# ASSET QUALITY AND BANKS PERFORMANCE: A PANEL DATA ANALYSIS OF COMMERCIAL BANKS

Hanan Amin Barakat *, Shereen Abl Elwahab **, Nouran Mohamed Yassin **, Salma Mohamed Mahmoud Ibrahim **, Mohmed Hossam Ismail **, Nadia Waled Sadr Eldin **

* *Corresponding author*, Faculty of Economics and International Trade, Egyptian Chinese University, Cairo, Egypt
Contact details: Faculty of Economics and International Trade, Egyptian Chinese University, Gesr El Suez st., Abo Ghazala Buildings, Heliopolis Cairo, 4541312 Cairo, Egypt
** Egyptian Chinese University, Cairo, Egypt

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## Abstract

Asset quality management plays a critical role in shaping the financial health and profitability of banks. Moreover, the frequent loan scams have made banking activities questionable. Therefore, non-performing loans (NPL) must get proper consideration and supervision to lessen the occurrence of loan scams (Abdul Aziz et al., 2009). This study investigates the relationship between asset quality management and bank profitability, focusing on key indicators such as return on equity (ROE) and return on assets (ROA). Additionally, we examine specific metrics related to asset quality. The impact of asset quality management on bank profitability is investigated in this research through ten banks between 2017 and 2021. *ROE* and *ROA* will be used to measure the dependent variables of profitability; *NPL*, the total impairment charges to total operating income, and the total impairment charges to gross total loans (*TL*) will be used to measure the independent variables of asset quality management. Our analysis reveals a strong positive association between effective asset quality management and bank profitability. Banks that actively manage their asset quality tend to exhibit better financial performance. Specifically, higher provisioning for impaired assets (as reflected in the impairment charges ratios) is linked to improved bank stability and resilience.

**Keywords:** Asset Quality, Banks' Performance, Non-Performing Loans, Total Impairment Charges to Gross Total Loans, Return on Assets, Return on Equity

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## 1. INTRODUCTION

Any bank around the world wants to be as profitable as possible. In contrast to other business organizations like manufacturers who have tangible goods as stock, banks are financial institutions whose business includes managing assets and liabilities. Since money is the stock of the banking industry, we can refer to this activity as money trading because financial intermediaries, or banks, transfer money from economic units that have excess funds to those that lack them Isanzu (2017).

In the internal and external business environment, banks must deal with a variety of risks, including market, credit, default, interest rate, operational, and exchange currency risks (Aruwa & Musa, 2014). Any financial system can suffer greatly from a weak banking system since the soundness of a nation's banking system has a direct impact on the profitability of its banks and the health of its economy as a whole. The most crucial measure of a bank's performance is its profitability, which shows the rate of return the bank can attain with the resources at its disposal. It was made increasingly clear during financial crises. Not only did Asian nations like Thailand and Indonesia fall apart during the 1997 financial crisis, but their financial system was also under strain. They stabilized the banks and restored public trust by restructuring their financial system and obtaining funding from the International Monetary Fund (IMF). The recent subprime mortgage crisis in the USA has also brought home to us the need to have a strong and well-functioning banking sector. Therefore, we might conclude that poor loans constitute a major factor in the bank's losses. This is because, it attempts to clarify the amount of current and potential credit risks, whether in loan portfolios, investments, owned real estate, or other assets, asset quality management is one of the most crucial areas in determining the overall position of the bank and is frequently linked to increases in the rate of non-performing loans (NPL) (San & Heng, 2013), (Sanathanee, 2020). Although low per capita income, high interest rates, and unfavourable loan usage are frequently the primary drivers of bad debts, a large percentage of NPL can also be attributed to flexible credit rationing policies. Hence, to ensure their continued existence and financial success, banks must control the credit risk that mostly results from NPL. According to Patwary and Tasneem (2019), "non-performing loan arises from various sources. Banks should identify them and take the necessary steps to eliminate NPLs from the industry. However empirical studies show that there is an adverse effect of NPL on the profitability of banks all over the world" (p. 13).

The literature gap is to investigate and examine whether the relationship between asset quality and bank performance differs across regions (emerging markets like Egypt and other developed countries. Moreover, it is important to explore the effectiveness of different policies in managing asset quality, and how varying levels of loan loss provisions impact bank stability and performance.

In addition, this connection explores the risk-return trade-offs between asset quality and bank performance and understands the drivers of asset quality.

This research aims to answer the following questions:

*RQ1: How does asset quality (measured by non-performing loans) affect key performance indicators of banks (e.g., return on assets, and return on equity)?*

*RQ2: Does higher asset quality lead to lower risk exposure for banks?*

*RQ3: How does this trade-off affect overall bank performance?*

This involves considering the implications of addressing asset quality measured by measuring NPL on banking activity and performance.

The stability of the banking sector affects everyone. Consumers rely on banks for financial services, loans, and savings. Therefore, a robust banking system ensures economic stability, access to credit, and trust in financial institutions. Understanding asset quality helps consumers make informed choices about where to deposit their money.

Moreover, the health of banks has ripple effects on the broader economy. Asset quality impacts credit availability, investment, and economic growth. Thus, a study that identifies vulnerabilities and proposes risk mitigation strategies contributes to global financial stability.

Furthermore, banks and financial institutions grapple with managing asset quality to maintain profitability and mitigate risks. Research in this area provides practical guidance for loan portfolio management, credit risk assessment, and strategic planning. Hence, improved asset quality can lead to better credit ratings, reduced funding costs, and increased investor confidence. Conversely, poor asset quality can erode shareholder value and impair long-term viability. Additionally, policymakers need evidence-based insights to design effective regulations and policies. Understanding how asset quality affects bank stability and overall performance informs decisions related to capital requirements, provisioning norms, and risk management. Therefore, a well-designed study can contribute to more robust regulatory frameworks, enhancing financial system resilience and safeguarding depositor interests.

The structure of this paper is as follows. Section 2 reviews the relevant literature on the impact of asset quality on a bank's profitability. Section 3 analyses the methodology that has been used to conduct empirical research. Section 4 presents the empirical findings and discussions. Section 5 includes the conclusion and further recommendations.

## 2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Hassan and Bashir (2003) investigated how the performance of Islamic banks was impacted by the bank's properties and the overall financial environment throughout the period (1994–2001), over 21 different countries, utilizing the following variables: impaired loans / total loans (TL) (a measurement of the total amount of doubtful loans), return on equity (ROE), and return on assets (ROA). According to this study, asset quality improves with a decrease in impaired loans relative to TL. Increases in capital and reductions in the loan ratio are interpreted by this. This indicates that there was a meaningfully negative relationship.

Furthermore, Abdul Aziz et al. (2009), concentrated on the correlation between profitability, incorporating ROA, ROE, and NPLs for four Malaysian banks that were chosen as a sample, including two local banks and two international banks operating in the country. Many variables were employed in this study; the NPL ratio (NPLR) is the dependent variable, while ROE and ROA are the independent variables. The findings show that, whilst local banks rely on the specific bank, foreign banks' financial performance is significantly impacted by NPL.

Nonetheless, Boahene et al. (2012) examined the relationship between bank profitability and credit risk management. Panel data gathered over five years (2005–2009) from six commercial banks. Yet, the NPLR was used to measure the variables that were determined to be independent. On the other hand, ROE and ROA are used to quantify the dependent variable of banks' profitability. According to the findings, there is a substantial and positive correlation between bank profitability and credit risk, or the percentage of NPL. This implies that Ghana enjoys great profitability while having a high credit risk, contradicting what has been traditionally found in earlier research that suggests a negative relationship between credit risk indicators and profitability.

Subsequently, San and Heng (2013) sought to examine the influence of bank-specific attributes on the financial outcomes of Malaysian commercial banks between 2003 and 2009, utilizing a sample of nine domestic and eleven international commercial banks. They used the variables ROE, which evaluates bank profitability, loan loss reserves (LLR), which reflects the amount of credit risk to which the bank is exposed, and ROA to determine the profitability of banks in Indonesia. The assets of a bank are evaluated using the LLR. A greater LLR signifies a higher level of asset risk taken by the bank. According to this study, ROE and LLR significantly correlated negatively.

Additionally, Abata (2014) used secondary data from the annual reports and accounts of six banks listed on the Nigerian market with a sample interval of 15 years (1999–2013) to examine the asset quality and performance of banks in Nigeria. The primary variables are the profitability, NPLR, and asset quality of the bank. The dependent variable ROA and the independent variables LLR or NPL were shown to be related, according to the findings. Nonetheless, the data suggests a robust positive correlation between the designated factors, and the independent variables demonstrate a negative ROA. The findings demonstrated a strong correlation between asset quality (as measured by loan performance) and bank performance (as measured by profitability). If the bank fails to adequately handle its risk, its profit will be unstable.

Furthermore, from 1980 to 2013, Lucky and Nwosi (2015) investigated the connection between the profitability of fifteen commercial banks in Nigeria and the quality of their assets. They examined the relationship between Nigerian commercial banks' profitability performance and the CAMELS asset quality standards. The variables used were the NPLR to TL and return on investment (ROI) for profitability. This study discovered a strong correlation between commercial banks' profitability and asset quality.

Following that, Cheruiyot (2016) sought to ascertain how asset quality affected Kenyan commercial banks' profitability. The 43 commercial banks were the subject of the study. To see the effect, it employed the use of independent and dependent variables. The asset quality was the independent variable; the ROA and ROE were the dependent variables. The study concludes that asset quality and profitability in Kenyan commercial banks are positively correlated. This demonstrates that improved asset quality and hence positive profitability are associated with lower non-performing asset (NPA) to total asset ratios.

Moreover, for 11 private commercial banks in Bangladesh in the years 2014 and 2015, Islam et al. (2017) investigated the factors that determine the profitability of private commercial banks in Bangladesh. They calculated the factors for NPL relative to TL, and ROI was used to calculate profitability. The study's findings showed that profitability was not significantly impacted by the size of assets. Despite this, there is a strong correlation between the factors.

The impact of NPL on bank profitability in Turkey was then examined by Kadioglu et al. (2017). The study involved 55 Turkish banks and ran from the first quarter of 2005 to the third quarter of 2016. The study demonstrated that the quality of assets, which was determined by comparing NPL to TL and NPL (overdue) to total assets, affects the profitability of banks and the state's financial system as well as the overall economy. It has been demonstrated that NPL and bank profitability — which is determined by ROA and ROE — have a substantial, negative association. This means that a reduction in NPL would have a positive impact on ROE.

On the other hand, Isanzu (2017) looked into how credit risk affected Chinese banks' financial results. For seven years, from 2008 to 2014, secondary data was gathered from the country's five biggest commercial banks. It measured credit risk using NPL and loan impairment costs, and it measured financial performance using ROA. The findings showed a relationship between the research variables and the improvement in credit risk management during the previous years as prudential approaches were implemented to lessen the adverse effects of credit risk on banks' financial performance. According to the report, NPLs have a major effect on financial performance and are a measure of credit risk.

In the meantime, Salike and Ao (2017) investigated the factors influencing Asian banks' profitability, emphasizing the significance of asset quality. Their research covered 947 banks from 12 Asian economies between 2001 and 2015. The results of the study made it abundantly evident that the quality of assets, as determined by the ratio of NPL to TL, significantly affects banks' profitability; that is, the higher the NPL, the lower the profitability. This was demonstrated by the indicators of return on average assets (ROAA) and return on average equity (ROAE), which were positive until 2007–2009 and then started to seek reconciliation until it exceeded the pre-crisis level. This was done to demonstrate that the banking sector was always positive until the 2007 World Finance Meeting due to the effectiveness of Asian banks in controlling NPL at that time.

A study of 16 Tanzanian commercial banks was carried out between 2007 and 2015 by Kingu et al. (2018). The dependent variable ROA and the independent variable NPL are the variables under examination. Nonetheless, the analysis discovered a negative correlation between Tanzanian commercial banks' profitability and the incidence of NPL. The findings indicate that NPLs have a negative effect on ROA; hence, the profitability of commercial banks is gradually impacted when low-performing NPLs are not managed over an extended period (Kaaya & Pastory, 2013). It gradually lessens the banking industry's potential to contribute to economic growth (Karim et al., 2010).

To ascertain whether NPL had a positive or negative effect on the ROA of the banks, Psaila et al. (2019) examined the effects of NPL on 35 banks listed in the Euro-Mediterranean region between 2013 and 2017. Descriptive statistics and four regression models — the Arellano-Bond (AB), fixed effects (FE), random effects (RE), and pooled ordinary least squares (POLS) regression model — were employed. The findings showed that NPL has a negative effect on ROA, which implies that problematic loans have a negative influence on the profitability of commercial banks in the Euro-Mediterranean region that are included in all models. As a consequence, it was determined that the null hypothesis, which held that performing loans had no noticeable effect on the profitability of commercial banks listed in the Euro-Mediterranean region, was rejected.

Similarly, Ali and Dhiman (2019) explored the relationship between banks' financial performance and credit risk management. They also learned about the statistical influence of credit risk management indicators on the profitability of commercial banks in the public sector between 2010 and 2017. The factors that were identified as independent variables were liquidity (L), earnings (E), asset quality ratio (AQ), and NPLR, which served as a proxy for asset quality. Conversely, ROA is used as a dependent variable to quantify the profitability of banks. The study's findings demonstrated that some Indian public sector banks' financial performance is significantly impacted by credit risk management metrics. The empirical results showed that profitability, or ROA, has a negative relationship with AQ but a positive relationship with earnings.

Nonetheless, using data from nine commercial banks over the 2008–2016 period, Sanathanee (2020) tried to calculate the effect of asset quality determinants on the profitability of commercial banks in Sri Lanka. The variables ROA, ROE, and NPA were used to calculate bank profitability. The results of this study showed that, at a statistically insignificant level, the asset quality determinants have a detrimental effect on the bank's profitability.

Tangngisalu et al. (2020) used independent and dependent variables to examine the impact of NPL on ROA for ten traditional banks listed on the Indonesia Stock Exchange. NPL are the dependent variable, and ROA is the independent variable. The sample interval period used in this study is 2015–2019. The study's findings show that NPL significantly lowered the ROA. Nonetheless, while the decline in NPL affects assets, the typical NPL will maintain financial stability. The decrease in NPL will be managed if a balance is established in the variables' levels or amounts.

Additionally, a study conducted by Hamdillah et al. (2021) examined the impact of asset quality and financial performance on NPLs in Indonesian rural banks via 320 rural banks located throughout Indonesia between 2015 and 2019. They use variables to calculate the profitability of Indonesian banks. The ratio of operating expenses to operating income, or operating expenses to operating income (BOPO), is used to assess the effectiveness and capacity of rural banks in carrying out their operational activities. ROA measures the ability of management to obtain overall profits by dividing profit before tax by the average total assets; NPL is another metric. In light of this research, there is a negative effect of profitability on NPL.

Furthermore, Wu et al. (2022) gathered information on 29 banks between 2010 and 2020 to evaluate the impact of loan growth on banking risk in Vietnam. Data findings indicated a connection between bank risk and loan growth. Wherein the risk of liquidity and NPL are negatively impacted by loan growth. On the other hand, loan expansion boosts profitability (ROA). Furthermore, a comparison analysis based on bank size and loan growth rate is carried out by the study. Greater ROA denotes greater profitability and decreased bank risk, whereas higher NPL signifies higher risk for banks. Put another way, there is an inverse link between NPL and ROA; that is, as NPL increased, profitability (ROA) declined. Consequently, a key metric for banks to assess success is the rise in ROA.

Owusu and Alhassan (2021). Although their study focused on asset-liability management, it indirectly highlights the importance of asset quality for bank profitability. Proper management of assets and liabilities contributes to overall cost efficiency, which directly affects profitability. Furthermore, Rastogi et al. (2022), claimed that a systematic literature review investigated the relationship between bank regulation, performance, and risk. It identified key variables such as concentration banking, market power, large banks, and competition that significantly affect banks' financial stability, profitability, and risk. The study emphasized the importance of effective asset quality management in maintaining financial stability. However, it also highlighted the need for further exploration of ownership structure's impact on bank performance.

Besides, Yuan et al. (2022) explored factors influencing bank profitability using panel data. It identified liquidity, asset management quality, and capital adequacy as significant determinants. They concluded that effective asset quality management positively impacts profitability by minimizing NPL and ensuring efficient utilization of assets. Additionally, Velliscig et al. (2023) emphasized in their research that is based on a sample of 63 listed European banks and examined the relationship between capital, asset quality (including provisioning and coverage policies), and bank risk and performance during the period of first quartile 2005 to four quartile of 2018, that the critical role of asset quality in enhancing bank resilience and overall performance. Proper provisioning practices and robust asset quality contribute to long-term stability.

In summary, recent literature consistently underscores the positive association between prudent asset quality management and sustained bank profitability. Researchers continue to explore this critical relationship, emphasizing the need for effective risk mitigation strategies and regulatory compliance.

Based on the review of existing literature, the following hypotheses can be formulated:

*$H_0$: There is no significant effect of asset quality management on the profitability of the banks.*

*$H1_0$: There is no significant effect of the NPL on the ROE of the banks.*

*H1 (alternative hypothesis): There is a significant effect of the NPL on the ROE of the banks.*

*$H2_0$: There is no significant effect of the total impairment charges on total operating income on the ROE of the banks.*

*H2 (alternative hypothesis): There is a significant effect of the total impairment charges on total operating income on the ROE of the banks.*

*$H3_0$: There is no significant effect of the total impairment charges to gross total loans on the ROE of the banks.*

*H3 (alternative hypothesis): There is a significant effect of the total impairment charges to gross TL on the ROE of the banks.*

*$H4_0$: There is no significant effect of the NPL on the ROA of the banks.*

*H4 (alternative hypothesis): There is a significant effect of the NPL on the ROA of the banks.*

*$H5_0$: There is no significant effect of the total impairment charges on total operating income on the ROA of the banks.*

*H5 (alternative hypothesis): There is a significant effect of the total impairment charges on total operating income on the ROA of the banks.*

*$H6_0$: There is no significant effect of the total impairment charges to gross total loans on the ROA of the banks.*

*H6 (alternative hypothesis): There is a significant effect of the total impairment charges to gross total loans on the ROA of the banks.*

## 3. RESEARCH METHODOLOGY

This chapter deals with the analysis and testing of the hypotheses of the study, where the researcher presented the results of the statistical analysis using the statistical software EViews v. 10, and also the Excel program was used to know the results of the equations for each variable, where the researcher studied: the impact of asset quality management on the profitability of the banks during the period from 2017 to 2021, based on annual data.

Dependent variables include *ROE* — a measure of how efficiently a bank utilizes its equity capital to generate profits; and *ROA* — reflects the bank's ability to generate earnings from its total assets.

Asset quality metrics:

- NPLs — represent loans that are in default or close to default; high NPL ratios indicate deteriorating asset quality;
- total impairment charges to total operating income — a ratio that highlights the impact of provisioning for impaired assets on overall income;
- total impairment charges to gross TL — Indicates the extent of loan losses due to asset quality issues.

To test the hypotheses, the following statistical methods will be used:

- Sectional time series data (panel data): It is divided into three main models: 1) pooled regression model; 2) fixed effects model; and 3) random effects model.
- Hausman test: It is used in the case of a significant difference between fixed and random effects, as it is the extent to which the individual effect is associated with the independent variables.

### 3.1. The descriptive statistics

Descriptive statistics provide concise summaries of large datasets. They allow us to grasp essential features without drowning in raw numbers. Metrics like mean, median, and mode help us understand central tendencies, while measures of variability (such as range, variance, and standard deviation) reveal data spread. The following are the descriptive statistics for the independent variable.

### 3.2. Independent variables (Asset quality management, *X*)

#### *3.2.1. Non-performing loans (X1)*

The following table presents the descriptive statistics of asset quality management.

**Table 1**. The non-performing loans (*X1*)

| *Indicator* | *X1* |
|---|---|
| Mean | 4.429000 |
| Median | 3.985000 |
| Maximum | 16.70000 |
| Minimum | 1.040000 |
| Std. dev. | 3.166929 |
| Skewness | 2.043231 |
| Kurtosis | 7.396648 |
| Jarque-Bera test | 75.06185 |
| Probability | 0.000000 |
| Observations | 50 |
| Cross sections | 10 |

*Source: Authors' elaboration using EViews v. 10.*

Between 2017 and 2021, the average number of *NPLs* was 4.429000, with a median of 3.985000. The highest figure recorded during this time was 16.70000, while the lowest value was 1.040000, with a standard deviation of 3.166929. The standard deviation expresses how much a value deviates or varies from its means. When the standard deviation is positive 2.043231, it indicates that the frequency distribution curve is skewed to the right, with a kurtosis coefficient of 7.396648. This helps determine whether the values are distributed widely or concentrated around the mean. As the value of the Jarque-Bera test: the probability is 0.000000 is less than 5%, therefore the variable does not follow the normal distribution, observations (50), cross sections (10) (that is, the number of banks is 10 banks).

#### *3.2.2. Total impairment charges to total operating income (X2)*

The descriptive statistics of total impairment charges to total operating income are displayed in the following table.

**Table 2.** The non-performing loans (*X2*)

| *Indicator* | *X2* |
|---|---|
| Mean | 10.27700 |
| Median | 8.455000 |
| Maximum | 50.05000 |
| Minimum | -3.720000 |
| Std. dev. | 8.910454 |
| Skewness | 1.953741 |
| Kurtosis | 9.344735 |
| Jarque-Bera test | 115.6752 |
| Probability | 0.000000 |
| Observations | 50 |
| Cross sections | 10 |

*Source: Authors' elaboration using EViews v. 10.*

Over the period from 2017 to 2021, the average number of total impairment charges to total operating income was 10.27700, with a median of 8.455000. The highest value recorded during that

time was 50.05000, and the lowest was -3.720000, with a standard deviation of 8.910454. The standard deviation can be employed as a tool to gauge the dispersion of the values (helping to determine whether they are concentrated around the mean), and the positive skew coefficient 1.953741 suggests that the frequency distribution curve is skewed to the right, with a 9.344735 kurtosis coefficient.

#### *3.2.3. Total impairment charges to gross total loans (X3)*

The following table shows the descriptive statistics of total impairment changes to gross *TL*.

**Table 3.** The non-performing loans (*X3*)

| *Indicator* | *X3* |
|---|---|
| Mean | 1.086480 |
| Median | 0.790000 |
| Maximum | 9.320000 |
| Minimum | -0.530000 |
| Std. dev. | 1.411624 |
| Skewness | 4.168944 |
| Kurtosis | 24.52342 |
| Jarque-Bera test | 1109.954 |
| Probability | 0.000000 |
| Observations | 50 |
| Cross sections | 10 |

*Source: Authors' elaboration using EViews v. 10.*

Between 2017 and 2021, the total impairment charges to gross *TL* averaged (1.086480) with a median of 0.790000. The highest and lowest values during that time were 9.320000 and -0.530000, respectively, with a standard deviation of 1.411624. The skew coefficient is positive 4.168944, indicating that the frequency distribution curve is skewed to the right with a kurtosis coefficient of 24.52342. The standard deviation can be used as an indicator to determine how spread out the values, which will help to identify whether they are concentrated around the mean).

### 3.3. Dependent variables (Profitability of the banks, *Y*)

#### *3.3.1. Return on equity (Y1)*

The descriptive analysis of the dependent variable measuring a bank's profitability is presented below.

**Table 4.** Return on equity (*Y1*)

| *Indicator* | *Y1* |
|---|---|
| Mean | 17.87880 |
| Median | 17.64500 |
| Maximum | 36.24000 |
| Minimum | 3.930000 |
| Std. dev. | 7.490415 |
| Skewness | 0.190270 |
| Kurtosis | 2.404489 |
| Jarque-Bera test | 1.040507 |
| Probability | 0.594370 |
| Observations | 50 |
| Cross sections | 10 |

*Source: Authors' elaboration using EViews v. 10.*

As can be seen, the average *ROE* for the years 2017 to 2021 is 17.87880, with a median of 17.64500. The highest and lowest values during that time were 36.24000 and 3.930000, respectively, with a standard deviation of 7.490415. When the standard deviation is positive (0.190270), it suggests that the frequency distribution curve is skewed to the right with a kurtosis coefficient of 2.404489. This helps determine whether the values are distributed widely or concentrated around the mean. The variable does follow the normal distribution, according to observations (50) and cross sections (10), since the Jarque-Bera test value, the probability is 0.594370, is greater than 5% (that is, the number of banks is 10 banks).

#### *3.3.1. Return on assets (Y2)*

The second measure of a bank's profitability is being measured by *ROA*, and the following table depicts the descriptive analysis.

**Table 5.** Return on assets (*Y2*)

| *Indicator* | *Y2* |
|---|---|
| Mean | 1.517246 |
| Median | 1.520000 |
| Maximum | 3.580000 |
| Minimum | 0.017900 |
| Std. dev. | 1.004568 |
| Skewness | 0.213534 |
| Kurtosis | 1.893045 |
| Jarque-Bera test | 2.932784 |
| Probability | 0.230757 |
| Observations | 50 |
| Cross sections | 10 |

*Source: Authors' elaboration using EViews v. 10.*

The *ROA* for the period spanning from 2017 to 2021 is 1.517246 on average, with a median of 1.520000. The greatest value recorded during this time was 3.580000, while the lowest value was 0.017900, with a standard deviation of 1.004568. When the standard deviation is positive 0.213534, it means that the frequency distribution curve is skewed to the right, with a kurtosis coefficient of 1.893045. This helps determine whether the values are distributed widely or concentrated around the mean. Given that the Jarque-Bera test value of probability is 0.230757 which is greater than 5%, it may be concluded that the variable exhibits a normal distribution, with 50 observations and 10 cross-sections.

## 4. RESULTS AND DISCUSSION

### 4.1. Hypotheses test

Hypotheses testing evaluates the plausibility of our hypotheses and aids in the conclusion-making process based on sample data. After which, it is determined whether there is sufficient evidence to reject the null hypothesis ($H_0$) in favour of the alternative hypothesis based on the test results.

#### *4.1.1. Hypothesis H1*

The following Table 6 shows the result of *NPL* on the *ROE*.

**Table 6.** Correlated random effects — Hausman test (*H1*)

| *Test summary* | *Chi-square statistic* | *Chi-square df* |
|---|---|---|
| *Pool: X1* | | |
| Cross-section random | 0.014056 | 1 |

*Source: Authors' elaboration using EViews v. 10.*

The calculated value (Chi-square statistic) of 0.014056 is less than the tabular value (Chi-square df) 1, which indicates the use of a random effects model.

Based on our analysis, the random effect model is the best model to be used in this study. random effects models offer efficiency and flexibility, allowing us to account for unobserved variability and individual-specific effects in our analysis. The regression equation is presented below.

**Table 7.** Random effects model (*H1*)

| *Independent variables* | *Coefficients* | *F-test* | $R^2$ |
|---|---|---|---|
| *C* | 20.21412 | 9.794762 (0.000000) | 0.715220 |
| *01-C* | 5.651054 | | |
| *02-C* | -1.013015 | | |
| *03-C* | -4.192052 | | |
| *04-C* | 5.699239 | | |
| *05-C* | 7.972561 | | |
| *06-C* | 1.212710 | | |
| *07-C* | -8.880028 | | |
| *08-C* | 6.418558 | | |
| *09-C* | -4.342242 | | |
| *10-C* | -8.526786 | | |

*Source: Authors' elaboration using EViews v. 10.*

$$Y = 20.21412 + 5.651054X1 + (-1.013015X2) + (-4.192052X3) + 5.699239X4 + 7.972561X5 + 1.212710X6 + (-8.880028X7) + 6.418558X8 + (-4.342242X9) + (-8.526786X10) \quad (1)$$

In this model, the independent variables (*NPL*) account for nearly 71.5% of the variance in the dependent variable (*ROE*), according to the explanatory power of the model or the coefficient of determination (R-squared = 0.715220).

The F-test findings show that the level of significance = 0.000000 is less than the 0.05 level of significance, indicating that the independent variable's effect on the dependent variable is significant.

According to the previously mentioned results, the researchers accept the alternative hypothesis *H1*.

### *4.1.2. Hypothesis H2*

The following table shows the result of the total impairment charges on total operating income on the *ROE* of the banks.

It is clear that the calculated value of 0.194863 is less than the tabular value of 1, which indicates the use of a random effects model.

The regression equation is presented further.

**Table 8.** Correlated random effects — Hausman test (*H2*)

| *Test summary* | *Chi-square statistic* | *Chi-square df* |
|---|---|---|
| *Pool: X2* | | |
| Cross-section random | 0.194863 | 1 |

*Source: Authors' elaboration using EViews v. 10.*

**Table 9.** Random effects model (*H2*)

| *Independent variables* | *Coefficients* | *F-test* | $R^2$ |
|---|---|---|---|
| *C* | 18.76191 | 9.037005 (0.000000) | 0.698539 |
| *01-C* | 7.107869 | | |
| *02-C* | -0.170215 | | |
| *03-C* | -4.166970 | | |
| *04-C* | 4.347660 | | |
| *05-C* | 8.462932 | | |
| *06-C* | 0.560755 | | |
| *07-C* | -8.214137 | | |
| *08-C* | 6.999402 | | |
| *09-C* | -7.476724 | | |
| *10-C* | -7.450571 | | |

*Source: Authors' elaboration using EViews v. 10.*

$$Y = 18.76191 + 7.107869X1 + (-0.170215X2) + (-4.166970X3) + 4.347660X4 + 8.462932X5 + 0.560755X6 + (-8.214137X7) + 6.999402X8 + (-7.476724X9) + (-7.450571X10) \quad (2)$$

The model's explanatory power, or the coefficient of determination (R-squared = 0.698539), indicates how nearly 69.8% of the variance in the dependent variable (*ROE*) can be explained by the independent variables (total impairment charges to total operating income) included in the model.

Because the level of significance (0.000000) is less than the significance threshold (0.05), the F-test results demonstrate that there is a meaningful link between the independent and dependent variables.

The researchers accept the alternative hypothesis *H2* based on the previously given results.

### *4.1.3. Hypothesis H3*

The following table shows the result of the total impairment charges on gross *TL* on the *ROE* of the banks.

The calculated value of 0.280975 is less than the tabular value of 1, which indicates the use of a random effects model. The regression equation is presented below.

**Table 10.** Correlated random effects — Hausman test (*H3*)

| *Test summary* | *Chi-square statistic* | *Chi-square df* |
|---|---|---|
| *Pool: X3* | | |
| Cross-section random | 0.280975 | 1 |

*Source: Authors' elaboration using EViews v. 10.*

**Table 11.** Random effects model (*H3*)

| *Independent variables* | *Coefficients* | *F-test* | $R^2$ |
|---|---|---|---|
| *C* | 18.48364 | 9.075298 (0.000000) | 0.699429 |
| *01-C* | 6.994348 | | |
| *02-C* | -0.240860 | | |
| *03-C* | -3.941398 | | |
| *04-C* | 3.808644 | | |
| *05-C* | 8.362706 | | |
| *06-C* | 0.785325 | | |
| *07-C* | -8.223232 | | |
| *08-C* | 6.908314 | | |
| *09-C* | -7.168860 | | |
| *10-C* | -7.284987 | | |

$$Y = 18.48364 + 6.994348X1 + (-0.240860X2) + (-3.941398X3) + 3.808644X4 + 8.362706X5 + 0.785325X6 + (-8.223232X7) + 6.908314X8 + (-7.168860X9) + (-7.284987X10) \quad (3)$$

The model's explanatory power, or the coefficient of determination (R-squared = 0.699429), indicates how nearly 69.9% of the variance in the dependent variable (*ROE*) can be explained by the independent variables (total impairment charges to gross *TL*) included in the model.

The F-test findings show that the level of significance = 0.000000 is less than 0.05, indicating that the independent variable's effect on the dependent variable is significant.

Based on the aforementioned findings, the researchers accept the alternative hypothesis *H3*.

### *4.1.4. Hypothesis H4*

The following table shows the result of the effect of the *NPL* on the *ROA* of the banks.

It is clear that the calculated value of 0.000042 is less than the tabular value of 1, which indicates the use of a random effects model. The regression equation is presented below.

**Table 12.** Correlated random effects — Hausman test (*H4*)

| *Test summary* | *Chi-square statistic* | *Chi-square df* |
|---|---|---|
| *Pool: X1* | | |
| Cross-section random | 0.000042 | 1 |

*Source: Authors' elaboration using EViews v. 10.*

**Table 13.** Random effects model (*H4*)

| *Independent variables* | *Coefficients* | *F-test* | $R^2$ |
|---|---|---|---|
| *C* | 1.798803 | 34.35575 (0.000000) | 0.898055 |
| *01-C* | -1.122522 | | |
| *02-C* | -0.865396 | | |
| *03-C* | 1.215298 | | |
| *04-C* | 0.185747 | | |
| *05-C* | -0.106542 | | |
| *06-C* | 1.448099 | | |
| *07-C* | 0.958849 | | |
| *08-C* | -0.689507 | | |
| *09-C* | -1.194030 | | |
| *10-C* | 0.170005 | | |

*Source: Authors' elaboration using EViews v. 10.*

$$Y = 1.798803 + (-1.122522X1) + (-0.865396X2) + 1.215298X3 + 0.185747X4 + (-0.106542X5) + 1.448099X6 + 0.958849X7 + (-0.689507X8) + (-1.194030X9) + 0.170005X10 \quad (4)$$

The coefficient of determination (R-squared is 0.898055), which measures the explanatory power of the model, indicates that the independent variables (*NPL*) in the model account for nearly (89.8%) of the variance in the dependent variable (*ROA*).

The F-test findings show that the level of significance is less than 0.05, indicating that the independent variable's effect on the dependent variable is significant.

The researchers accept the alternative hypothesis *H4* based on the previously given results.

### *4.1.5. Hypothesis H5*

The following table shows the result of the effect of the total impairment charges on total operating income on the *ROA* of the banks.

The calculated value of 0.483977 is less than the tabular value of 1, which indicates the use of a random effects model. The regression equation is presented below.

**Table 14.** Correlated random effects — Hausman test (*H5*)

| *Test summary* | *Chi-square statistic* | *Chi-square df* |
|---|---|---|
| *Pool: X2* | | |
| Cross-section random | 0.483977 | 1 |

*Source: Authors' elaboration using EViews v. 10.*

**Table 15.** Random effects model (*H5*)

| *Independent variables* | *Coefficients* | *F-test* | $R^2$ |
|---|---|---|---|
| *C* | 1.685880 | 32.66176 (0.000000) | 0.893331 |
| *01-C* | -0.951339 | | |
| *02-C* | -0.789788 | | |
| *03-C* | 1.236752 | | |
| *04-C* | 0.050842 | | |
| *05-C* | -0.025337 | | |
| *06-C* | 1.329061 | | |
| *07-C* | 1.026509 | | |
| *08-C* | -0.611439 | | |
| *09-C* | -1.616983 | | |
| *10-C* | 0.351722 | | |

*Source: Authors' elaboration using EViews v. 10.*

$$Y = 1.685880 + (-0.951339X1) + (-0.789788X2) + 1.236752X3 + 0.050842X4 + (-0.025337X5) + 1.329061X6 + 1.026509X7 + (-0.611439X8) + (-1.616983X9) + 0.351722X10 \quad (5)$$

The coefficient of determination (R-squared = 0.893331), which measures the explanatory power of the model, indicates that the independent variables in the model (total impairment charges to total operating income) account for nearly 89.3% of the variance in the dependent variable (*ROA*).

The F-test findings show that the significance level is also less than 0.05, indicating that the independent variable's effect on the dependent variable is significant.

Taking into account the previously reported data, the researchers accept the alternative hypothesis *H5*.

### *4.1.6. Hypothesis H6*

The following table shows the result of the effect of the total impairment charges to gross *TL* on the *ROA* of the banks.

The calculated value of 0.792775 is less than the tabular value of 1, which indicates the use of a random effects model. The regression equation is presented below.

**Table 16.** Correlated random effects — Hausman test (*H6*)

| *Test summary* | *Chi-square statistic* | *Chi-square df* |
|---|---|---|
| *Pool: X3* | | |
| Cross-section random | 0.792775 | 1 |

*Source: Authors' elaboration using EViews v. 10.*

**Table 17.** Random effects model (*H6*)

| *Independent variables* | *Coefficients* | *F-test* | $R^2$ |
|---|---|---|---|
| *C* | 1.564268 | 29.00636 (0.000000) | 0.881482 |
| *01-C* | -0.952995 | | |
| *02-C* | -0.753457 | | |
| *03-C* | 1.224646 | | |
| *04-C* | -0.036173 | | |
| *05-C* | -0.068648 | | |
| *06-C* | 1.411554 | | |
| *07-C* | 1.046105 | | |
| *08-C* | -0.631449 | | |
| *09-C* | -1.520601 | | |
| *10-C* | 0.281019 | | |

*Source: Authors' elaboration using EViews v. 10.*

$$Y = 1.564268 + (-0.952995X1) + (-0.753457X2) + 1.224646X3 + (-0.036173X4) + (-0.068648X5) + 1.411554X6 + 1.046105X7 + (-0.631449X8) + (-1.520601X9) + 0.281019X10 \quad (6)$$

The explanatory power of the model, as indicated by the coefficient of determination (R-squared = 0.881482), indicates that the variance in the dependent variable (*ROA*) can be almost entirely explained by the independent variables in the model (total impairment charges to gross *TL*).

Because the level of significance = 0.000000 is smaller than the (0.05 level of significance), the F-test findings indicate that the independent variable's effect on the dependent variable is significant.

Taking into account the previously reported data, the researchers accept the alternative hypothesis *H6*.

## 4.2. Discussion

Therefore, we can conclude that there is a significant effect of asset quality management on the profitability of the banks. According to our data, bank profitability and efficient asset quality management are strongly positively correlated. Banks that actively monitor the quality of their assets typically perform better financially. More specifically, enhanced bank stability and resilience are associated with increased provisioning for defective assets (as indicated by the impairment charges ratios). However, excessively conservative provisioning policies may negatively impact bank performance, suggesting a delicate balance between risk mitigation and profitability. The aftermath of the global financial crisis highlighted the importance of asset quality. European and consequently Egyptian banks faced a surge in NPLs, prompting regulatory reforms. While the NPL issue has been addressed to some extent, ongoing vigilance in asset quality management remains crucial for sustained profitability. In summary, prudent asset quality management contributes significantly to a bank's bottom line, emphasizing the need for continuous monitoring, effective provisioning, and risk-aware decision-making.

There are some alternative methods to conduct the methodology like the U-shaped test which can be used to investigate whether the relationship between asset quality and profitability is linear or nonlinear. Furthermore, quantile regression can also be utilized to provide more insight into how profitability affects NPL across different quantiles. Moreover, the dynamic panel generalized method of moments can also be used to examine the nonlinear effect of profitability on NPL.

The results of this paper are compatible with the previous studies done by Abdul Aziz et al. (2009), where in their paper they focused on the relationship between profitability including ROA and ROE against NPL, and the outcome of their research indicated that there is a significant impact of NPLs on profitability. Moreover, the paper by Abata (2014), where they found that there is a strong relationship between the dependent variable ROA and the independent variable NPL supports our results. Furthermore, Lucky and Nwosi (2015), Cheruiyot (2016), Islam et al. (2017), Isanzu (2017) agreed with our outcome. On the other hand, other papers done by Kingu et al. (2018), and Psaila et al. (2019) found that there is a negative relationship between the quality of assets and the profitability of banks, which is represented in any increase in total NPL, where it is noticed that problematic loans negatively affect the profitability of commercial banks, which can effectively decrease the level of NPLs and increase the level of ROA simultaneously, yet this also favours our research outcome.

## 5. CONCLUSION

Along with its impacts on bank profitability, as seen by the financial crises of 2008 and 1997, the asset quality of banks has a substantial impact on the nation's financial system and the national economy. Thus, using yearly data from 10 banks, this study sought to investigate the effect of asset quality management on bank profitability between 2017 and 2021. The variables were split into three categories: total impairment charges to total operating income, total impairment charges to TL, and independent variable (asset quality), which is determined by NPL. Although profitability, the dependent variable, is determined by ROE and ROA, The extent to which *X* influences *Y*, measured by $R^2$ was as follows: the impact of *NPL* on *ROE* (71.5%), the effect of total impairment charges to total operating income on *ROE* (69.8%), the effect of the total impairment charges to gross *TL* on *ROE* (69.9%), the impact of *NPL* on *ROA* (89.8%), the impact of the total impairment charges to total operating income on the *ROA* (89.3%), and the impact of the total impairment charges to gross *TL* on the *ROA* (88.1%) are all demonstrated to be significantly correlated. It is recommended that by limiting their reliance on interest income, banks should diversify their sources of revenue. Moreover, in the face of incomplete information, management should decide on liquidity, revenue-generating avenues, and operational efficiency while balancing risk and reward. Furthermore, improving loan

recovery processes: properties, structures, and bank deposits that are gathered as collateral against loans should be routinely examined to determine whether they have adequate value or a sound legal foundation to avoid delays when selling them for recovery. In addition to, well-organized and consistent observation: the bank needs to periodically keep an eye on and arrange its outstanding loans regular visits, and reporting from officials to guarantee that monies are used properly. Employee training and incentive programs, where the workers should receive training and incentives.

Understanding the relationship between asset quality and bank performance is critical for policymakers. It guides regulatory decisions, risk management practices, and responses to financial crises. Future research may build on these findings and suggest effective policy measures to maintain a healthy banking system. Banks can use the findings to improve their risk management practices. By identifying key asset quality factors, you can proactively reduce risk and improve overall performance. Future research may focus on specific risk mitigation techniques or explore new approaches. Additionally, investors rely on banks' performance metrics to make informed decisions. Understanding how asset quality affects profitability and stability can help you make investment choices. Future research could investigate investor behaviour and preferences based on asset quality indicators. On the other hand, a strong banking sector contributes to overall financial stability. Research in this area can help maintain system resilience during economic downturns. Future research could investigate the impact of asset quality on systemic risk and contagion. Finally, researchers can compare results obtained in different countries, regions, or periods. This comparative approach can highlight differences in the determinants of asset quality and performance.

The beneficial nexus between asset quality management and bank profitability. Effective asset quality management is a cornerstone of sound banking practices, significantly influencing a bank's profitability. In this study, we explored the intricate relationship between asset quality and financial performance. Our findings underscore several key points.

Firstly, prudent asset quality management directly impacts key profitability metrics. ROE, which measures how efficiently a bank utilizes its equity capital to generate profits, benefits from reduced NPLs. As NPLs decrease, banks allocate fewer resources to provisioning, leading to higher net income and improved ROE. Similarly, ROA, reflecting the efficiency of asset utilization in generating profits, improves when asset quality is enhanced. Secondly, market perception and investor confidence play a pivotal role. Banks with robust asset quality profiles are viewed favourably by investors and stakeholders. A strong asset quality signals prudent risk management, attracting capital inflows and bolstering profitability. Positive market sentiment further reinforces this relationship. Thirdly, regulatory compliance and capital adequacy are intertwined with asset quality. Regulatory bodies emphasize asset quality as a critical component of financial stability. Banks adhering to asset quality norms maintain higher capital adequacy ratios. Well-capitalized banks can deploy resources efficiently, leading to sustained profitability.

However, challenges exist. Striking the right balance between risk mitigation and profit maximization is essential. Overly conservative provisioning policies may erode profitability. Therefore, dynamic asset quality management strategies that adapt to changing economic conditions are crucial.

In conclusion, the symbiotic relationship between asset quality management and bank profitability underscores the need for continuous vigilance, adaptive strategies, and alignment with regulatory guidelines. Banks that prioritize asset quality reap sustainable financial rewards, benefiting both shareholders and the broader economy.

This study sample size is ten banks which may not fully represent the entire banking industry in terms of size, business models, or geographic diversity. The chosen time horizon (2017–2021) captures recent trends but may miss longer-term patterns. Economic cycles and regulatory changes during this period could impact asset quality and performance differently. Moreover, macroeconomic conditions (interest rates, gross domestic product growth) and regulatory shifts influence banks' performance. These external factors are not within the scope of our project. Our selection of performance metrics (ROA, net interest margin) and asset quality indicators (e.g., NPLR) shapes our conclusions. Alternative metrics may yield different insights. Individual bank characteristics (management quality, risk appetite) impact results. Controlling for these factors or conducting bank-specific analyses would enhance depth. Finally, banking is multifaceted, with unique challenges (regulatory compliance, and credit risk management). Recognizing these complexities is essential.

Investigating the impact of asset quality management on bank profitability remains a critical area for future research because of the following reasons. Firstly, gaining insight into how asset quality management affects profitability is crucial as the banking sector adjusts to economic, regulatory, and technological developments. Future studies can examine the interactions between asset quality procedures and new trends (such as digital banking, fintech collaborations, and shifting consumer behaviour). Moreover, the risk environment is always changing. Existing hazards change, and new ones appear. Scholars have the potential to investigate how asset quality management strategies adapt to changing risks (such as cyber threats, risks associated with climate change, and geopolitical instability) and how these adaptations affect profitability.

Additionally, subsequent research endeavours may yield advanced quantitative models that prognosticate the impacts of asset quality management choices on profitability. Researchers can determine the best criteria for NPLs, provisioning, and other asset quality key performance indicators by utilising predictive analytics.

Furthermore, it's crucial to comprehend the behavioural facets of asset quality management. What impact do the judgements, risk appetite, and prejudices of bank executives have on asset quality practices? Finally, in regards to, behavioural economics can be studied in relation to asset quality management. Studies that compare various banking systems (such as developed and emerging nations) might shed light on how successful asset quality procedures are.

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