The core objective of the microfinance policy is to make financial services accessible to a plethora of productive Nigerian populace, which has had little or no access to financial services and empowers them to significantly contribute to rural transformation and national development.

However, the recent huge company collapse, corporate scandals, and other external and internal factors, coupled with the lack of confidence by investors and creditors in financial reporting, are the strong motivating factors for strengthening and enhancing corporate governance and the adoption of enterprise risk management (ERM) across industries (Lam, 2014). The advent of global economic depression (meltdown) that startled both the developed and developing countries' economy has equally made it necessary for every institution of human endeavour to take the implementation of ERM more seriously. Coskun (2013) affirmed that the impact of global financial crisis publicised the relevance of ERM, and its importance is attributed to the dynamic business environment characterised by threats from political, economic, terrorist, natural and technical resources. Cendrowski and Mair (2009) opined that ERM should involve basic risk management activities that spread across the whole scope of an organisation's risks such as strategic risks, operational risks, liquidity risk, financial risks and regulatory compliance risks.

In today's risky world, companies can no longer rely on a silo approach to risk management. An integrated and holistic perspective of all the risks facing the organisation is needed. A risk-centric organisation does not avoid risks, but rather it knowingly takes risks aligned with its risk appetite (Institute of Management Accounting (IMA), 2011). Globally, risk and risk management are a foremost concern for all financial institutions, particularly MFBs which are sensitive to credit risk, liquidity risk, market risk, operational risk and

competition (Stolow & Leigh, 1999). Declaring the existence of a risk management strategy is inadequate, MFBs need to aggressively engage in risk management practices to address the convergence of key risks being experienced in the current economic environment where credit crunch risk, fluctuating commodity prices, increased government debt, rising unemployment and declining consumer spending are impacting individually and combined, on organisations (Boateng & Boateng, 2014), as well as the cataclysmic effect of dwindling oil revenue on Nigeria economy.

As formal financial institutions faltered and people lost confidence in them, the success stories of microfinance received ever increasing attention. Microfinance has been presented as an effective and proven model for alleviating poverty. This development made it necessary for MFBs to come under increasing scrutiny for their reliability, resilience, and maturity (Khan, 2010). However, the onward revocation of two hundred and twenty-four (224) MFBs licenced by CBN and the eventual closure of one hundred and three (103) MFBs by Nigerian Deposit Insurance Corporation (NDIC) in 2010 (CBN Press Release, 2010) and another eighty-three (83) in 2014 (MicroCapital, 2014). More so, according to EFInA (2015) surveys between 2012 and 2014 on access to financial services in Nigeria, there was a significant drop in the number of microfinance bank users from 4.6 million in 2012 to 2.6 million in 2014. The top three (3) reasons that influenced the lapsed microfinance bank users were attributable to the irregularity of income, lack of trust and microfinance banks closing down. The Central Bank of Nigeria (CBN, 2012) equally maintained that risk management is still at its rudimentary stage and bedeviled by some challenges. These challenges include but not limited to inadequate knowledge of risk management by members of the board of many banks and lack of professionals. Others are a lack of risk training and education and lack of a framework that defends the growth of skilled and capable workers in the industry (Sanusi, 2011). Therefore, this study empirically examined the effect of enterprise risk on the financial performance of national microfinance banks in Nigeria.

The primary objective of this study is to examine the effect of enterprise risk on the financial performance of national microfinance banks in Nigeria, while the specific objectives were to examine the effect of:

i. credit risk on the financial performance of national microfinance banks in Nigeria;
ii. liquidity risk on the financial performance of national microfinance banks in Nigeria; and
iii. solvency risk on the financial performance of national microfinance banks in Nigeria.

The following null hypotheses were formulated and tested for this study.

H_{01}: Credit risk has no significant effect on the financial performance of national microfinance banks in Nigeria.

H_{02}: Liquidity risk has no significant effect on the financial performance of national microfinance banks in Nigeria.

H_{03}: Solvency risk has no significant effect on the financial performance of national microfinance banks in Nigeria.

In the recent past, considerable efforts have been made in the literature on enterprise risk management (ERM) studies, for instance, Oyerogba, Ogungbade and Idode (2016); Dabari and Saidin (2015); Osisioma, Egbunike and Adeaga (2015); Okehi (2014) have contributed to knowledge on ERM with focus on commercial banks in Nigeria. In addition, Addai and Pu (2015) focused their study on banks in Ghana. Similarly, Nyagah (2014) worked on ERM with respect to pension fund management firms in Kenya. Oguntoyinbo (2011) studied credit risk assessment of microfinance industry in Nigeria using Accion Microfinance Bank limited as a case study. It is obvious that despite the rising importance of ERM, there is a dearth of an empirical study assessing the effect of enterprise risk on the financial performance of microfinance banks in Nigeria. Apparently, empirical evidence to evaluate the state of ERM practices of microfinance banks in Nigeria is sparse. Therefore, this development has necessitated the drive to empirically explore a study focusing on the effect of enterprise risk on the financial performance of national MFBs in Nigeria. This will further broaden the existing body of knowledge on ERM in the country, avail the management and board of directors of MFBs the requisite knowledge and importance of ERM, and assist the policy makers (CBN and NDIC) in the discharge of their supervisory and regulatory roles. It will equally serve the informational need of both local and international donors of MFBs funds on the current ERM practices in the country's banking sub-sector, as well as prompt the need for further study on this subject matter.

This study garnered effort on examining the effect of enterprise risk on the financial performance of national MFBs in Nigeria. Therefore, annual reports of all the seven (7) national MFBs operating in Nigeria between 2009 and 2015 were considered useful for this study. The choice of making use of national MFBs is as a result of their broader outreach/coverage through wide branch network and supposed data availability on this category of MFB in the country. Therefore, the spotlight of this study is on licensed MFBs operating in Nigeria under the purview and supervision of CBN.

Literature Review

Conceptual Issues: Microfinance and Microfinance Banks

Microfinance is the provision of financial service to the economically active poor who are hitherto un-served by the mainstream financial service provider (Abiola, 2012). The Central Bank of Nigeria (CBN, 2005) defined microfinance as the provision of financial services to the economically active poor and low-income households. These services include credit, savings, micro-leasing, micro-insurance and payment transfer. Microfinance has been defined as a development tool used to create access for the economically active poor to financial services at an affordable price (CBN, 2011). It is the provision of credit and other financial services to the low-income group and micro-entrepreneurs to enable them to build sustainable micro enterprises (Otero, 2000; Muktar, 2009). In the same vein, microfinance is the provision of a variety of financial services to poor, low-income people and micro and small enterprises that lack access to banking and related services (UN, 2013). Consultative Group to Assist the Poor (CGAP, 2012) defined microfinance as the provision of formal financial services to poor and low-income people, as well as others systematically not benefited from the financial system. In essence, microfinance is not only providing a range of credit products (for consumption, smoothing for business purposes, to fund social obligations and for emergencies) only, but also savings, money transfers, and insurance. A microfinance bank (MFB) is any company licensed by the CBN to carry on the business of providing financial services such as savings and deposits, loans, domestic fund transfers, other financial and non-financial services to microfinance clients (CBN, 2012). There are three categories of MFBs in Nigeria by CBN, which are:

i. Unit Microfinance Bank: A unit microfinance bank is authorised to operate in one location, required to have a minimum paid-up capital of ₦20 million (twenty million Naira) and is prohibited from having branches and/or cash centres.
ii. State Microfinance Bank: A state microfinance bank is authorised to operate in one state or the Federal Capital Territory (FCT), required to have a minimum paid-up capital of ₦100 million (one hundred million Naira) and is allowed to open branches within the same state or the FCT, subject to prior written approval of the CBN for each new branch or cash centre.
iii. National Microfinance Bank: A national microfinance bank is authorised to operate in more than one state including the FCT, required to have a minimum paid-up capital of ₦2 billion (two billion Naira), and is allowed to open branches in all states of the federation and the FCT, subject to prior written approval of the CBN for each new branch or cash centre (CBN, 2012).

Risk, Enterprise Risk Management, and Corporate Governance

Generally, the definition of risk is synonymous with an unexpected result and bad or good outcome depending on the probability of the occurrence or non-occurrence of the result. Risk management is a process that involves the system of identifying, evaluating, planning, and managing risks (D`Arcy & Brogan, 2001). Risk management, in the context of a microfinance institution, is defined as the process of controlling the likelihood and potential severity of an adverse event; it is about systematically identifying, measuring, limiting, and monitoring risks faced by an institution (Fernando, 2008). According to OECD (2014), risk management practice is the process by which a company manages the risks that it faces which involves three dimensions or steps. The setting of risk limit and control before the commencement of business to avoid excessive risk taking by the management and monitoring of adherence to this limit must be undertaking by the board of directors as well as periodic review of the risk policy of the company. Since risks are unavoidable, they must be managed. Risk management systems are, in effect, the wings needed before taking the leap of faith of lending to large numbers of informal micro-businesses. Risk management is the structured approach to managing uncertainty related to a threat, by way of identifying potential sources of loss, measuring the financial consequences of a loss occurring, and using controls to minimise actual loss or their financial consequences.

Committee of Sponsoring Organisations of the Treadway Commission (COSO) (2004) defined enterprise risk management as process effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance of entity objectives. The understanding of ERM practice is a channel within the organisations which are motivated by risk rationalities, technologies and experts (Arena, Arnaboldi & Azzone, 2010; Lai, 2014). Enterprise risk management also exists for planning, directing, managing and organising actions that could mitigate significant risks related to financial risk, operational risks and strategic risks (Cassidy, 2005). Mawuko-Yevugah (2013) affirmed that risk management framework is a consciously designed system to protect the organisation from undesirable shocks (downside risks), and allows the MFI to take advantage of opportunities (upside risks). Enterprise risk management is designed to enhance top management's capacity to control the whole portfolio of risks facing the organisation (Beasley, Clune & Hermanson, 2006). It further provides an important source of competitive advantage, exhibiting a strong risk management competency and power for enhancing shareholder value (Jalal-Karim, 2013). The practices of corporate governance and ERM are interdependently and closely connected because they enhance the monitoring

capacity and capability of the board of directors (Manab, Kassim & Hussin, 2010). Rosen and Zenios (2001) emphasised that corporate governance is vital for effective risk management and that none of the risk management activities can be achieved without corporate governance compliance. Thus, corporate governance and risk management are therefore interrelated and interdependent implying that stability and improvement of the company's performance are highly dependent on the effective role of both components (Sobel & Reding, 2004; Manab *et al.*, 2010). Consequently, without good corporate governance, risk management cannot be successfully carried out. Similarly, with a good risk management, the corporate governance could be beefed up. The board of directors has a critical role to play in the implementation of risk management practices (Daud, Haron & Ibrahim, 2011). More so, The CBN had issued "Revised Regulatory and Supervisory Guidelines for Microfinance Banks in Nigeria" in December, 2012, which required all MFBs operating in Nigeria to put in place adequate policies, risk management structures and process with emphasis on the roles of the board, board risk management committee, and top management as well as establishing risk management systems for individual risk elements to mitigate their risk exposures.

Major Categories of ERM

The following are some of the commonly found categories of ERM in the literature: credit risk; market risk; operational risk; liquidity risk; legal and regulatory risk; strategic risk; reputation risk and solvency risk.

Credit Risk

Credit risk is the potential for loss due to the failure of a borrower, endorser, guarantor or counterparty to repay a loan or honour another predetermined financial obligation. This is the most significant measurable risk that financial institutions face (BMO Financial Group, 2012). Mawuko-Yevugah (2013) referred to credit risk as the potential that borrower or counterparty will fail to meet its obligations in accordance with the terms and conditions of the contract. Since most loans advanced by MFIs are unsecured, these expose them to a great deal of credit risk. Gatuhu (2013) affirmed that the biggest risk in microfinance as with any financial institution is lending money and not getting it back. Credit risk exists in every lending activity that MFBs enters into. When an MFB grants credit to its customers, it incurs the risk of non-payment. The effective management of credit risk requires the establishment of an appropriate credit risk culture. Key credit risk policies and credit risk management strategies are important elements used to create this culture (Scotiabank, 2012).

Market Risk

Market risk is the potential for adverse changes in the value of assets and liabilities resulting from changes in market variables such as interest rates,

foreign exchange rates, equity and commodity prices and their implied volatilities, and credit spreads, as well as the risk of credit migration and default (BMO Financial Group, 2012). Scotiabank (2012) referred to market risk as the risk of loss from changes in market prices and rates (including interest rates, credit spreads, equity prices, foreign exchange rates and commodity prices), the correlations among them, and their levels of volatility. Okehi (2014) referred to market risk as the risk arising from fluctuations of financial assets prices. Market risks are, by nature, environmental and include risks from financial losses as a result of changes in interest rates, fluctuations in foreign exchange, or mismatch in the management of long-term assets and liabilities (investment risk). MFBs in Nigeria have been managing their global operations with local borrowing to meet expansion in their loan portfolios as a way of avoiding, or hedging against foreign currency exposures (Oguntoyinbo, 2011).

Operational Risk

The Basel Committee (2001) defined operational risk as the risk of direct or indirect loss resulting from inadequate or failed internal processes, people, and systems or from external events. Operational risk is more related to internal problems, such as employee fraud, corporate leadership, segregation of duties, information risk and product flaws. MFBs are exposed to potential losses arising from a variety of operational risks, including process failure, theft, and fraud, business processes, technology, business continuity, channel effectiveness, customer satisfaction, health and safety, environment, product/service failure, efficiency, capacity, and change integration, regulatory non-compliance, fiduciary or disclosure breaches, information security breaches and exposure related to outsourcing, as well as damage to physical assets. Operational risk is inherent in all MFBs business activities, including the processes and controls used to manage credit risk, market risk and all other risks they face. Since operational risk cannot be fully eliminated, operational risk management is, therefore, essential to reduce exposure to financial loss, reputational harm or regulatory sanctions (BMO Financial Group, 2012), as well as to safeguard clients' assets and preserve shareholders' value.

Liquidity Risk

Liquidity risk is the potential for loss if an organisation is unable to meet its financial commitments in a timely manner and at reasonable prices as they fall due. Financial commitments include liabilities to depositors and suppliers, lending, investment and pledging commitments (BMO Financial Group, 2012). Okehi (2014) referred to liquidity risk as the current and prospective risk of earnings on capital arising from a bank's inability to meet its obligations when they come due without incurring unacceptable losses.

Liquidity risk refers to a disparity of maturities of assets and liabilities. Liquidity risk is the possibility of negative effects on the interests of owners, customers and other stakeholders of a financial institution resulting from the inability to meet current cash obligations in a timely and cost-efficient manner (Mawuko-Yevugah, 2013). In other words, liquidity risk relates to the risk of insufficient liquid assets to meet the MFBs obligations as they fall due or having to meet the obligations at excessive cost. This risk arises from mismatches in the timing of cash flows. Managing liquidity risk is essential to maintaining the safety and soundness of MFBs, depositors' confidence and stability in earnings. Mago, Hofisi, and Mago (2013) affirmed that the most direct approach to financial/liquidity risk mitigation is a dedicated contingency fund. A contingency fund is an earmarked fund that may be accessed in times of disaster to help clients and MFIs survive and recover.

Legal and Regulatory Risk

The legal and regulatory risk is the risk of not complying with laws, contractual agreements or other legal requirements, as well as regulatory requirements and regulators' expectations (BMO Financial Group, 2012). Failure to properly manage legal and regulatory risk may result in litigation claims, financial losses, regulatory sanctions, inability to execute business strategies and potential harm to an MFB's reputation. The legal and regulatory risk are inherent in almost every undertaken of MFBs, and they are held to strict compliance standards of regulators and other statutory authorities. The financial services industry is highly regulated and continues to receive heightened attention as new rules are proposed and enacted as part of worldwide regulatory reform initiatives and best practices. Legal risk management is significant in any MFB as virtually all MFBs operations and transactions have substantial legal risk implications. Being fully aware of the significance of legal risk support function to the overall success of an MFB, a dedicated legal unit saddled with the responsibility of effective legal risk management is not negotiable. This entails the provision of legal advisory services, security documentation, management of bank litigation and debt recovery among others.

Strategic Risk

Strategic risk is the potential for loss due to fluctuations in the external business environment and/or failure to properly respond to these fluctuations due to inaction, ineffective strategies or poor implementation of strategies (BMO Financial Group, 2012). Strategic risk arises from external risks inherent in the business environment within which MFBs operate, as well as the risk of potential loss if they are unable to address the impact of the external risks effectively. While external strategic risks including economic, political, regulatory, technological, social and competitive risks cannot be controlled by MFBs, the likelihood and magnitude of their impact can be

mitigated through an effective strategic risk management process. MFBs board of directors are ultimately responsible for oversight of strategic risk, by adopting a strategic planning process and approving, on an annual basis, a strategic plan for the banks.

Reputation Risk

Reputation risk is the impact of negative publicity (whether true or not) on an MFB resulting from deterioration in stakeholders' perception of the MFB's reputation. These potential impacts include revenue loss, litigation, regulatory sanction or additional oversight, declines in client loyalty and declines in the MFB's share price. Negative publicity about an institution's business practices may involve any aspect of its operations but usually relates to questions of business ethics and integrity or quality of products and services. Negative publicity and attendant reputational risk frequently arise as a by-product of some other kind of risk management control failure (Scotiabank, 2012). Fostering a business culture in which corporate governance practices, integrity, and ethical conduct are core values is paramount to effectively protecting and maintaining MFBs reputation.

Solvency Risk (Capital Adequacy Ratio)

The capital to assets ratio is a simple measure of the solvency of MFBs. This ratio helps an MFB assess its ability to meet its obligations and absorb the unexpected loss. The determination of an acceptable capital to asset ratio level is generally based on a MFBs assessment of its expected losses as well as its financial strength and ability to absorb such losses. Expected losses should generally be covered through provisioning by the MFBs accounting policies, which removes expected losses from both assets and equity. Thus, the ratio measures the amount of capital required to cover additional unexpected losses to ensure that the MFB is well capitalised for potential shocks (Abebaw, 2014). It is important for MFBs to develop a keen interest in identifying these risks, appropriately measure them and find ways to mitigate and control them in their operations. The main aim of doing this is to be able to report a substantial profit at the end of every financial year and to remain viable as a business entity. It is with this level of efficient operation that the bank would be able to make expected reserves and provisions in order to absorb future losses when they occur. Where these reserves and provisions fail, equity capital stands in to safeguard the MFB.

Financial Performance

According to the business dictionary, financial performance involves measuring the results of a firm's policies and operations in monetary terms. These results are reflected in the firm's return on investment, return on assets and value added. Financial performance is the ability to operate efficiently,

profitably, survive, grow and react to environmental opportunities and threats (Turyahebya, 2013). The essence of performance measurement is to assess how efficient an enterprise is in use of its resources in achieving its objectives. MFBs earn financial revenue from loans and other financial services in the form of interest fees, penalties, and commissions. Financial revenue also includes income from other financial assets, such as investment income. An MFB's financial activities also generate various expenses, from general operating expenses and the cost of borrowing to provisioning for the potential loss from defaulted loans. Profitable institutions earn a positive net income (i.e., operating income exceeds total expenses).

According to Ali-Shami (2008), there are different ways to measure profitability such as return on asset (ROA) and return on equity (ROE). Return on asset indicates how profitable a company is relative to its total assets. It gives an idea as to how efficient management is in using its assets to generate earnings. On the other hand, return on equity measures a company's profitability with respect to how much profit a company generates with the money shareholders have invested. This measure gives a sense of how well a company is in using its money to generate returns. In this study, the financial performance of MFBs is measured by their return on assets (ROA). ROA is net income before tax divided by total assets and reflects how well an MFB's management is in using the bank's real investment resources to generate profits. Gatuhu (2013) affirmed that return on assets (ROA) falls within the domain of performance measures and tracks MFBs ability to generate income based on its assets. ROA provides a broader perspective compared to other measures as it transcends the core activity of MFBs namely, provision of micro-loans, tracks income from operating activities including investment, and assesses profitability regardless of the MFBs funding structure. Unlike ROE that is particularly concerned with the interest of the shareholders of a company, ROA takes into consideration all stakeholders with vested interest in the business of the company.

Theoretical Framework (Stakeholders Theory)

Stakeholder theory is a general theory of the firm, which encompasses corporate accountability and disclosure to a broad range of stakeholders. This theory became prominent in organisational management through the study of Freeman (1984). The thrust of the theory is that a firm is a social person and therefore is responsible and accountable not only to the shareholders but to numerous stakeholders. In the traditional view of the firm, the shareholders or stockholders are the owners of the company, and the firm has a binding fiduciary duty to put their needs first, to increase value for them. However, stakeholder theory argues that there are other parties involved, including employees and prospective employees, customers and prospective customers, potential investors, regulatory and statutory authorities, rating agencies, trade

associations and unions, communities, associated corporations and the public at large, and that management should give due regard to the informational need of these groups. Odia (2014) asserted that stakeholder theory has been used to argue that companies will disclose on their social and environmental impacts because their numerous stakeholders want the social and environmental information as substantiated by Freeman (1984); Ullman (1985); Roberts (1992); Lei (2006); Mason and Simmons (2014). The theory claims that whatever is the ultimate aim of corporate organisations, managers must take into consideration the legitimate interest of those groups and individuals who can affect (or be affected by) their activities (Donaldson & Preston, 1995). Orts and Strudler (2009) argued that stakeholder theory helps in addressing the corporate social responsibility of firms. The theory has been used to explore disclosure behaviour by firms in order to handle stakeholders' interests or expectations (Gray, Owen & Adam, 1996; Roberts, 1992). According to this theory, firms should disclose more information to meet the information needs of various stakeholders. Hence, management of microfinance banks in Nigeria should be accountable to not only the shareholders but all stakeholders with vested interest in the business of MFBs in the country. Therefore, stakeholders' theory is considered as an appropriate theoretical base underpinning the discussion of this study.

Review of Empirical Studies

Extant literature available on enterprise risk management (ERM) empirically seemed to be scanty despite its increasing relevance to managers, academics, and practitioners. Nevertheless, the following studies have made empirical contributions to the discourse of ERM. Nyagah (2014) examined the effect of ERM on the financial performance of pension fund management firms in Kenya as well as the level of its implementation. The study revealed that ERM practices influences the financial performance of pension fund management firms in the country to a very large extent and highly implemented by the sampled firms. Similarly, Gatuhu (2013) examined the effect of credit management on the financial performance of MFIs in Kenya. The study established that client appraisal, credit risk control, and collection policy significantly influence financial performance of MFIs in Kenya. Furthermore, Addai and Pu (2015) studied the impact of delinquent loans on the financial performance of banks in Ghana. The study equally established a significant impact of delinquent loans on the financial performance of banks. Muriu (2011) empirically studied the determinants of profitability of African MFIs by investigating "what explains the low profitability of MFIs in Africa? He used Generalised Method of Moments (GMM) system using an unbalanced panel dataset comprising of 210 MFIs across 32 countries operating from 1997 to 2008. The proxies for profitability were both ROA and ROE. Credit risk measured by the sum of the level of loans past due 30 days or more

(PAR>30) was found to be negatively and significantly related to MFI profitability. The study found evidence to support the conjecture that increased exposure to credit risk is normally associated with lower MFI profitability.

Dabari and Saidin (2015) assessed the current state of ERM practices in the Nigerian banking industry using qualitative data. The study revealed that the current state of ERM practices in the country is yet to be fully implemented as some banks have not fully complied with CBN mandate on ERM implementation. Oguntoyinbo (2011) studied credit risk assessment of microfinance industry in Nigeria with respect to Accion MFB limited. The study found that good regulatory corporate governance and management practices, sound quantitative credit risk assessment and management, and quality as well as the maturity of management lead to low credit risk and is accompanied by high profitability and sustainability for MFBs. Okehi (2014) modeled risk management in banks by examining why banks fail in Nigeria. The study specifically investigated whether effective risk management in banks, coupled with corporate governance practices and adherence to regulations play significant roles in banks' performance. The study confirmed the existence of a significant positive relationship between effective risk management, corporate governance practices, adherence to regulations and banks' performance. The study stressed that general risk management has the most significant effect on banks' performance.

Osisioma, Egbunike, and Adeaga (2015) investigated the impact of corporate governance on banks' performance in Nigeria. The study conducted a field experiment to ascertain whether capital adequacy ratio (CAR), liquidity ratio, loan to deposit ratio, deposit money bank lending rate (DMBLR), nonperforming loan to total credit and cash reserve ratio (as surrogates for corporate governance), affect banks' performance (using return on asset (ROA) to proxy performance). The study indicated a significant relationship between deposit money banks' performance and corporate governance proxy variables, with CAR and DMBLR impacting positively on deposit money banks' performance in Nigeria. Furthermore, Oyerogba, Ogungbade and Idode (2016) studied the relationship between risk management practices and financial performance of Nigerian listed banks by investigating how risk limit setting, risk adherence monitoring, risk policy review, credit risk management, operational risk management and market risk management has impacted the financial performance of listed banks in Nigeria. Using both primary and secondary data, the study found risk policy review to be statistically insignificant, while credit risk management had an inverse relationship with financial performance and was statistically significant. Moreover, all other independent variables were found to be positively significant with the financial performance of the listed banks in Nigeria.

However, Abebaw (2014) conducted a study on the determinants of financial performance on selected MFIs in Ethiopia. The study specifically measured the effect of internal and external determinants on financial performance in terms of return on asset (ROA). Findings of the study revealed that operational efficiency, GDP, and size of MFIs affect MFIs financial performance significantly, while portfolio quality (credit risk), gearing ratio, capital to asset ratio (solvency risk) and market concentration had a negative effect and not significant. Furthermore, Power (2009) criticised the role that risk management played especially during the global financial crisis and noted that an impoverished conception of risk appetite is seen as part of the intellectual failure. Thus, the value addition of ERM and the promotion of organisational performance have been put to question.

Methodology

Research Design

The study with the aim of assessing the effect of enterprise risk on the financial performance of MFBs in Nigeria used ex-post facto research design to achieve the objectives of this study with panel data. According to Gujarati (2004), using panel or longitudinal data has advantage for instance, the techniques of panel data estimation can take heterogeneity explicitly into account by allowing for individual-specific variables; combining time series and cross-section observations, panel data give more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency; better suited to study the dynamics of change; detect and measure effects that simply cannot be observed in pure cross-section or pure time series data. Therefore, multiple regression models were used to assess the significant effect of enterprise risk on the financial performance of national MFBs in Nigeria.

Population and Sample Size of the Study

The population of this study comprised all the seven (7) (AB MFB Ltd., Accion MFB Ltd., FBN MFB Ltd., Fortis MFB Ltd., LAPO MFB Ltd., NPF MFB Ltd., and Parallex MFB Ltd.) national MFBs in Nigeria as at December 31, 2015, accessed on CBN website. This study used only five (5) national licensed MFBs (AB MFB Ltd., Accion MFB Ltd., FBN MFB Ltd., Fortis MFB Ltd., and NPF MFB Ltd.) whose audited financial statements accessed between 2009 and 2015 were sampled for this study. This is because access to audited financial statements of these MFBs (with the exemption of NPF MFB and Fortis MFB Ltd. listed on the floor of Nigeria Stock Exchange) were practically inaccessible as at the time of reporting this study despite several attempts made. Therefore, the criteria for choosing these MFBs were based on availability and quality of data for the time period of 7 years (2009-2015). The

data extracted from the audited annual financial statements of these five (5) national MFBs between 2009 and 2015 totaled twenty-three (23) observations (unbalanced panel data). These twenty-three data observations were further converted from annual (low frequency) reports to quarterly (higher frequency) reports through an interpolation process. Interpolation refers to the case where no genuine quarterly/monthly measures exist for a target variable, thus annual totals are distributed across quarters (Rashid & Jehan, 2013; Brett, 2009; Cabred & Pavia, 1999; Octavio, 2012). This accounted for the eventual ninety-two (92) data observations used for this study.

Measurement of Variables

i. Dependent Variable/Regressand

Return on asset (ROA) measures how well the institution uses all its assets. It is also an overall measure of profitability which reflects both the profit margin and the efficiency of the institutions. It is expressed mathematically as:

$$\text{Return on Asset} = \frac{\text{Net Operating Income - Tax}}{\text{Total Assets}}$$

ii. Independent Variables/Regressors

To measure the predictor variables of the financial performance of MFBs in Nigeria, three (3) measures were used as independent variables which are portfolio at risk, liquidity ratio and capital asset ratio.

a. Portfolio at risk (PAR) indicates the value of all loans outstanding that have one or more installments of principal past due to more than a certain number of days (30 days). It indicates how efficient an MFB is in making prompt collections on its disbursed loan portfolio. PAR is expected to impact negatively on the financial performance of national microfinance banks in Nigeria. Mathematically, it is expressed as:

$$\text{PAR} = \frac{\text{Outstanding balance, loan overdue >30 days}}{\text{Gross loan portfolio}}$$

b. Liquidity ratio (LR) indicates how efficient an MFB is in meeting its financial commitments in a timely manner and at reasonable prices as they fall due with respect to its liquidity position. High liquidity ratio is expected to positively influence the financial performance of national MFBs in Nigeria. Mathematically, it is expressed as:

$$\text{LR} = \frac{\text{Cash and short-term fund (Net liquid assets)}}{\text{Deposits from customers}}$$

c. Capital adequacy ratio (CAR) measures the capital to asset ratio of an MFB. It indicates how effective an MFB is in meeting its obligations and ability to absorb unexpected losses as well as surviving against potential shocks. High CAR is expected to positively influence the financial performance of national MFBs in Nigeria. Mathematically, it is expressed as:

$$CAR = \frac{\text{Shareholders' fund unimpaired by losses}}{\text{Risk Weighted Assets}}$$

Estimation Technique

The data collected for the purpose of this study were analysed using both descriptive and inferential statistics. The descriptive statistics reported summary of data used, while the hypotheses formulated for this study were tested using panel least square regression analysis at 5% level of significance.

Model Specification

The model specified for this study to underpin the interplay between enterprise risk management and financial performance of national MFBs in Nigeria was adapted from the studies of Abebaw (2014); Muriu (2011) and Osisioma *et al.* (2015) as follows:

MFBs' Financial Performance = *f* (Enterprise risk management).

MFBs' Financial Performance (ROA) = *f* (Enterprise risk management: PAR, LR, CAR).

$ROA_{it} = \alpha + \beta_1 PAR_{it} + \beta_2 LR_{it} + \beta_3 CAR_{it} + \mu_{it}$

Where:

ROA = Return on asset (proxy for financial performance) which is the dependent variable/regressand.

α = Constant term.

β_{1-3} = Coefficients of the explanatory variables (enterprise risk management).

PAR = Portfolio at risk (as a proxy for credit risk) which is the independent regressor.

LR = Liquidity ratio (as a proxy for liquidity risk) which is the independent regressor.

CAR= Capital adequacy ratio (as a proxy for solvency risk) which is the independent regressor.

$\mu_{it} = \mu_i + \nu_{it}$ (one-way error component model).

μ_i = Denotes the unobservable individual specific effect of the cross-sectional units.

ν_{it} = Denotes the remainder stochastic disturbance term.

i = individual MFBs in the sample.

t = years.

f = functional notation.

Results and Discussion of Findings

Preliminary Analysis

Table 4.1 depicted the descriptive statistics of all the variables of this study for the annual audited financial statements used. The financial performance of national MFBs in Nigeria with respect to ROA for 23 observations indicated that the sampled MFBs during the period (2009-2015) realised an average annual profit before tax of 0.0635kobo in every ₦1 investment made on the

total asset. Moreover, the most and least profitable sampled MFBs during the period recorded 0.18kobo and 0.01kobo respectively. The average annual credit risk of sampled MFBs for the period with respect to PAR was 0.0409, which indicated that only 4.09% of their loan portfolio in arrears or unpaid was at risk. In addition, the highest and lowest PAR during the period was 9% and 1% respectively. This implies that the sampled MFBs average annual loan portfolio at risk is performing creditably below 5% regulatory benchmark of CBN. The average annual liquidity risk of the sampled MFBs for the period was 38.35%, with maximum and minimum being 68% and 5% respectively. This shows that the sampled MFBs were operating with robust liquidity judging by the 20% minimum regulatory benchmark of CBN. Furthermore, the average annual solvency risk of the sampled MFBs using CAR was 39.13%, with maximum and minimum being 65% and 12% respectively. On the average, this implies that the sampled MFBs were performing creditably above the 10% minimum regulatory benchmark of CBN and that 39% of the total assets of the sampled MFBs were financed by shareholders' funds while the remaining 61% was financed by deposit liabilities.

Table 4.1: Descriptive Statistics (Annual Data)

Variable	Observation	Mean	Std. Dev.	Min.	Max.
Return on asset (ROA)	23	0.0635	0.0452	0.01	0.18
Portfolio at risk (PAR)	23	0.0409	0.0241	0.01	0.09
Liquidity ratio (LR)	23	0.3835	0.1923	0.05	0.68
Capital adequacy ratio (CAR)	23	0.3913	0.1958	0.12	0.65

Source: Author's Computations, 2016.

Table 4.2 depicted the descriptive statistics of all the variables of this study for the converted annual audited financial statements to quarterly financial statements. The financial performance of national MFBs in Nigeria with respect to ROA for 92 observations indicated that the sampled MFBs during the period (2009-2015) realised an average quarterly profit before tax of 0.0158kobo in every ₦1 investment made on the total asset. Moreover, the most and least profitable sampled MFBs during the period recorded 0.0448kobo and 0.0025kobo respectively. The average quarterly credit risk of sampled MFBs for the period with respect to PAR was 0.0099, which indicated that only 0.99% of their loan portfolio in arrears or unpaid was at risk. In addition, the highest and lowest PAR during the period was 2.22% and 0.25% respectively. This implies that the sampled MFBs quarterly loan portfolio at risk is performing creditably below 5% regulatory benchmark of CBN. The average quarterly liquidity risk of the sampled MFBs for the period was 9.6%, with maximum and minimum being 17.08% and 1.34% respectively. This shows that the sampled MFBs were not operating in strict adherence to a minimum of 20% regulatory benchmark of CBN required of MFBs in the country on liquidity. Furthermore, the average quarterly solvency

risk of the sampled MFBs using CAR was 9.79%, with maximum and minimum being 16.15% and 3.12% respectively. On the average, this implies that the sampled MFBs were not operating in strict adherence to 10% minimum regulatory benchmark of CBN and that 9.79% of the total assets of the sampled MFBs were financed by shareholders' funds while the remaining 90.21% was financed by deposit liabilities.

Table 4.2: Descriptive Statistics (Quarterly Data)

Variable	Observations	Mean	Std. Dev.	Min.	Max.
Return on asset (ROA)	92	0.0158	0.0111	0.0025	0.0448
Portfolio at risk (PAR)	92	0.0099	0.0059	0.0025	0.0222
Liquidity ratio (LR)	92	0.0960	0.0472	0.0134	0.1708
Capital adequacy ratio (CAR)	92	0.0979	0.0480	0.0312	0.1615

Source: Author's Computations, 2016.

Correlation Analysis

Table 4.3 displayed the correlation matrix of both endogenous and explanatory variables of this study. This is to measure the linear relationship between the dependent variable (ROA) and each of the independent variables (PAR, LR, and CAR). This correlation matrix reflects the relative strength of the linear relationship between ROA and any of the exogenous variables being analysed. According to Gujarati (2004), multicollinearity could only be a problem if the pair-wise correlation coefficient among regressors is above 0.80. In addition, the rule of thumb is that any correlation that is above 0.5 will constitute correlation problem. However, it is apparent that the variables in Table 4.3 are orthogonal. Furthermore, both PAR and LR behaved inversely with the explained variable (ROA). This implies that the higher the value of PAR and/or LR, the more negatively would the ROA be affected. In another word, the higher the credit risk and/or liquidity risk of the sampled MFBs, the more negatively would their financial performance be affected. Meanwhile, CAR has a positive relationship with ROA, which suggests that the more solvent the sampled MFBs are, the better would their financial performance be.

Table 4.3: Correlation Matrix

VARIABLES	ROA	PAR	LR	CAR
ROA	1.0000			
PAR	-0.0287	1.0000		
LR	-0.2429	0.0680	1.0000	
CAR	0.4527	0.3978	0.4397	1.0000

Source: Author's Computations, 2016.

Multicollinearity Test

An implicit assumption that is made when using panel least square estimation method is that the exogenous variables are not perfectly correlated or near perfect correlation with one another. If there is no relationship between the explanatory variables, they would be said to be orthogonal to one another. Table 4.4 shows the relationship between the independent variables with the aid of variance inflation factor (VIF). The result indicated that there is the absence of multicollinearity among the exogenous variables used in this study as indicated by VIF of each variable falling below 10, and the average VIF is also less than 10.

Table 4.4: Variance Inflation Factor

Variable	VIF	1/VIF
CAR	1.49	0.6707
LR	1.26	0.7931
PAR	1.21	0.8276
Mean VIF	1.32	

Source: Author's Computations 2016.

Regression Analysis

The decision on whether the random effects (RE) model or fixed effects (FE) model was an appropriate model for this study depended on whether the individual effect was fixed or random. Hausman test was conducted to check which model is appropriate between fixed effects and random effects. The result of Hausman test (presented in appendix iv) revealed that fixed effects model is appropriate as indicated by probe (0.0278) at 0.05 level of significance. Therefore, Table 4.5 shows the result of the pool OLS, fixed effects and random-effects of the model for the effect of enterprise risk on the financial performance of national microfinance banks in Nigeria. The F-statistic (3, 84) = 3.12 and P-value 0.0303 indicates strong statistical significance at 0.05 level of significance and enhanced the reliability and validity of the model. The description of each exogenous variable in relation with the explained variable (ROA) is as follows.

This study examined the effect of credit risk (proxy by PAR>30 days) on the financial performance of national microfinance banks in Nigeria. Portfolio at risk (PAR) measure indicates how efficient an MFB is in making prompt collections on its disbursed loan portfolio. High PAR implies low repayment rate and a pointer that an MFB is operating with high credit risk. The PAR as shown in the regression result has an inverse linear relationship with the ROA coefficient of -0.2276 as expected and statistically significant with P-value of 0.012 at 5% level of significance. This implies that ₦1 increase in the PAR of the sampled national licensed MFBs in Nigeria will induce 0.2276kobo decline in their financial performance. In other words, a high portfolio at risk

limits the potential revenue derivable from microcredit operations of these MFBs and negatively impact on their financial performance. Therefore, the stated null hypothesis that credit risk has no significant effect on the financial performance of national microfinance banks in Nigeria cannot be accepted.

More so, the effect of liquidity risk (proxy by liquidity ratio) on the financial performance of national microfinance banks in Nigeria was examined by this study. Liquidity ratio (LR) indicates how efficient an MFB is in meeting its financial commitments in a timely manner and at reasonable prices as they fall due. High liquidity ratio indicates that an MFB is operating with a robust liquidity to promptly meet its financial commitments, while a low liquidity ratio portends danger of liquid risk and will encumber the financial commitments of these MFBs, and ultimately affect their financial performance negatively. The LR as shown in the regression result has a positive linear relationship with the ROA coefficient of 0.0153, but statistically insignificant with P-value of 0.319 even at 10% level of significance. Therefore, the stated null hypothesis that liquidity risk has no significant effect on the financial performance of national microfinance banks in Nigeria cannot be refuted.

Furthermore, the effect of solvency risk (proxy by capital adequacy ratio) on the financial performance of national microfinance banks in Nigeria was equally assessed in this study. Capital adequacy ratio (CAR) indicates how effective an MFB is in meeting its obligations and ability to absorb unexpected losses. It is an indication of how capitalised an MFB is in surviving against potential shocks. High CAR indicates that an MFB is well capitalised to survive unexpected losses. In other words, a high capital to asset ratio is a pointer to the viability of these MFBs and relatively little concern for solvency risk, while low CAR will not augur well for these MFBs. The CAR as shown in the regression result has a positive linear relationship with the ROA coefficient of 0.0241 as expected, but statistically insignificant with P-value of 0.418 even at 10% level of significance. Therefore, the stated null hypothesis that solvency risk has no significant effect on the financial performance of national microfinance banks in Nigeria cannot be refuted.

Table 4.5: Regression Result for Effect of Enterprise Risk on Financial Performance of National Microfinance Banks in Nigeria.

Variable	Pooled OLS	Fixed Effect Model	Random Effect Model
Constant	0.0162 (0.000)*	0.1424 (0.000)*	0.1138 (0.001)*
PAR	-0.6115 (0.000)*	-0.2276 (0.012)**	-0.2909 (0.006)*
LR	-0.1390 (0.000)*	0.0153 (0.319)	-0.0068 (0.697)
CAR	0.1947 (0.000)*	0.0241 (0.418)	0.0898 (0.001)*
F-Statistic	33.54 (0.000)*	3.12 (0.0303)**	
Wald X^2			15.24 (0.0016)*
Hausman Test		9.12 (0.0278)**	

*, ** denotes 1% and 5% level of significance respectively.
( ) denotes Prob., while the value denotes coefficients of the variables.
Source: Author's Computations, 2016.

Discussion of Findings

This study revealed that credit risk has a negative and statistically significant effect on the financial performance of national microfinance banks in Nigeria. This is in consonance with the a priori expectation of this study, because the higher the credit risk of an MFB the lower its financial performance will be. This result is consistent with Oyerogba *et al.*(2016); Muriu (2011); Gatuhu (2013); Addai and Pu (2015) who equally found that credit risk has significant effect on financial performance of microfinance institutions and banks in Nigeria, Kenya and Ghana respectively, but inconsistent with Abebaw (2014) who found portfolio quality (credit risk) of selected microfinance institutions in Ethiopia to be insignificant.

Furthermore, this study hypothesised that liquidity risk has no significant effect on the financial performance of national microfinance banks in Nigeria, and found liquidity risk to be positively related to the financial performance of the sampled microfinance banks, but statistically insignificant. This result is inconsistent with Osisioma, Egbunike and Adeaga (2015) who found that liquidity risk has a negative impact on deposit money banks' performance in Nigeria.

This study equally conjectured that solvency risk has no significant effect on the financial performance of national microfinance banks in Nigeria. Eventually, the result of this study revealed that solvency risk has a positive and significant effect on the financial performance of the sampled microfinance banks. This is also in tandem with the a priori expectation of this study, because the higher the capital to asset ratio of an MFB is, the better the chance for its financial performance enhancement. This result is consistent with Osisioma, Egbunike and Adeaga (2015) who also found that capital

adequacy ratio has a positive impact on deposit money banks' performance in Nigeria, but inconsistent with Abebaw (2014) who found capital to asset ratio (solvency risk) of selected microfinance institutions in Ethiopia to be insignificant.

In the final analysis, this study confirmed that enterprise risk has a significant effect on the financial performance of the sampled national microfinance banks in Nigeria.

Conclusion and Recommendations

This study sought to examine the effect of enterprise risk management on the financial performance of national microfinance banks in Nigeria, by specifically assessing the effect of credit risk, liquidity risk and solvency risk on the financial performance of national microfinance banks in the country. The results of both the descriptive and inferential statistical analyses of this study revealed that credit risk has inverse and significant influence on the financial performance of sampled microfinance banks in Nigeria, while liquidity risk and solvency risk have a positive effect on their financial performance, but statistically insignificant. Therefore, this study revealed that enterprise risk has a significant effect on the financial performance of national microfinance banks in Nigeria.

Consequent upon the data collected and analysed for this study, the study found that credit risk had a negative significant effect on the financial performance of national microfinance banks in Nigeria, while liquidity risk and solvency risk had a positive but insignificant effect on the financial performance of national microfinance banks in the country. Thus, this study concludes that enterprise risk has a significant influence on the financial performance of microfinance banks in Nigeria.

Based on the findings of this study and the conclusion drawn above, the following recommendations were made:

i. The regulatory authorities (Central Bank of Nigeria and Nigeria Deposit Insurance Corporation) of microfinance banks (MFBs) in Nigeria should consistently ensure strict compliance of MFBs operators in the country with its prudential guidelines on the portfolio at risk through the board of directors of these MFBs and apply necessary sanctions on erring MFBs. More so, MFBs operators in Nigeria should be more thorough in and committed to the dynamic credit clients selection process to forestall incidences of delinquent credit facility.
ii. Similarly, the regulatory authorities (Central Bank of Nigeria and Nigeria Deposit Insurance Corporation) of MFBs in Nigeria should

also ensure strict adherence of microfinance bank's operators in the country to its prudential guidelines on liquidity ratio through the MFBs board of directors, and apply timely sanctions on erring MFBs. In addition, MFBs board of directors should be dedicated to proactive and quality liquidity risk management strategy, this will help in addressing the exigencies of liquidity risk in the nation's microfinance banking sub-sector.

ii. Central Bank of Nigeria and Nigeria Deposit Insurance Corporation should strictly enforce the maintenance of its minimum regulatory benchmark on capital to asset ratio of microfinance bank's operators in the country through the MFBs board of directors. Moreover, the regulatory authorities should demand and heighten robust capital to asset ratio in the nation's MFBs, this will forestall the re-occurring instances of distressed MFBs and their eventual insolvency in the country.

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Appendices

Appendix I: Pooled OLS Model for Effect of Enterprise Risk on Financial Performance of National Microfinance Banks in Nigeria

```
      Source |       SS       df       MS              Number of obs
=      92
-------------+------------------------------           F(  3,    88)
=   33.54
       Model |  .005994509     3   .00199817           Prob > F
=  0.0000
    Residual |  .005242824    88  .000059578           R-squared
=  0.5334
-------------+------------------------------           Adj R-squared
=  0.5175
       Total |  .011237332    91  .000123487           Root MSE
=  .00772
```

roa	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
par	-.6115016	.1514952	-4.04	0.000	-.9125665	-.3104366
lr	-.1390344	.0192439	-7.22	0.000	-.1772776	-.1007913
car	.1947293	.0205882	9.46	0.000	.1538145	.2356442
_cons	.016154	.0022902	7.05	0.000	.0116026	.0207053

Appendix II: Fixed Effects Model of Enterprise Risk on Financial Performance of National Microfinance Banks in Nigeria

```
Fixed-effects (within) regression               Number of obs      =
92
Group variable: company                         Number of groups   =
5
R-sq:  within  = 0.1003                         Obs per group: min =
12
       between = 0.1140                                        avg =
18.4
       overall = 0.0495                                        max =
28
                                                F(3,84)            =
3.12
corr(u_i, Xb)  = 0.0725                         Prob > F           =
0.0303
```

roa	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
par	-.2275875	.0884756	-2.57	0.012	-.403531	-.051644
lr	.0152877	.0152407	1.00	0.319	-.0150201	.0455954
car	.024096	.0296318	0.81	0.418	-.03483	.0830221
_cons	.0142384	.003224	4.42	0.000	.0078272	.0206497

sigma_u	.01194005	
sigma_e	.00400729	
rho	.89876382	(fraction of variance due to u_i)

```
------------------------------------------------------------------------------
F test that all u_i=0:     F(4, 84) =     60.62                 Prob > F
= 0.0000
```

Appendix III: Random Effects Model of Enterprise Risk on Financial Performance of National Microfinance Banks in Nigeria

```
Random-effects GLS regression                   Number of obs      =
92
Group variable: company                         Number of groups   =
5
R-sq:  within  = 0.0610                         Obs per group: min =
12
       between = 0.5144                                        avg =
18.4
       overall = 0.2957                                        max =
28
Random effects u_i ~ Gaussian                   Wald chi2(3)       =
15.24
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =
0.0016
------------------------------------------------------------------------------
        road |      Coef.   Std. Err.      z    P>|z|     [95% Conf.
Interval]
-------------+----------------------------------------------------------------
         par |   -.2909288   .1052175    -2.77   0.006    -.4971513
-.0847063
          lr |   -.0067831   .0174456    -0.39   0.697    -.0409758
.0274096
         car |    .0898357   .0272714     3.29   0.001     .0363848
.1432866
       _cons |    .0113826   .0033293     3.42   0.001     .0048573
.0179079
-------------+----------------------------------------------------------------
     sigma_u |  .00311408
     sigma_e |  .00400729
         rho |  .37651501   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Appendix IV: Hausman Test

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)
sqrt(diag(V_b-V_B))
             |       fe           re       Difference          S.E.
-------------+----------------------------------------------------------------
         par |   -.2275875    -.2909288        .0633413
.
          lr |    .0152877    -.0067831        .0220707
.
         car |     .024096     .0898357       -.0657397
.0115895
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained
from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained
from xtreg
    Test:  Ho:  difference in coefficients not systematic
                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =          9.12
                Prob>chi2 =        0.0278
                (V_b-V_B is not positive definite)
```

Appendix V: Summary of Statistics (Annual Data)

```
.summarise roa par lr car
    Variable |       Obs        Mean    Std. Dev.       Min
Max
-------------+--------------------------------------------------------
-
         roa |        23    .0634783    .0451874        .01
.18
         par |        23    .0408696    .0241045        .01
.09
          lr |        23    .3834783    .1922737        .05
.68
         car |        23    .3913043     .195827        .12
.65
```

Appendix VI: Summary of Statistics (Quarterly Data)

```
.summarise roa par lr car
    Variable |       Obs        Mean    Std. Dev.       Min
Max
-------------+--------------------------------------------------------
-
         roa |        92    .0158174    .0111125       .0025
.0448
         par |        92    .0098739    .0058711       .0025
.0222
          lr |        92    .0960435    .0472145       .0134
.1708
         car |        92    .0978522    .0479901       .0312
.1615
```