The role of retail bank loans on the relationship between financial inclusion and financial safety for Egyptian banking system

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Journal of Business Research

Faculty of Commerce -Zagazig University

Volume 46 - Issue 2 April 2024

link: https://zcom.journals.ekb.eg/

Abstract:

The aim of this study is to examine the effect of retail loans as a control variable on the relationship between financial inclusion and financial safety., The financial inclusion variables are: (number of branches (NB), number of automated teller machines (ATMs), number of borrowers (NBS), number of points of sale (POS), and deposit size (DZ)). The financial safety indicators variables are: (capital adequacy, liquidity, asset quality, and profitability) in 13 Egyptian banks registered with the Central Bank of Egypt from 2014 to 2021. This is in both pre- and after-embedding of retail bank loans (RBL) as a control variable, with the goal of elucidating the control variable's effect on the relationship between financial inclusion and financial safety indicators. The results indicated that the control variable RBL has a significant effect on the relation between financial inclusion and financial safety indicators. Hence, this suggests a need for further expansion of retail bank loans (RBL).

Keywords: retail loans, financial inclusion, financial safety.

Introduction:

The banking system is one of the aspects of the financial system, and the strength of the financial system is primarily determined by the strength of the banking system, and the presence of a financial system is seen as one of the fundamental prerequisites for country growth. This necessitates a continuous effort to achieve financial stability, as illustrated by measuring the relationship between retail loans and measures of financial safety and financial inclusion.

Due to financial safety is so important in the financial sector, financial institutions such as the International Monetary Fund and the World Bank have worked to develop appropriate indicators such as (capital adequacy index, asset quality, profitability, and liquidity) to measure the financial safety of the financial system in order to develop bank work. Financial safety is described as a combination of criteria that enable bank indicators to predict crises in advance.

Financial safety indicators (FSI) are indicators of financial health that play an important part in assessing financial stability. They are relatively recent economic data ratios from the International Monetary Fund's (IMF) monetary statistics, and they exhibit a group of effects to clarify the actions of financial organizations.

As for financial inclusion, the World Bank defines it in its report issued in 2014 under the title (Global Financial Development Report) as “the proportion of individuals or companies that use financial services.” Financial inclusion also indicates, according to the joint report of the Arab Monetary Fund and the Consultative Group to Assist the Poor issued in January 2017 under the title

“Financial Inclusion Measurement in the Arab World," that individual, including low-income earners, and companies, including the smallest, have good access to, at reasonable prices, a wide range of services. Official finance of high quality (payments, transfers, savings, credit, insurance, etc.).

The research indicates that the definition of retail bank loans is that they are consumer loans. As a result, the purpose of granting these loans is to protect consumers, and it is called “fractionation” because it divides the risks. Instead of lending to the client or company, the same amount can be loaned to a large number of clients. Dinc and Yusuf (2017) explained that retail loans became an important tool for banking in the 1960s. The key components of retail loans, such as mortgages and consumer loans, contribute significantly to banks' risk management, as does having a regular cash flow in banks. These loans have a clear role in the profitability of banks. On the other hand, consumer loans are offered to customers with shorter maturity periods and at higher costs to banks. Ahamed and Mallick (2019) confirm that financial inclusion improves banking stability. But the criticism has been in financial terms, as financial inclusion may lead to banks being exposed to a riskier pool of borrowers, leading to increased transaction costs, and creating information asymmetry, which exposes banks to default. In turn, this can lead to increased provisioning and financing costs, weaker lending, and reduced profitability.

Research problem:

To be good, the banking sector's performance must be regularly examined using conventional norms and indicators that have become important in

indicating the sector's financial status. To avoid crises whose consequences could affect the entire economy.

According to the central bank and banking sector law of 194 for 2020[1], it might be inferred that all banks operating in Egypt – thirty-eight banks- are commercial banks which might be categorized according to its ownership structure to; public banks (owned and controlled by the government), and non-public banks (either privately owned and managed by natural or legal persons, or jointly owned and managed by the governments and persons). However, the law identified special activities of some banks in both categories which were called specialized banks defined as those licensed to conduct banking operations according to the law covenants. Dawood (2016) highlighted that specialized banks are those which were originally established to direct the financing of specific economic activities.

Moreover, according to El-Nasharty (2007), some Egyptian banks offer banking services and products with a differentiated marketing mix that are generally proposed to the public as Islamic banking services and products (in compliance with the Islamic shari'a), such as the Faisal Islamic Bank of Egypt. In addition, some conventional banks provide such differentiated services in specific branches (such as Abu Dhabi Commercial Bank). However, by reviewing their issued financial statements, it might be concluded that these services are of immaterial relevance to the total portfolio of assets and

[1]For more information, visit the CBE website, banking laws, Doi: https://www.cbe.org.eg/-/media/project/cbe/page-content/other-links/cbe-law-no,-d-,-194-of-2020.pdf, visited March 1st 2023.

liabilities since those statements are issued under the typical labeling of conventional banks [1].

As a result, the five specialized banks (Agricultural Bank of Egypt, Industrial Development Bank, Egyptian Arab Land Bank, Housing and Development, and Export Development Bank of Egypt) and four Islamic banks (Faisal Islamic Bank of Egypt, Abu Dhabi Islamic Bank, The United Bank, and alBaraka Bank) were excluded from the research sample. Arab Bank, Ahli United Bank, Altijariwafa, National Bank of Greece, Citibank, Mashreqbank, and First Abu Dhabi Bank were also omitted since their financial statements are consolidated and released in line with their foreign holding companies: Arab Bank, Ahli United Bank, Altijariwafa, National Bank of Greece, Citibank, Mashreqbank, and First Abu Dhabi Bank.

The researcher couldn't locate any published financial statements for Bank Audi, Abu Dhabi Commercial Bank, and Midbank, possibly due to their acquisitions by First Abu Dhabi Bank in 2021, Abu Dhabi Commercial Bank's acquisition of United National Bank operations in 2020, and Midbank's recurring ownership restructuring. Moreover, Arab Banking Corporation and Blom Bank of Egypt were excluded for a lack of published statements for the year 2021 since their merger agreement in January 2021. Thus, the research investigation covered the following 17 banks, which exhibited continuing operations from 2014–2021, despite some changing their names during the period or changing their ownership structure after 2021: National Bank of Egypt, Banque Misr, Banque de Caire, Emirates National Bank of Dubai, Commercial International Bank, Arab Investment Bank, Societe Arabe

Internationale de Banque, Suez Canal Bank, Egyptian Gulf Bank, Alex Bank, Credit Agricole, HSBC, Arab African International Bank, Al Ahli Bank of Kuwait, National Bank of Kuwait, Arab International Bank, and Qatar National Bank Alahli.

The approach for measuring the relationship between financial safety, financial inclusion, and retail loans is critical, with the goal of achieving the maximum return with the lowest risk.

Objectives of the study:

The study aims to achieve the following:

1- examine the effect of financial inclusion on financial safety.
2- examine the effect of retail loans as a control variable on the relationship between financial inclusion and financial safety.

Literature Review:

This study looked at various past studies that were related to the variables in the study. Some of them addressed the effect of financial safety, others the effect of financial inclusion, and still others the impact of retail loans, as follows:

financial safety:

1- Babihuga, (2007)

The paper finds that financial services institutions fluctuate strongly with both the business cycle and the inflation rate. Short-term interest rates and the real exchange rate have also been used as important determinants. There is heterogeneity in the relationship between macroeconomic indicators and

financial services institutions for 96 countries covering the period 1998–2005.

2- Ali, (2020)

The study aimed to analyze the effect of capital structure on liquidity risks in Sudanese banks. The descriptive analytical method was used to interpret and analyze the field study information using analytical statistics through (SPSS) The results of the study were as follows: The need for banks to find a balance between borrowing funds and ownership funds. Sudanese bank managements must adhere to the capital adequacy standards issued by the Basel Committee and the Islamic Financial Services Council in order to achieve banking safety.

3- Naouel, (2021)

This study aims to determine the status of the Jordan Islamic Bank. The results of the study concluded that the Jordan Islamic Bank has a good financial position, a great ability to reduce costs, and high flexibility in achieving profits.

4- Salman, Mohammed and Flayyih, (2021)

The research reviews the most important financial safety indicators applied by the Central Bank of Iraq. Capital adequacy ratios increased in the Iraqi banking system as a whole and in private banks. The research assumes that the application of financial safety indicators by Iraqi banks will have a positive impact on the performance of these banks, on their confidence, and on their exposure to banking crises.

financial inclusion:

1- Akhisar (2015).

In this study, we studied the effects of bank profitability performance through electronic banking services. The performance effects of return on assets and return on equity in the data, namely 23 electronic banking services in developed and developing countries over the period from 2005 to 2014, were analyzed through dynamic panel data methods. The results showed that the profitability of banks in developed and developing countries effected by the ratio of the number of branches to the number of ATMs is very large and electronic banking services are large.

2- Aliabadi., Gheysari., & Ahmadian. (2016)

In this study he analyzed the impact of different e-banking systems such as ATM, POS and return on assets (ROA) in India, during the period 2006-2014 using panel model**.** The results of the study showed that the cost of ATMs, points of sale, and return on assets for the selected banks have a positive and significant impact. There is a positive effect of increasing the number of ATMs and profitability, with no significant relationship between the number of branches and bank profitability.

3- Mostak, Hob, Mallickc, and Matousek, (2021)

This paper examines the ability of banking services to enhance performance at the bank level, through an international sample of 1,740 banks during the period 2004-2015. The result was a positive and significant relationship between financial inclusion and bank efficiency.

4- Olusegun, T. S., Evbuomwan, O., and Belonwu, M. C., (2021)

This paper empirically examined the relationship between financial inclusion and financial stability in Nigeria, using panel data for the period from the first quarter of 2014 to the fourth quarter of 2018. An index of financial inclusion was created to reflect penetration, availability, and use. The paper provided evidence that financial inclusion had a positive impact on financial stability.

5- Moaaz (2022)

Measuring the impact of financial inclusion on banking financial performance. during the period from 2011 to 2020. The results of the study showed that there is a significant positive impact of financial inclusion indicators (number of branches, number of debit cards, number of credit cards, number of ATMs, and banking density) on the dependent variable (profitability). However, there is a significant negative effect of financial inclusion indicators (in terms of number of debit cards, number of credit cards, number of ATMs, and number of points of sale) on liquidity as a dependent variable.

6- Khatib et al. (2022)

The study focused on some indicators of financial inclusion, such as the number of ATMs, the number of branches, points of sale, and the number of customer deposit and credit cards for small and medium-sized companies, using the rate of return on assets. The results were that the number of ATMs and the number of branches help improve the profitability of banks, but it was found that the point of sale has no effect on profitability.

7- Yunus, Abdulrafiu, Abdulmumin, Opefolu & Hanafi. (2023).

this study examines the impact of financial inclusion on bank performance in Nigeria. Specifically, how banking performance is affected by ATMs, the

branch network, the number of bank accounts, and the location of sales terminals. The study used all databases in Nigeria between 2014 and 2018 using pooled data based on least squares. The results of the study show that the effect of ATMs, banking location, towers, ATMs, and points of sale on returns in Nigeria was positive and significant at a rate of 0.05.

8- Abu Al-Qumsan and Jamil, (2023)

This study aims to identify the relationship between financial inclusion, banking sector liquidity, and banking sector solvency. The researchers relied on a sample of 10 countries: Egypt, Bolivia, Cameroon, Cambodia, Algeria, Germany, Denmark, Spain, France, and Italy. The results of the research were: First, increasing the number of ATMs has a positive impact on banks' liquidity. Second: The increase in the number of bank branches, credit cards, and debit cards negatively affects banks' liquidity. The financial solvency of banks is negatively affected by the increase in the number of bank branches. The results showed that ATMs and mobile phones had a significant impact on the profitability of deposit banks in Nigeria. However, point of sale (POS) has little impact on the profitability of deposit banks in Nigeria.

retail loans:

1- Bhengu and Naidoo, (2016)

In this study, researchers adapted the service quality model to the banking industry in South Africa. The findings of the pilot study revealed dissatisfaction with the quality-of-service offerings provided by retail banks in South Africa. By improving the service quality of retail banks in South Africa, investigating expectations as well as own perceptions will allow retail

branches to be creative in product differentiation and pricing strategies in order to remain competitive.

2-Dinc and Yusuf, (2017)

Within the scope of this study, the effects of retail loans on conventional banks and active participating banks in Turkey were studied. The study results show that retail loan types have strong negative effects on net interest margin (NIM), which was chosen as an indicator of profitability for traditional banks within the scope of the study. On the other hand, for participating banks, and unlike traditional banks, retail loan types have stronger and more positive effects on net profit share margin (NPSM).

3-Sree and Rajender, (2021)

This paper focuses on the trends, strategies implemented, challenges and opportunities faced by retail bankers and clients in India. In recent years, there has been tremendous development in the retail sector. Retail banks operate through rapid advances in information technology and are embedded in the financial market with supply and demand factors at the micro and macro levels. But the retail loan system changed the entire banking market by shifting from a seller's market to a buyer's market. There were plenty of opportunities to get a soft retail loan even as there were challenges facing India in emerging economies.

Both Akhisar (2015) and Cihak, Mari, and Melecky (2016) disagreed on the relationship between branch count and bank profitability.

According to Akhisar (2015), there is a positive association between them, however according to Cihak, Mari, and Melecky (2016), there is no

relationship, and there is a positive relationship between increasing the number of ATMs and profitability.

They were both in agreement. Financial inclusion indicators (number of branches, number of debit cards, number of credit cards, number of ATMs, and banking density) have a strong positive impact on the dependent variable (profitability), according to Akhisar (2015), Moazz (2022), and Khatib et al. (2022). According to Moazz (2022), financial inclusion indicators (in terms of the number of debit cards, credit cards, ATMs, and points of sale) have a strong negative effect on liquidity as a dependent variable. and the number of points of sale) on liquidity as a dependent variable. This largely verifies the current research idea that financial inclusion has a major impact on banking performance in terms of profitability and liquidity measures.

However, according to Khatib et al. (2022), the point of sale has little effect on profitability.

According to Abu Al-Qumsan and Jamil (2023), the study's findings were as follows: First, increasing the number of ATMs has a favorable impact on bank liquidity. Second, the increased number of bank branches, credit cards, and debit cards has a detrimental impact on bank liquidity. The increased number of bank branches has a detrimental impact on bank financial solvency.

He used the approach as a research tool. The findings revealed that ATMs and mobile phones had a substantial impact on the profitability of Nigerian deposit institutions. However, POS has little impact on the profitability of Nigerian deposit banks.

As a result, the goal of this study was to fill that gap by providing actual information from a developing country like Egypt. The purpose of this

study is to address that hole by exploring the relationship between financial safety and financial inclusion using retail loans as a control variable. The study intends to give a more complete picture by analyzing data from a long time period. Using panel regression analysis, examine the effect of financial inclusion on banking sector financial safety. This study explains in depth how financial inclusion affects a bank's financial safety and stability when retail loans are present. The research gap is that panel models were used to examine outcomes prior to and after the RBL was embedded as a control variable. There is also a difference between the statistical methods used in this study and some previous studies.

The researchers attempted to answer this research question in this study.

1- Is there an effect of financial inclusion on financial safety?
2- Does the impact of retail loans as a control variable affect how financial inclusion affects financial safety differently?

Study hypothesis:

Based on the study aim, the study formulated the following null hypotheses:

Main hypotheses

H_{0-1}There is no statistically significant effect of financial inclusion on the financial safety Indicators.

H_{0-2}There is no statistically significant difference in the effect of financial inclusion on the financial safety Indicators according to retail bank loans (RBL) as a control variable.

Sub hypothesis

H_{01-1}There is no statistically significant effect of financial inclusion on the financial safety Indicators (capital adequacy).

H_{02-1}There is no statistically significant difference in the effect of financial inclusion on financial safety indicators (capital adequacy) according to retail bank loans (RBL) as a control variable.

H_{01-2}There is no statistically significant effect of financial inclusion on the financial safety Indicators (liquidity).

H_{02-2}There is no statistically significant difference in the effect of financial inclusion on financial safety indicators (liquidity) according to retail bank loans (RBL) as a control variable.

H_{01-3}There is no statistically significant effect of financial inclusion on the financial safety Indicators (asset quality).

H_{02-3}There is no statistically significant difference in the effect of financial inclusion on the financial safety Indicators (asset quality) according to retail bank loans (RBL) as a control variable.

H_{01-4}There is no statistically significant effect of financial inclusion on the financial safety Indicators (Profitability).

H_{02-4}There is no statistically significant difference in the effect of financial inclusion on financial safety indicators (profitability) according to retail bank loans (RBL) as a control variable.

Define model variables:

Dependent variables (financial safety) and how to measure them:

1- Capital adequacy

The capital adequacy index is a measure of the financial strength of the bank, as capital is a means of protecting the bank from losses.

2- Asset quality indicators

The quality of assets is an important element in evaluating the financial grade of the bank. The main purpose of measuring asset quality is to determine the composition of non-performing assets as a percentage of total assets.

3- Liquidity

Liquidity is essential in credit to compensate for expected and unexpected fluctuations in the balance sheet and provide funds for growth.

4- Profitability indicators

Profitability indicators show the profitability of banks through the quality of management, shareholder behavior, competitive strategies, in addition to their ability to manage risks. The quality of earnings reflects current operating performance; It will be a good indicator of future operating performance.

Dependent variables (financial safety)

Table (1): Dependent variables (financial safety) and how to measure them.

Variables	How to measure
Capital Adequacy	1. Capital Base to Risk Weighted Assets = Total Capital Base /Risk weighted Assets. 2. Tier 1 Capital to Risk Weighted Assets = Tier one capital / Risk weighted Assets. 3. Financial Leverage = Total Debt / Total Equity
Asset Quality	1 . Nonperforming Loans to Total Loans = Total loans / Performing loans. 2. Loan Provisions to Nonperforming Loans = Provision for loan impairment / Nonperforming loans
Profitability	ROE = Net Income / Total Equity ROA = Net Income / Total Assets Net Interest Margin = Net Income / Total Revenues
Liquidity	Loans to Deposits = Total Loans / Total Deposits Deposits to Assets = Total Deposits / Total Assets Securities to Assets = Total Securities / Total Assets

Source: Prepared by the researcher

Independent variables (financial inclusion)

Table (2): Independent variables (financial inclusion)

Symbol	Independent variables
NB	Number of branches
ATMs	the number of automated teller machines (ATMs)
NBS	number of borrowers
POS	number of points of sales
DZ	deposit size

Source: Prepared by the researcher

Control variable:

Retail bank loans (RBL)

Research Methodology

Model specification

We examine the effect of financial inclusion on **financial safety in presence of Retail bank loans (RBL) as Control variable** by running several panel regressions that use the following baseline model:

$$\boldsymbol{financial\ safety_{it}= \beta_0 + \beta_1 Financial\ Inclusion_{it} + \beta_2 RBL_{it} + \varepsilon_{it}} \ (1)$$

Where the i and t subscripts indicate bank, and year, respectively.

Three approaches, among others, can be used to estimate the regression model using panel data analysis:

Common Effect Model or Pooled Regression Model (PRM)

To examine section data, a panel data model is utilized. Because time and individual dimensions are not considered in this model, the behavior of c is expected to be approximated using the Ordinary Least Squares (OLS) approach or the least squares technique. The Pooled Regression Model equation is written in the same way as the regular least squares equation:

$$y_{i,t} = \alpha_i + \beta_i x_{i,t} + \varepsilon_{i,t} \ \ldots\ldots \ (2)$$

Description:

For $i = 1,2,\ldots,N \ and \ t = 1,2,\ldots,T$. Where N is the number of individuals or cross-sections and T is the number of time periods. This model can yield NxT equations, which are equivalent to T equations of

cross and as many N equations of coherent time or time series, $\boldsymbol{\beta}$is the estimated coefficient(Zulfikar & STp, 2018).

Fixed Effect Model (FEM)

Individual differences (cross section) are assumed to be compensated by varying intercepts in fixed effects. As a result, the following equation is identical to the following equation(Zulfikar & STp, 2018).

$$\boldsymbol{y_{i,t} = \alpha_i + \beta_i x_{i,t} + \varepsilon_{i,t} \ldots\ldots\ldots \ (3)}$$

For $i = 1,2,....,$ N and $t = 1, 2,., T$, see the description.

Where N is the number of individuals or cross-sections, and t signifies the number of time periods.

Random Effect Model

This model will estimate panel data in which interference variables have relationships across time and individuals. The error terms of each company in the Random Effect model account for the difference in intercepts. The Random Effect model is beneficial in that it removes heteroscedasticity.

The panel data regression equation for the random effects model is as follows:

$$\boldsymbol{y_{i,t} = \alpha_i + \beta_i x_{i,t} + u_{i,t} + \varepsilon_{i,t} \ldots\ldots\ldots(4)}$$

The Random Effect Model (RE) is defined as follows for i = 1, 2,.,N and $t = 1,2,\ldots,T$.

Where:

N = number of cross-sections

t is the number of time periods.

$\boldsymbol{\varepsilon_{i,t}}$ = is the total residual, where the residual is a cross section and time series combination.

$\boldsymbol{u_{i,t}}$= is the individual residual, which is the $i-t$ hand's random feature that remains constant at all times(Zulfikar & STp, 2018).

Model Specification Test

There are three main types of panel models, and we compare them using the three tests listed below to determine which model is the best:

Comparison between the Fixed effects model (FEM) and the OLS Pooled Regression Model (PRM)

Redundant Fixed Effects Test

The Redundant Fixed Effects Testis used to determine whether Pooled Regression Model (PRM) or Fixed Effect (FEM) model is the most appropriate one for estimating panel data. H_0: Select (PRM) if (p> 0.05), H_1: Select (FEM) if (p< 0.05).

The redundant fixed effects provided by EViews 12, which is used to determine the significance of effects. In this test, the null hypothesis is that the effects are redundant. The F-test was employed to choose the best analysis technique for the study's data.

Comparison between FEM (fixed effects model) and REM (random effects model)

HausmanTest

The Hausman test is used to differentiate between fixed and random effects models. In the case of panel data, the model must be selected based on

information about the individual particular components as well as the exogeneity of the independent variables. To choose the optimal model, three hypotheses are tested. The Hausman test, for example, is used to establish if a fixed or random effects model is acceptable by detecting endogeneity in the independent variable(Sheytanova, 2015).

The REM model and the FEM model are compared using Hausman selection on the study's data to discover the best model between them, as the two hypotheses are as follows:

H_0:The REM model is the most efficient.

H_1: The FEM model is the most efficient, reject H_0 if p-value < 0.05.

Comparison between the random effects model (REM) and the Pooled Regression Model (PRM)

To evaluate if the Random Effect model is better than the Pooled Regression Model (PLS) approach, utilize the Lagrange Multiplier Test (LM). If Result: H_0: Select (PRM) if (p> 0.05), H_1: Select (REM) if (p< 0.05).

Performing model diagnostics tests:

heteroskedasticity test for panel data

Common definitions of heteroskedasticity include variations on the term "non-constant error variance," or the notion that residual variability varies as a function of factors outside the regression model once predictors are incorporated. To comprehend or address this source of dependency, further action is necessary if the model mistakes are not entirely random. In certain

situations, such as when clustering is present in a multilevel modeling framework or during repeated measures analysis, it is easy to identify this dependency because each observation is more closely related to the others than it would be if the research design had not included an unnecessary component.

Panel heteroskedasticity.

Goodness-of-fit tests.

In this step, the relevant model estimated from the study data is tested for suitability using the following methods:

Jarque-Bera-test

In this step, the Jarque-Bera test statistic JB is used to assess the applicability of the relevant model estimated from the study data. In order to guarantee the normal distribution of the standardized residuals, where is defined as:

$$JB = \frac{n}{6}.\left(S^2 + \frac{(K-3)^2}{4}\right)$$

where S stands for sample skewness, K for sample kurtosis, and n for sample size.

The Jarque-Bera test and its rivals for determining normality.

Derbin Watson Test

A test for autocorrelation in the residuals from a statistical model or regression study is the Durbin Watson (DW) statistic. There is never a

Durbin-Watson statistic with a value outside of the 1.5–2 range. shows that the sample has no autocorrelation found in it.

H_0: There is no autocorrelation.

H_1: There is autocorrelation.(OO, 2019)

The heteroscedasticity LM White test

Heteroscedasticity is the presence of distinct variances among random variables. The residual variance's stability over time is checked using the LM White test. The following are the hypotheses for the LM White test:

H_0: No Heteroscedasticity

H_1: Heteroscedasticity exists.

Statistical Analysis of Quantitative Data

Analysis, results, and discussion

The aim of this study is to examine the effect of independent variables of financial inclusion (number of branches (NB), the number of automated teller machines (ATMs), number of borrowers (NBS), number of points s of sales (POS), and deposit size (DZ) on the dependent variable of financial safety indicators (capital adequacy, liquidity, asset quality, and profitability) in 13 Egyptian banks registered with the Central Bank of Egypt from 2014 to 2021. This is in both pre- and after-embedding of retail bank loans (RBL) as a control variable, with the goal of elucidating the control variable's effect on the relationship between financial inclusion and financial safety indicators. The method used in this study is econometric quantitative analysis with panel data regression using the E-Views 13 program.

3.1. Data Sources and Sampling

The population in this study is an Egyptian bank registered with the Central Bank of Egypt. The sampling technique is the purposive sampling method. A total population of 38 banks was selected based on data availability by using a purposive sampling method. While for the sample research that meets the above criteria, there are as many as 13 banks with a span of time covering the years 2014–2021.

Method of Data Analysis

This research tests the hypotheses using the balanced panel data analysis method with a pooled regression model (PRM), a Fixed effects model (FEM), and a random effects model (REM). panel data analysis method connects one dependent variable with some independent variable in a research model to determine whether there is an effect of the independent variable on the dependent variable.

Panel data analysis is used to obtain regression coefficients, which will determine whether the hypothesis made will be accepted or rejected on the basis of panel data regression analysis results using a significance level of 5%.

The tests of statistical criteria 5 include the t test (individual parameter significance test or partial test), the F test (simultaneous significance test), and the adjusted $\boldsymbol{R^2}$ (coefficient of determination test) and S.E. of regression, and Durbin-Watson stat In more detail, the results of the estimated output can be described in the following tables.

Descriptive Analysis

Table 3 presents the descriptive statistics of the variables in the model. There are no large differences that can be observed between the minimum and maximum values for all variables.

Table (3): Summary statistics

	capital adequacy	liquidity	asset quality	profitability	NB	ATMS	NBS	POS	DZ	RBL
Mean	0.39	0.11	0.19	0.32	0.04	0.06	0.02	0.08	0.17	0.19
Maximum	4.36	4.77	1.82	3.26	2.79	3.93	2.57	2.95	3.29	3.58
Minimum	-2.18	-3.81	-1.35	-2.50	-2.68	-2.79	-2.60	-3.02	-2.51	-3.92
Std. Dev.	1.26	2.08	0.90	1.39	1.21	1.90	1.10	1.13	1.41	1.46
Skewness	0.41	0.38	0.03	0.01	-0.03	0.53	-0.03	0.01	0.24	-0.24
Kurtosis	3.22	2.64	2.26	2.23	2.85	3.00	2.81	3.01	2.33	2.92
Jarque-Bera	3.17	3.09	2.40	2.57	0.11	4.82	0.18	0.00	2.94	1.00
Probability	0.21	0.21	0.30	0.28	0.94	0.09	0.91	1.00	0.23	0.61

Skewness values indicated that all variables were skewed to the right, and only three were skewed to the left. Similarly, since the kurtosis of two variables was above 3, their distributions were leptokurtic, while other variables had a platykurtic distribution. The Jarque-Bera test was used to determine if the data was normally distributed, with the null hypothesis indicating that a series is normally distributed if the probability associated with the test is higher than the chosen significance level, which was 5% (Batrancea & Management, 2021).

Correlation matrix

Table 4 presents the correlation analysis, which is used to examine the initial relationship between the variables and also to explore the traces of

multicollinearity among the independent variables of the study. The value of the correlation coefficient can range from -1 to +1. The absolute value closer to 1 indicates a strong link between the variables, and 0 means no relationship at all. The sign indicates the direction of the relationship(Gujarati, 2022)suggesting that a correlation coefficient value above 0.80 indicates severe problems with multicollinearity. The correlation matrix here doesn't contain any value greater than 0.85, as all of the remaining values are below 0.80, suggesting that there is no issue of significant multicollinearity in the data set. For more confirmation, the variance inflation factor (VIF) statistics for the study models were calculated, which are used to quantify the severity of multicollinearity in all the models of the study (Batrancea & Management, 2021). The tests don't suggest that any variables be removed from the regression because the VIF statistics are within the specified range(Ashraf, Nazir, U-Din, Yaqoob, & Shahzad, 2023).

Table (4): Correlation among Variables of the study

	capital adequacy	liquidity	asset quality	profitability	NB	ATMS	NBS	POS	DZ	RBL	VIF
capital adequacy	1.000										
liquidity	0.547	1.000									
asset quality	0.668	0.297	1.000								
profitability	0.582	0.610	0.682	1.000							
NB	0.366	-0.410	0.345	0.457	1.000						1.2
ATMS	0.614	-0.631	0.555	0.635	0.264	1.000					2.3
NBS	0.477	-0.440	0.397	0.647	0.478	0.489	1.000				1.5
POS	0.256	-0.614	0.654	0.257	0.698	0.537	0.765	1.000			2.8
DZ	0.550	0.669	0.224	-0.640	0.547	0.257	0.641	0.691	1.000		2.4
RBL	0.655	-0.366	0.645	0.365	0.456	0.263	0.364	0.594	0.564	1.000	1.6

According to the results in Table 4, the highest correlation of the independent variables was registered between NB and POS (r = 0.698), while the lowest correlation was registered between the variables ATMS and DZ (r = 0.257).

Unit Root Test

The time series stationary test is one of the prerequisites for selecting the best econometrics model. Many tests are used to validate the unit root for panel data. The Levin, Lin, and Chu test technique was chosen since it is one of the most commonly used procedures for testing the unit root for panel data. If the null hypothesis indicating the presence of the unit root is rejected at the 5% level of significance, the variable is stationary at that level, However, if the null hypothesis is accepted, the variable is not stable at the level, and the first difference must be considered, as well as the existence of co-integration between study variables. Table 5 displays the results of the (LLC) unit root test, which reveal that all of the study's variables are stationary at level. As a result, testing probability of the research variables is unnecessary(A. J. A. Al-Qudah, 2021; Birkel & Violence, 2014; Pedroni, 2004).

Table (5): Panel Unit Root Tests

Null hypothesis: Data are non-stationary. Alternative hypothesis: Data are stationary.				
Variables	**The Levin, Lin, and Chu test**			
	Statistic	**sig**	**Level of Integration**	**Stationary**
capital adequacy	**-21.80**	**0.00**	**I (0)**	**Stationary**
liquidity	**-28.34**	**0.00**	**I (0)**	**Stationary**
asset quality	**-11.84**	**0.00**	**I (0)**	**Stationary**
profitability	**-27.11**	**0.00**	**I (0)**	**Stationary**
NB	**-3.90**	**0.00**	**I (0)**	**Stationary**
ATMS	**-2.78**	**0.04**	**I (0)**	**Stationary**
NBS	**-9.57**	**0.00**	**I (0)**	**Stationary**
POS	**-2.89**	**0.04**	**I (0)**	**Stationary**
DZ	**-8.55**	**0.00**	**I (0)**	**Stationary**
RBL	**-10.01**	**0.00**	**I (0)**	**Stationary**

Findings of the Empirical Model Estimation and Discussion of the Findings pre- and after-embedding of the control variable (RBL) in the fixed effects models as a Control Variable

Panel data estimation models include pooled OLS, fixed effects models, and random effects models. confirms that the pooled ordinary least square approach is the simplest and most successful way of estimating panel data if the individual non-observable effects of the bank are not completely different. In most circumstances, pooled OLS is unlikely to be acceptable(A. J. D. j. a. Al-Qudah, 2021).

In this study, the Breusch-Pagan Lagrange Multiplier (LM) test is used in panel data analysis to select between pooled OLS and random effects models, whereas the Hausman test is used to select between fixed effects and random effects models (Baltagi & Baltagi, 2008).

Findings of the tests for the hypotheses H_{01-1} and H_{02-1}

In analyzing the effects of financial inclusion indicators on financial safety indicators (capital adequacy) both pre- and after-embedding of the control variable RBL in the panel regression models using the E-Views 12 program,the findings indicate that the pooled regression (PRM) and random effects (REM) models are insignificant, and the fixed effects model (FEM) has an F-statistic of less than 5%; hence, FEM findings are addressed only in Table 6.

Table 6 displays the FEM findings prior to embedding the control variable RBL into the model, indicating that the POS has a significant positive effect on Egyptian banks' capital adequacy, with a coefficient of 0.001 at a 5% significance level. This is the sole significant indicator that has an effect on capital adequacy among financial inclusion indicators, with the remaining indicators having insignificant effects, while the intercept of the regression equation has an insignificant value.

Table 6 shows the FEM findings after embedding the control variable RBL into the model. The results revealed that financial inclusion indicators such as NB-NBS-POS and DZ have a significant positive effect on capital adequacy in Egyptian banks, with coefficients of 0.084, 0.025, 0.024, 0.053, and 0.201, respectively. ATMs, on the other hand, had no effect at a 5% significance level, and the regression equation's intercept, -0.036, represents the lowest level of financial safety indicators (capital sufficiency) achievable regardless of independent variables.

The control variable RBLhas a significant positive effect on the capital adequacy with coefficient of 0.201at a significance level of 5%, Hence,

this suggests a need for further expansion of the retail bank loans (RBL).

Table (6): Effect of financial inclusion indicators on financial safety Indicators (Capital Adequacy).

The dependent variable: represents the Capital Adequacy Method: Panel EGLS (Cross-section weights) Sample (adjusted): 2014 2021. Linear estimation after one-step weighting matrix Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)								
	Capital Adequacy Model Prior to embedding the control variable RBL				Capital Adequacy Model after embedding the control variable RBL			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.003	0.006	-0.479	0.633	-0.036	0.003	-13.95	0.000
NB	0.005	0.006	0.724	0.471	0.084	0.005	17.45	0.000
ATMS	0.039	0.077	0.511	0.611	0.000	0.022	0.005	0.996
NBS	0.001	0.005	0.192	0.848	0.025	0.002	16.28	0.000
POS	0.024	0.005	4.782	0.000	0.024	0.001	20.61	0.000
DZ	0.008	0.006	1.400	0.165	0.053	0.002	25.27	0.000
RBL					0.201	0.011	17.93	0.000
The appropriate model	Fixed effects model				Fixed effects model			
R-squared	0.25				0.45			
Adjusted R-squared	0.11				0.33			
S.E. of regression	0.29				0.29			
F-statistic	1.72				3.86			
Prob(F-statistic)	0.049				0.00			
Durbin-Watson stat	2.24				2.34			
NO. of observation	104				104			

Coefficient of Determination for the Relationships

The adjusted R-Square value in the fixed effects model pre- and after-embedding of the control variable RBL is (0.11, 0.33), indicating that the independent variables in the fixed effects model explain 11% and 33% of the variation in the financial safety Indicators (Capital Adequacy) of Egyptian banks, respectively.

The standard error of the estimate in Table 6 is 0.29 in the two models, which is less than one, indicating that the FEM fits the data better.

The FEM in Table 6 indicates significant variation in the effect of financial inclusion on financial safety indicators when a control variable (RBL) is added. This leads in significant improvements for indicators that were not significant prior RBL and an increase in the adjusted r square from 11% to 33%, showing a considerable beneficial effect on Egyptian banks' capital adequacy over time.

Based on the findings of the capital adequacy models, there is a statistically significant difference in the effect of financial inclusion on the profitability indicator when embedding RBL as a control variable.

Findings of the tests for the hypotheses H_{01-2} and H_{02-2}

Table 7 presents the results of the study on the effect of financial inclusion indicators on financial safety indicators (liquidity) before and after the RBL control variable embedding at the 5% significance level. Based on the Breusch-Pagan-Lagrange multiplier test, REM is an appropriate model, with all findings having a probability of less than 5%. Based on the Hausman test

results, REM is appropriate, with all results having a probability greater than 5%. As a result, only REM results will be included in this study.

The REM findings prior to embedding the control variable RBL into the model at a 5% significance level indicate that the NB and NBS have a significant negative effect on Egyptian banks' liquidity, with coefficients of (-0.71, -.039), respectively, and DZ has a significant positive effect on Egyptian banks' liquidity, with a coefficient of 1.02, while the remaining indicators have insignificant effects and the regression equation's intercept has an insignificant value.

The REM findings After embedding the control variable RBL into the liquidity model at a 5% significance level, the results revealed that the financial inclusion indicators of NB ATMs, NBS, and RBL have a significant negative effect on liquidity in Egyptian banks, with coefficients of -0.64, -0.19, -1.04, and -1.03, respectively.

DZ have a significant positive effect on Egyptian banks' liquidity, with 1.12, respectively. POS, on the other hand, has no significant effect on liquidity in Egyptian banks, and the intercept of the regression equation is insignificant.

Hence, this suggests a need for further expansion of the retail bank loans (RBL).

It should be discovered that NB ATMs and NBS indicators have led to a drop in Egyptian bank liquidity over time, while DZ has contributed to an increase in liquidity. After the embedding of the control variable RBL in the liquidity model.

Table (7):findings of the effect of financial inclusion indicators on financial safety indicators (liquidity).

The dependent variable: represents the Liquidity. Method: Panel EGLS (Cross-section random effects) Sample (adjusted): 2014- 2021. Linear estimation after one-step weighting matrix Cross-section SUR (PCSE) standard errors & covariance (d.f.corrected) significant at α 5% (p<0.05)								
	Liquidity Model Prior to embedding the control variable RBL				Liquidity Model after embedding the control variable RBL			
Variable	Coef ficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
C	0.12	0.09	1.39	0.17	0.001	0.17	0.01	0.97
NB	-0.37	0.09	-4.09	0.00	-0.64	0.18	-3.53	0.00
ATMS	-0.01	0.14	-0.06	0.96	-0.19	0.05	-3.53	0.00
NBS	-1.03	0.10	-10.50	0.00	-1.04	0.16	-6.45	0.00
POS	-0.01	0.05	-0.21	0.83	-0.21	0.16	-1.32	0.19
DZ	0.70	0.09	7.54	0.00	1.12	0.20	5.63	0.00
RBL					-1.03	0.21	-4.90	0.00
The appropriate model	Random effects model				Random effects model			
R-squared	0.76				0.94			
Adjusted R-squared	0.75				0.93			
S.E. of regression	0.82				0.42			
F-statistic	63.34				249.86			
Prob(F-statistic)	0.00				0.00			
Durbin-Watson-stat	1.87				1.54			
NO. of observation	104				104			
Tests for determining the appropriate model of the study data								
Hausman Test	Chi-Sq. Statistic		Prob.		Chi-Sq. Statistic		Prob.	
	1.70		0.89		3.07		0.80	
Breusch –Pagan Lagrange Multiplier test	Cross-section	Time	Both		Cross-section	Time	Both	
	7.2	620.1	627.2		6.39	586.4	592.8	
	0.00	0.00	0.00		0.01	0.00	0.00	

Coefficient of Determination for the Relationships

The adjusted R-Square value in the fixed effects models pre- and after-embedding of the control variable RBL is (0.75, 0.93), indicating that the independent variables in the fixed effects model explain 75% and 93% of the variation in the financial safety Indicators (**Liquidity**) of Egyptian banks, respectively.

The standard error of the estimate in Table 7 is 0.82 and 0.42 respectively in the two models, which is less than one, indicating that the REM fits the data better.

The REM in Table 7 shows significant variations in the effect of financial inclusion on financial safety indicators when a control variable (RBL) is added. This results in the emergence of significance for indicators not significant before RBL and an increase in the adjusted r square from 75% to 93%, showing a considerable beneficial effect on Egyptian banks' liquidity over time.

Based on the findings of the liquidity models, there is a statistically significant difference in the effect of financial inclusion on the liquidity indicator when embedding RBL as a control variable.

Findings of the tests for the hypotheses H_{01-3} and H_{02-3}

In analyzing the effects of financial inclusion indicators on financial safety indicators (asset quality) both pre- and after-embedding of the control variable RBL in the panel regression models, the findings indicate that the pooled regression (PRM) and random effects (REM) models are insignificant, and the fixed effects model (FEM) has an F-statistic of less

than 5%; hence, as a result, only FEM results will be included in this study as shown in Table8.

The FEM findings prior to embedding the control variable RBL into the model at a 5% significance level indicate that the NB, ATMS, NBS, and DZ have a significant positive effect on Egyptian banks' asset quality, with coefficients of (0.012, 0.127, 0.006, 0.001), respectively, and POS has an insignificant effect on Egyptian banks' asset quality; the regression equation's intercept has an insignificant value.

The FEM findings After embedding the control variable RBL into the asset quality model at a 5% significance level, the results revealed that the financial inclusion indicators of the NB, ATMS, NBS, DZ, and RBL have a significant positive effect on asset quality in Egyptian banks, with coefficients of 0.021, 0.131, 0.004, 0.005, and 0.023, respectively. POS, on the other hand, has no significant effect on asset quality in Egyptian banks, and the intercept of the regression equation is insignificant.

Hence, this suggests a need for further expansion of retail bank loans (RBL).

The findings discovered that NB ATMs and NBS indicators have led to a rise in Egyptian bank asset quality over time after the embedding of the control variable RBL in the asset quality model.

Table (8):findings of the effect of financial inclusion indicators on financial safety indicators (asset quality).

The dependent variable: represents the Asset quality. Method: Panel EGLS (Cross-section weights) Sample (adjusted): 2014- 2021. Linear estimation after one-step weighting matrix Cross-section SUR (PCSE) standard errors & covariance (d.f.corrected) significant at α 5% (p<0.05)								
	Asset quality Model Prior to embedding the control variable RBL				Asset quality Model after embedding the control variable RBL			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.014	0.002	-6.60	0.00	-0.001	0.005	-0.24	0.81
NB	0.012	0.002	6.19	0.00	0.021	0.006	3.38	0.00
ATMS	0.127	0.029	4.45	0.00	0.131	0.026	5.01	0.00
NBS	0.006	0.001	5.49	0.00	0.004	0.002	1.98	0.05
POS	8.08E-05	0.002	0.05	0.96	0.001	0.001	0.80	0.42
DZ	0.001	0.002	-0.42	0.68	0.005	0.002	2.90	0.00
RBL					0.023	0.010	2.23	0.03
The appropriate model	Fixed effects model				Fixed effects model			
R-squared	0.87				0.92			
Adjusted R-squared	0.85				0.90			
S.E. of regression	0.22				0.31			
F-statistic	32.33				52.65			
Prob(F-statistic)	0.00				0.00			
Durbin-Watson-stat	1.59				1.72			
NO. of observation	104				104			

Coefficient of Determination for the Relationships

Table 8 indicates that the adjusted R-Square value in the fixed effects models pre- and after-embedding of the control variable RBL is (0.85, 0.90), indicating that the independent variables in the fixed effects model explain

85% and 90% of the variation in the financial safety Indicators (**Asset quality**) of Egyptian banks, respectively.

The standard error of the estimate in Table 8 is 0.22 and 0.31 respectively in the two models, which is less than one, indicating that the FEM fits the data better.

The FEM in Table 8 shows significant variations in the effect of financial inclusion on financial safety indicators when a control variable (RBL) is added. This results in the emergence of significance for indicators not significant before RBL and an increase in the adjusted R square from 85% to 90%, showing a considerable beneficial effect on Egyptian banks' asset quality over time.

Based on the findings of the asset quality models, there is a statistically significant difference in the effect of financial inclusion on the asset quality indicator when embedding RBL as a control variable.

Findings of the tests for the hypotheses H_{01-4} and H_{02-4}

The effect of financial inclusion indicators on financial safety indicators (profitability) has been investigated as shown in Table 9. At a 5% significance level Prior to and after embedding the RBL control variable the results indicate that the Breusch-Pagan Lagrange multiplier test indicates that the REM is chosen since the cross-section Chi-Square is (7.3) with a probability of (0.000), the time Chi-Square is (622.7) with a probability of (0.0003), and both Chi-Square are (630) with a probability of (0.0000) less than 5%. The result of the Hausman test indicates that the REM is preferred since the Chi-Square value is (0.56) with a probability of (0.98) less than

5%. The result of the profitability model after embedding the control variable RBL indicates that the REM is the appropriate model.

Table 9 shows the results of REM, in addition to the inclusion of the values of the Hausman test and the Breusch-Pagan Lagrange multiplier test.

The REM findings prior to embedding the control variable RBL into the model at a 5% significance level, indicating that the NB and DZ have a significant negative effect on Egyptian banks' profitability, with coefficients of (-0.37, -1.03), respectively, and NBS has a significant positive effect on Egyptian banks' profitability, with a coefficient of 0.70.

Among financial inclusion indicators, these are the only significant indicators that have an effect on profitability, with the remaining indicators having insignificant effects and the intercept of the regression equation having an insignificant value.

The REM findings after embedding the control variable RBL into the model at a 5% significance level. The results revealed that the financial inclusion indicators of NB and DZ have a significant negative effect on profitability in Egyptian banks, with coefficients of -2.14 and -0.86, respectively.

ATMs, NBS, and the control variable RBL have a significant positive effect on Egyptian banks' profitability, with 0.15, 1.86, and 6.22, respectively. POS, on the other hand, had no effect at a 5% significance level Hence, this suggests a need for further expansion of the retail bank loans (RBL).

The regression equation's intercept, -1.19, represents the lowest level of profitability achievable regardless of independent variables.

It should be noted that these significant indicators have contributed to an increase in the **profitability** of Egyptian banks throughout time.

Table (9): findings of the effect of financial inclusion indicators on financial safety indicators (profitability).

The dependent variable: represents the Profitability. Method: Panel EGLS (Cross-section random effects) Sample (adjusted): 2014- 2021. Linear estimation after one-step weighting matrix Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected) significant at α 5% (p <0.05)								
	Profitability Model Prior to embedding the control variable RBL				Profitability Model after embedding the control variable RBL			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.13	0.09	-1.50	0.14	-1.19	0.37	-3.24	0.00
NB	-0.71	0.09	-7.69	0.00	-2.14	0.75	-2.86	0.01
ATMS	0.001	0.14	0.01	0.99	0.15	0.06	2.31	0.02
NBS	1.02	0.09	11.28	0.00	1.86	0.25	7.35	0.00
POS	0.08	0.09	0.92	0.36	0.18	0.19	0.95	0.35
DZ	-0.39	0.09	-4.26	0.00	-0.86	0.35	-2.46	0.02
RBL					6.22	1.71	3.65	0.00
The appropriate model	Random effects model				Random effects model			
R-squared	0.77				0.90			
Adjusted R-squared	0.75				0.89			
S.E. of regression	0.81				0.53			
F-statistic	64.1				147.1			
Prob (F-statistic)	0.00				0.00			
Durbin-Watson-stat	1.81				2.24			
NO. of observation	104				104			
Tests for determining the appropriate model of the study data								
Hausman Test	Chi-Sq. Statistic		Prob.		Chi-Sq. Statistic		Prob.	
	0.56		0.98		1.73		0.94	
Breusch –Pagan Lagrange Multiplier test	Cross-section	Time	Both		Cross-section	Time	Both	
	7.3	622.7	630.0		6.4	548.5	554.9	
	0.00	0.00	0.00		0.00	0.00	0.00	

Coefficient of Determination for the Relationships

The adjusted R-Square value in the fixed effects models pre- and after-embedding of the control variable RBL is (0.77, 0.90), indicating that the independent variables in the fixed effects model explain 77% and 90% of the variation in the financial safety Indicators (**Profitability**) of Egyptian banks, respectively.

The standard error of the estimate in Table 9 is 0.29 in the two models, which is less than one, indicating that the REM fits the data better.

The random effects model in Table 9 shows significant variations in the effect of financial inclusion on financial safety indicators when a control variable (RBL) is added. This results in the emergence of significance for indicators not significant before RBL and an increase in the adjusted r square from 77% to 90%, showing a considerable beneficial effect on Egyptian banks' profitability over time.

Based on the findings of the profitability models, there is a statistically significant difference in the effect of financial inclusion on the profitability indicator when embedding RBL as a control variable.

Diagnostic Tests

The reliability of each model in the study has been verified to ensure that it fits the standards of a good regression model. The diagnostic test findings in Tables (6, 7, ,8 and 9) show that the level of significance of the two tests is greater than 5%, proving that all of the models in the study are good.

Table (10): The reliability of fixed effects models

	Tests	Jarque Bera Null hypothesis the standardised residuals have a normal distribution	Heteroskedasticity Test: Breusch-Pagan-Godfrey Null hypothesis: Homoskedasticity			
H_{01-1}	Statistics	2.79	F-statistic	1.57	Prob.	0.16
	P – value	0.25	Obs*R-squared	9.21	Prob. Chi-Square	0.16
H_{02-1}	Statistics	1.71	F-statistic	1.79	Prob.	0.12
	P – value	0.42	Obs*R-squared	8.72	Prob. Chi-Square	0.12
H_{01-2}	Statistics	1.98	F-statistic	1.07	Prob. F	0.40
	P – value	0.37	Obs.*R-squared	5.43	Prob. Chi Square	0.37
H_{02-2}	Statistics	2.94	F-statistic	2.5	Prob. F	0.06
	P – value	0.23	Obs.*R-squared	10.9	Prob. Chi Square	0.06
H_{01-3}	Statistics	0.85	F-statistic	0.09	Prob. F	0.98
	P – value	0.65	Obs.*R-squared	0.46	Prob. Chi Square	0.97
H_{02-3}	Statistics	4.76	F-statistic	0.084	Prob. F	0.97
	P – value	0.09	Obs.*R-squared	0.54	Prob. Chi Square	0.97
H_{01-4}	Statistics	3.74	F-statistic	0.63	Prob. F	0.65
	P – value	0.15	Obs.*R-squared	3.11	Prob. Chi Square	0.54
H_{02-4}	Statistics	3.29	F-statistic	1.21	Prob.	0.31
	P – value	0.19	Obs*R-squared	7.24	Prob. Chi-Square	0.30

The models' reliability has been validated to guarantee that they meet the requirements of a good regression model. Table 10 displays diagnostic tests for all study models prior to and after embedding the control variable RBL. Results show standardized residuals have a normal distribution, supported by the Jarque Bera test with a probability value greater than 5%. The data is normal in the absence of a null hypothesis. As the probability value of the

White Test is more than 5%, the results support the null hypothesis, indicating that there is homoskedasticity (equal variance in residuals).

The Durbin-Watson statistics values shown in Tables (6, 7, 8, and 9) fall between 1.5 and 2.5. As a result, it is possible to conclude that there is no autocorrelation in all study models in the case of prior- and after-embedding of the control variable RBL.

Conclusion

The purpose of this study, which ran from 2014 to 2021, was to ascertain whether the effect of financial inclusion indicators on financial safety indicators changed significantly prior to and after retail bank loans (RBL) were included as a control variable in the panel models used in the study.

The FEM model revealed that POS positively effects Egyptian banks' capital adequacy, with other financial inclusion indicators also positively effecting it. ATMs have no effect, and RBL needs further expansion. Financial inclusion significantly effects Egyptian banks' capital adequacy, with a significant effect on profitability when RBL is used as a control variable.

The study revealed that NB ATMs and NBS negatively effect on Egyptian banks' liquidity, while DZ positively effects it. Financial inclusion indicators of these banks have a significant negative effect on liquidity. The study suggests the need for further expansion of retail bank loans (RBL). The REM shows significant variations in the effect of financial inclusion on financial safety indicators when RBL is added, showing a considerable beneficial effect on Egyptian banks' liquidity over time.

The FEM model revealed that financial inclusion indicators like NB, ATMS, NBS, and DZ positively impact Egyptian banks' asset quality.

However, POS has no significant effect. When RBL is added, NB ATMs and NBS indicators increase Egyptian bank asset quality over time, suggesting the need for further expansion of retail bank loans. The FEM also shows significant variations in the effect of financial inclusion on financial safety indicators.

The study examines the effect of financial inclusion indicators on profitability in Egyptian banks. It finds that NB and DZ have a negative effect on profitability, while NBS has a positive effect. ATMs, NBS, and RBL positively affect profitability, while POS has no effect. The study suggests further expansion of retail bank loans (RBL) is needed to improve profitability, as the REM shows significant variations in the effect of financial inclusion on financial safety indicators in the presence of RBL, which lead to a beneficial effect on profitability over time.

In light of the above, we see that a lot of the RBL can be used to control the effect of financial inclusion on financial safety.

Recommendations

1- The banks have to raise the amount of retail bank loans they offer in order to increase the beneficial effect of financial inclusion on financial safety.
2- Increasing innovative access to financial services.
3- Strengthening the information technology infrastructure and developing financial services with the aim of raising the level of digital banking services, which are considered relatively low compared to other middle-income countries.

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دور قروض التجزئة على العلاقة بين الشمول المالي والسلامة المالية للنظام المصرفي المصري

الخلاصة:

تهدف هذه الدراسة إلى دراسة تأثير قروض التجزئة كمتغير ضابط على العلاقة بين الشمول المالي والسلامة المالية. ومتغيرات الشمول المالي هي: (عدد الفروع (NB)، عدد أجهزة الصرف الآلي (ATMs) وعدد المقترضين (NBS)، وعدد نقاط البيع (POS)، وحجم الودائع (DZ)). متغيرات مؤشرات السلامة المالية هي: (كفاية رأس المال، والسيولة، وجودة الأصول، والربحية) في 13 بنكًا مصريًا مسجلاً لدى البنك المركزي المصري في الفترة من 2014 إلى 2021. وذلك في كل من ما قبل وبعد تضمين قروض بنوك التجزئة (RBL) كمتغير ضابط، بهدف توضيح تأثير متغير التحكم على العلاقة بين الشمول المالي ومؤشرات السلامة المالية. أشارت النتائج إلى أن لمتغير التحكم RBL تأثير كبير على العلاقة بين الشمول المالي ومؤشرات السلامة المالية. وبالتالي، يشير هذا إلى الحاجة إلى مزيد من التوسع في القروض المصرفية للأفراد (RBL).

الكلمات المفتاحية: القروض المصرفية للأفراد، الشمول المالي، السلامة المالية.