# Effect of Bank Asset Default Risk on Profitability of DMBS in Nigeria

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**Abstract:** The business of lending exposes banks to default risk, one of the primary risks inherent in banking. This study examined the effect of default risk on the profitability of Deposit Money Banks in Nigeria over a 13-year period (2010 to 2022). The independent variables, representing bank asset default risk (income balance, capital adequacy ratio, provisioning coverage ratio, non-performing asset ratio, and economic trends), were regressed against the return on assets (ROA) as a proxy for bank profitability. An ex-post facto research design was adopted. Data were collected from the annual reports and financial statements of 10 listed deposit money banks selected from a population of 25 commercial banks in Nigeria. A panel regression based on the random effect model was found to be the most suitable for estimating all models. The results of the random effect model revealed that capital adequacy ratio had a negative and significant effect, while economic trends had a significant positive effect on the return on assets of deposit money banks in Nigeria. Other default risk variables (income balance, provisioning coverage ratio, and non-performing asset ratio) did not have a significant effect on bank profits. The study asserts that capital adequacy ratio (CAR) and economic trends (ET) are the primary determinants of bank profitability in Nigeria.

**Key words:** Bank Profitability, Deposit Money Banks, Default risk, non-performing risk, Nigeria.

## INTRODUCTION

Banking involves providing financial services, primarily facilitating the exchange or possession of value through contracts. Banks play a crucial role in financial intermediation by collecting deposits, which contribute to capital accumulation, and extending funds to deficit units as loans. These services, including various types of loans and marketable securities, form the asset base of banks, through which they generate income to sustain their operations. Bank assets encompass financial instruments held by the bank (such as cash reserves or deposits with the central bank) or instruments that represent obligations owed to the bank, including loans, government securities like treasury bills, and bonds (Gaasbeck, 2024). These assets have a unique nature, characterized as risky debt claims (Nagel & Purnanandam, 2019). This inherent risk arises from their structure, which effectively functions as a short put option on borrowers' assets, exposing banks to losses when negative shocks reduce borrower asset values, leading to asset volatility.

**Default risk**, a byproduct of credit events, has far-reaching implications, impacting the sustainability of business firms, the stability of the financial system, and the overall economy (Kim, 2019). Default risk refers to the probability that a bank will incur losses due to its customers failing to meet loan obligations (Kagan, 2022; Thaker, 2023). Banks, as central pillars of economic systems, face severe repercussions when defaults occur. A notable example is the 2007 subprime mortgage crisis in the United States, which triggered financial sector bankruptcies, including Lehman Brothers, and necessitated bailouts like that of AIG. These events culminated in a global financial crisis, marked by widespread housing market disruptions, evictions,

foreclosures, and business failures, as well as a significant stock market decline (Loo, 2023). Consequently, assessing asset default risk has become a vital aspect of banking operations, especially when such risks impose financial obligations on banks.

Bakshi, Gao, and Zhong (2022) highlighted that default risk significantly influences corporate bond returns, credit default swap spreads, default probability estimates, and associated losses. Against this backdrop, this study examines how default probabilities affect the profitability of deposit money banks in Nigeria.

In academic literature, profitability is a key indicator of financial performance, reflecting a bank's ability to efficiently manage its resources to generate profit (Adesugba & Bambale, 2016). Common profitability metrics include **Return on Assets (ROA)** and **Return on Equity (ROE)**. ROA, regarded as a superior measure of bank profitability by many regulators, evaluates how effectively management uses assets to generate earnings (Rasa, 2021). Rivard and Thomas (1997) argue that ROA is more reliable than other metrics like ROE, as it avoids distortions caused by high equity multipliers. It is computed as the ratio of income to total assets (Adesugba & Bambale, 2016).

Empirical studies have shown that default risk indicators, such as non-performing loans (NPLs) and loan loss provisions (LLPs), generally have negative and significant impacts on financial performance, as measured by ROA or ROE (Natufe & Evbayiro-Osagie, 2023; Nwosu et al., 2020; Kajola et al., 2019; Ayrton et al., 2019). However, some studies report positive impacts of NPLs on performance (e.g., Abimbola, 2020; Hieu, 2021). These discrepancies may stem from differences in methodologies, sample periods, or control variables. For instance, Adeleke et al. (2023) and Ihegboro and Egbo (2021) reported insignificant impacts of certain variables, such as NPLs and LLPs, which could indicate omitted variable bias or limited temporal scopes.

The global financial crisis of 2007–2008 underscored the critical importance of understanding and modeling bank asset default risks. Assessing these risks is essential not only for investors but also for risk managers analyzing counterparty risks and regulators monitoring bank stability. Accurate modeling of default risks is crucial for evaluating their effects on key performance indicators, such as profitability, thereby providing insights for sound risk management and regulatory policies.

## THEORETICAL CONSIDERATIONS

The core measure of bank profitability is the interest earnings which comes from loan assets. Bank loans are susceptible to default. The presence of non-performing assets (NPAs) leads to increase in real interest rates (Roy, 2001 cited in Nwosu, Okedigba & Anih, 2020). The real interest rate (the difference between nominal rate of interest and the expected rate of inflation, at a realistic level) has to be kept low so that borrowers do not pay a high price and depositors have an incentive to save, as a measure of deregulation. But in Nigeria, structural rigidities in the form of high intermediation costs and NPAs have been responsible for higher real interest rates. The loss of income from NPAs not only brings down the level of income of the banks but also hinders them from quoting finer Prime Lending Rates (PLR) (Jain & Balachandran, 1997). Thus, the foremost concern of banks is how best to reduce the share of NPAs to total advances but also the level of NPAs, though they are familiar with non-payment risks (Michael, Vasanthi & Selvaraju, 2006).

Banks make-up charges for each and every form and stage of loan defaults from sub-standard, doubtful to bad. A sub-standard loan has a propensity of being repaid within the next round of repayment schedule. Banks with aggressive loan recovery strategy changes penalties for defaults, and triggers loan recovery moves at every slight indication of unhealthy loan relationship. Banks are able to recovery defaulting assets at gain from additional changes. Lina and Indre (2014) reported that banks tend to take more risks over time and manage their asset and liability with an attempt to influence their activity and profitability for the bank.

However, NPAs can be one of the major causes of loss to the bank. NPAs throw can throw banks into litigation process especially when the assets do not have collateral. Banks lose loan assets to

NPAs. Non-performing assets in banking shows the effect of a decrease in interest earned and bank income caused by debtors who experience bad credit or fail to pay (Bila & Sugandha, 2022).

This supposes that non-Performing asset has a negative relationship with bank profitability.

## METHODOLOGY

The secondary data form of variables were generated based on an *ex-post facto* research design analyze the cause and effect nexus of default risk and bank profitability. The annual report of the Nigerian commercial banks were generated for thirteen years spanning 2010 to 2022. The sample is made up of 10 quoted commercial banks which represent 40% of the total commercial banks quoted on the floor of the Nigeria Exchange Group. The sample of justifying for a number of reasons: The researcher was able to obtain over 10% to 30% of the population to justify that is is a good representation (Mugenda & Mugenda, 2003). The periods consist of 130 observations per variable covering both a period of stable economic trends (2010 to 2015) and periods of relatively high economic uncertainty.

The independent variables are treated as the influencing factors on the bank performance. They are the default risk variables of the study. The study aims to find out the extent to which the various bank performance indicators (dependent variable) reacts to a unit change in the default risk factors of the commercial banks in Nigeria. These variables are (1) bank loss, (2) capital ratio (capital adequacy ratio), (3) loan loss provisioning (provisioning coverage ratio), and (4) non-performing asset. The variables will be defined and explains in Table 1 as ratios.

**Table 1: Description of the variables of the study**

| SN | Variable | Proxy | Computation | Explanation | Adaptations |
|----|----------|-------|-------------|-------------|-------------|
| 1 | Bank Profitability | Return on Asset (ROA) | Profit After Tax divided by Total Asset | Indicates how much profits a business able to generate from its assets | Adeleke, *et al* (2023), Agbamuche, *et al* (2022) |
| 2 | Bank loss | Income Balance | Revenue less Expenses | This is an indicator of default risk. A dummy variables is used to indicate a troubled bank as 1, and a healthy bank as 0. | Andrés (2021) |
| 3 | Capital ratio | Capital adequacy ratio (CAR) | Equity/Assets | The ratio measures the banks' ability to absorb losses. A CAR below 15% signifies | Agbamuche, *et al* (2022) |
| 4 | Loan Loss Provisioning | provisioning coverage ratio (PCR) | Loan Loss Provision/ Total Loans | The ratio is used to cushion the effects of loss arising from bad debts. A value > 1 indicates threats of bank default risk and lack of creditworthiness. | Ajayi & Ajayi (2017), Annor & Obeng (2017) |

| 5 | Non-Performing Asset | Non-Performing Asset Ratio (NPA) | Non-Performing Loans/Total Loans * 100 | The ratio indicates how well the bank to manages its credit risk. A lower NPA means creditworthiness and higher indicates troubled bank | Agbamuche, *et al* (2022), Abimbola (2020), Afolabi, *et al* (2020), Okoli, *et al* (2020) |
| 6 | Economic Trend | ET | Dummy | Periods covering 2010 to 2015 is presumed period of economic stability is denoted with 1 while period spanning 2016 to 2022 is relatively economic unstable and denoted as 0 | Author conceived from theory of information asymmetry |

Model was derived from eclectic studies Isedu and Erhabor (2021) recognized non-performing loans and the provision for loan loss as the two major proxies for asset default. This was corroborated by Natufe and Evbayiro-Osagie (2023) where in default risk was described using Capital adequacy Ratio (CAR), Liquidity Ratio (LQR), Loan-to-deposit ratio (LDR), Risk Asset Ratio (RAR), Non-performing loans ratio (NPLR), Loan Loss Provision Ratio (LLP), with a control variable as Size (SZ). The use of return on asset as proxy is derived from the work of Adeleke, *et al* (2023). The functional relatinship was captured as follows:

ROA = $f$(IB, CAR, PCR, NPAR, ET)

The functional notation can be written as equation as follows:

$ROA_{it} = \alpha_0 + \beta_1 IB_{it} + \beta_2 CAR_{it} + \beta_3 PCR_{it} + \beta_4 NPAR_{it} + \beta_5 ET + \mu_{it}$

Where:

**$ROA_{it}$**: Return on Assets for bank i in period t

**$IB_{it}$**:     Income Balance for bank i in period t (dummy variable)

**$CAR_{it}$**: Capital Adequacy Ratio for bank i in period t

**$PCR_{it}$**: Provisioning Coverage Ratio for bank i in period t

**$NPA_{it}$**: Non-Performing Asset Ratio for bank i in period t

**$ET_{it}$**:     Economic Trend dummy variable for period t

**$\varepsilon_{it}$**:       Error term for bank i in period t

Expected Signs of Coefficients

Based on the theoretical underpinnings and previous studies, we expect the following signs for the coefficients:

**$\beta_1$ (IB):** Positive. A higher income balance indicates better financial health and lower default risk, leading to higher profitability.

**$\beta_2$ (CAR):** Negative. A higher capital adequacy ratio implies more conservative lending practices, which may reduce profitability in the short term.

**β₃ (PCR):** Negative. A higher provisioning coverage ratio suggests that the bank is setting aside more funds to cover potential loan losses, which may negatively impact profitability.

**β₄ (NPA):** Negative. A higher non-performing asset ratio indicates weaker asset quality and higher credit risk, leading to lower profitability.

**β₅ (ET):** Positive. Positive economic trends can stimulate economic activity, leading to increased lending opportunities and higher profitability for banks.

The study adopted a panel data regression technique. The regression is based on fixed or random effect model. It also employed the Hausman test to decide between random and fixed effect model. The estimation started with preliminary analysis including descriptive statistics and trend analysis. The descriptive statistics used mean, and standard deviation of the variables to explain the nature of the variables, whereas the trend analysis defines the behaviour of the variables over the time period of the study.

## DATA ANALYSES AND INTERPRETATION

### Descriptive Statistics

**Table 3: Descriptive Statistics of the Variables for the Study**

|  | ROA | IB | CAR | PCR | NPAR | ET |
|---|---|---|---|---|---|---|
| Mean | 21.2112 | 0.0437 | 54.966 | 0.7346 | 34.915 | 0.4312 |
| Median | 21.5200 | 0.4501 | 65.020 | 0.5302 | 23.1040 | 0.5432 |
| Maximum | 53.6400 | 1.0000 | 76.0210 | 1.1032 | 0.7104 | 1 |
| Minimum | 0.0000 | 0.0000 | 21.0231 | 0.3208 | 0.272 | 0 |
| Std. Dev. | 15.6474 | 0.3826 | 43.119 | 0.6581 | 28.216 | 0.2123 |
| Skewness | 0.0943 | 4.1391 | 1.1496 | 4.2293 | 6.1644 | 0.8976 |
| Kurtosis | 1.9216 | 12.133 | 8.4034 | 7.2044 | 18.235 | 05465 |
|  |  |  |  |  |  |  |
| Jarque-Bera | 2.9959 | 81.32 | 87.132 | 17.253 | 122.11 | 2.4346 |
| Probability | 0.2235 | 0.0032 | 0.0000 | 0.0000 | 0.0000 | 0.0003 |
|  |  |  |  |  |  |  |
| Observations | 130 | 130 | 130 | 130 | 130 | 130 |

The Jarque-Bera statistics examines the normality of the individual variables of the study. The null hypothesis is that the variables are normally distributed. Thus, we reject the hypotheses for variables with p.value less than 0.05 level of significance, otherwise we cannot reject. The p.values for ROA (0.2235) is greater than 0.05, whereas others are less than 0.05, thus we cannot reject the null hypothesis for ROA. Most of the variables tends to show lack of normal distribution.

### Model Estimation and Test of Hypotheses

**Table 4: Regression analysis of the effect of asset default risk on Bank profitability**

| Explanatory Variables | Fixed Effects | | Random Effects (Preferred) | |
|---|---|---|---|---|
|  | Coefficient | t-Statistic | Coefficient | t-Statistic |
| IB | 7.2605 | 0.5032 | 3.6105 | 0.1088 |
| CAR | -0.0721 | -4.0063* | -0.0733 | -2.7202** |
| PCR | 0.0481 | 2.4900 | 0.0483 | 1.0565 |
| NPAR | -0.3796 | -0.4828 | -0.4299 | -0.2311 |
| **ET** | -0.2593 | -1.5828 | 0.7229 | 3.2613** |
| C | 16.998 | 10.2679* | 17.0824 | 4.3575* |
|  |  |  |  |  |

| R-Squared | 0.108744 | 0.020839 |
|---|---|---|
| F-statistic (Prob) | 3.687480 (0.0002) | 6.473838 (0.0103) |
| | | |
| No of periods | 13 | 13 |
| No. of Firms | 10 | 10 |
| No. of Observations | 130 | 130 |
| **Hausman Test** | | |
| Chi-Sq. Statistic (Prob) | 1.673905 (0.4330) | |

Dependent Variable: Return on Asset (ROA), significant at *1%, **5%, ***10%

**Source:** Output from Eviews 9.

Table 4 presented the fixed and random effects regression results of the effect of asset default risk on the profitability of deposit money banks in Nigeria. In the model, Return on asset (ROA) is the dependent variable while IB, CAR, PCR, NPAR and ET are introduced as explanatory variables.

The Hausman test showed a probability value of 0.4330 which is insignificant, being greater than 0.05 level of significance. Based on the insignificance of the result of the Hausman test, it follows that Random Effect model estimates are preferred above that of the fixed Effect. The meaning of this is that differences across the firms have some influences on the profitability of deposit money banks. Thus the result of the Random Effect Model is preferred and used in the interpretation of the model. From the regression analysis the coefficients for IB, CAR, PCR, NPAR and ET are 3.610500, -0.00733, 0.04832, -0.429973 and 0.7229 respectively. It is therefore observed that IB, PCR and ET have positive relationships while CAR and NPAR have a negative relationship. However CAR and ET are the only variables with a significant effect on ROA. The t-value for CAR is -2.7202 which is less than 0.05 level of significance. Also the t-statistics for ET is 3.2613 which is less than 0.05 level of significance. The results indicate that capital adequacy ratio (CAR) had a significant negative effect on return n asset while Economic trend showed positive and significant effect on return on asset.

The regression result showed that R-Squared (coefficient of determination) was 0.021 which means that default risk has 2.1% significant effect on the profitability of the DMBs in Nigeria. The R-Squared (coefficient of determination) of 0.020839 shows that the explanatory variables (IB, CAR, PCR, NPAR and ET) can only explain 2.1% of total variation in ROA.

The F-statistics is 6.473838 with probability value of 0.0103 which is less than 0.05 level of significance. This indicates that the coefficient of asset default risk variables have a significant effect on profitability proxied by return on asset of the deposit money banks in Nigeria. Based on this, the null hypothesis is therefore rejected while the alternate hypothesis is accepted.

**Decision**: Since the p.value is less than 0.05 level of significance, the study conclude that asset default risk has a significant effect on the profitability of deposit money banks in Nigeria.

**Discussion of Findings**

The results has shown that only capital adequacy ratio (CAR) and economic trends (ET) influences bank profitability for deposit money banks in Nigeria. The result showed that CAR has a negative effect on profitability while ET had positive effects. This means that a rising level of capital adequacy of the banks will cause a loss of profitability. This is contrary to conventional expectations that a higher CAR negatively impacts profitability. This support the assertion that idle cash does not generate profit for the bank. This finding highlights the trade-off between risk mitigation and profitability. Thus it is expected that the dilemma to keep more reserve to cushion the effect of bank defaults to protect firm solvency will result in lowering the profit margin of the bank. Moreover, economic trends has been seen to driver high bank profitability. This supposes that in times of economic boom, bank profits will be high and the verse is for the times of recession. This is expected following that bank has to be cautious in loan grant to cushion for asset defaults in the time of adverse economic reality.

Additionally, the study found that default risk factors such as income balance, loss provisioning, and non-performing assets do not significantly influence bank profitability. The propensity for bank loss (IB) and loss provisioning has the tendency to drive for high bank profitability, while non-performing assets would cause negative influence on profitability. The hypotheses tested showed that these situations does not happens inn the banks in Nigeria. This suggests that Nigerian banks may not be effectively managing these risk factors or that other factors are more dominant in determining profitability. A bank that desire higher profit can intensify to reduce non-performing asset through sound credit administration. A cursory look at the coefficient of determination reveals that asset default risk has a very low explanatory power on bank profitability, which suggests that it is one of the least drivers of bank profitability in Nigeria. This supposes that Nigerian deposit money banks could enhance profitability, thus banks in Nigeria can ignore asset risk factors in order to ensure high profitability margins. The position that capital adequacy has positive implications for bank profit is support by studies including Nwosu, *et al* (2020) but strongly opposed by Bishnu (2020), Okoh, Inim & Idachab (2019), Kajola, *et al* (2019), and Annor & Obeng (2017). Thus, the results of this study is not a popular opinion of previous studies.

Sequel to the above postulations from the study, the study has recommended that banks should strive to maintain an optimal level of capital adequacy to balance risk mitigation and profitability. Excessive capital holding can negatively impact profitability. While the study suggests that traditional risk factors may not be significant drivers of profitability in Nigeria, banks should continue to strengthen their risk management practices to mitigate potential losses. More so, the study recommends that banks should focus on improving operational efficiency through automation, digitization, and process optimization to reduce costs and enhance profitability.

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