Financial inclusion and Financial Performance: The interplay role of capital adequacy requirements in Egyptian Banks

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Abstract

Purpose Financial inclusion aims to provide affordable financial services, including banking, loans, equity, and insurance products, to underserved populations. This study aims to examine the moderating effect of a bank's capital adequacy ratio (CAR) on the nexus between financial inclusion (FI) and a bank's financial performance (FP) in the Egyptian setting.

Design/methodology/approach The study uses two empirical linear mixed models (LMM) to test the moderation effect of a bank's CAR on the association between FI and FP. The study sample comprises 360 bank quarter-observations of 10 listed banks in the Egyptian Stock Exchange (EGX) from 2013 to 2021.

Findings The findings show that the bank's CAR strengthens the association between FI dimensions, namely, deposit growth, loan growth, and the number of employees, and the bank's FP with contradicted directions.

Research limitations/implications This study provides policymakers insights into the crucial role of complying with banking regulation, namely, the capital adequacy ratio (CAR) and expanding financial inclusion practices to enhance and improve the bank's FP. Thus, encouraging more strategies and facilities toward financial inclusion.

Originality/value Due to the scarcity of financial inclusion literature in emerging economies, this paper extends FI literature by highlighting the moderation impact of a bank's CAR on the relationship between FI dimensions and FP in the Egyptian banking sector. Consequently, this study clarifies this beneficial relationship, which may have significant implications for restoring the challenges faced by the Egyptian economy following the critical events it went through, which, in turn, impacted the country's poor and vulnerable.

Keywords Financial inclusion, Bank performance, Bank regulation, Linear mixed model (LMM), EGX

JEL Classification G20, E54, C32

Introduction

In emerging nations, substantial issues such as human rights abuses, poverty, and poor working conditions are a concern of different international associations [35]. Thus,

on a global scale, the financial services sector greatly enhances society as a whole and the daily lives of individuals by offering financial services to the least fortunate and unbanked people, which, in turn, mitigates these significant issues. As a result, the banking industry contributes to economic growth by facilitating safe and efficient financial transactions [41].

Inclusion in financial markets has increasingly become a key component of long-term growth because it allows people to focus on their educational and business goals,

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and to manage financial risks effectively. In addition, it has helped those less fortunate overcome poverty [27, 64].

In Egypt, the Central Bank of Egypt (CBE) leads the nation's FI strategy procedure. In 2013, it joined the Alliance for Financial Inclusion (AFI) and became a member of the network's data and FI working groups. Consequently, according to the CBE report [24], the FI indicators reflect a significant increase, achieving a growth rate of 147%, and bringing the total number of Egyptians who own transactional accounts to 42.3 million consumers, which represents 64.8% of the population (16 years +).

Practitioners and academics have been paying close attention to FI throughout the past few decades [31, 39]. On December 18, 2012, the board of directors of the CBE revealed a cutting-edge plan. It released regulations determining the minimum allowable capital adequacy ratio (CAR) for all Egyptian banks, excluding foreign banks, under the framework of Basel II implementation. This suggests that banks must preserve a minimum capital requirement of 10% between the capital base and CAR to fulfill operational, market, and credit risks.

One of the primary methods used by regulators to protect banks against credit risk is the CAR. Banks that fail to comply with CAR regulations may face a variety of regulatory penalties. According to Abdel Karim [1], banks that do not comply may face severe dividend limits, rejection requests to combine or establish new branches, or be required to present detailed plans outlining how capital would be increased. According to Moyer [58], certain bank managers tend to modify profitability measures to lower the regulatory costs imposed by CAR authorities.

Furthermore, this motivated a significant number of academics to develop a variety of finance theories on the ideal capital structure after Modigliani and Miller's theory [56, 57]. Trade-off and the pecking order theories are two of these conventional theories that tackled the capital structure dilemma. The trade-off theory states that if the financial benefits of debt financing are balanced with bankruptcy filing expenses, an ideal capital structure can be achieved [47, 66]. On the other hand, according to pecking order theory, organizations utilize retained earnings as their first option for funding new investment opportunities, followed by debt financing, and then equity financing [32, 33]. In other words, considering agency issues retained earnings override debt in new investment financing and debt over equity [33].

The previous research based on the aforementioned theories suggested that banks should constantly assess the minimum capital requirements to determine how to gain access to less expensive funding sources and increase their profit margins. This would significantly contribute to the public's continued trust in banks to meet consumer credit demands and protect depositor money. Banks in Egypt may benefit greatly from focusing on FI to comply with CAR requirements, as more FI transactions may increase FP and reduce the amount of capital needed.

According to Beck et al. [9] and Kumar [48], FI significantly affects banks' financial performance through a variety of parameters at the country level. Prior research does not adequately address whether FI has a positive (e.g., [17, 43, 46, 65, 76]) or negative (e.g., [5, 13]) influence on bank financial performance (FP) based on bank-level factors. Despite this, bank-level attributes can play a crucial role in enhancing country-level financial indicators. Thus, this study aims to answer this question: *Do capital adequacy requirements moderate the association between FI and the Egyptian banks' FP?*

This research contributes to accounting literature in several ways to fill this gap. Firstly, this study adopts a single approach that offers a thorough analysis of how financial inclusion affects bank financial performance in Egypt since conclusions from country studies [36, 67, 70, 72] cannot be generalized. This complements the few research that have examined the relationship between financial performance and financial inclusion in the Egyptian context. As far as the researchers are aware, the only study that has examined the influence of financial inclusion on Egyptian bank-level features is that of Al-Adwey [4]. Secondly, although the previous studies used full sample analysis, this study goes in a different direction by focusing on the critical years 2013–2021, which mark a recovery from the 2011 revolution's instability, the 2015 expansion of the Suez Canal that improves international trade, the 2016 currency devaluation that was conquered, and the COVID pandemic recovery to investigate the effect of financial inclusion on bank performance in Egypt.

Thirdly, this study examines how CAR moderates the effect of FI on banks' FP in Egypt. This study will only focus on Egypt since it has declared FI as a national priority and an integral part of its Vision 2030. Since 2013, Egypt has implemented several encouraging strategies, initiatives, and procedures to attain an increase in the rates of FI to ease the achievement of the Sustainable Development Goals (SDGs) [61]. Furthermore, FI would assist Egypt achieve inclusive progress, improving people's lives especially those who are less fortunate, and empowering women more [23].

This study presents several contributions. First, the study examined the association between specific FI measures such as deposit growth, loan growth, and the number of employees and the bank's FP quarterly. Second, the study investigated mandated CAR as a vital moderator, and the results suggest that bank executives cope with FI pillars and CAR with caution. Banks' FP is increased due to higher loans along with increased CAR requirements. Third, prior studies focused mainly on CAR [30] and its

impact on banks' performance, though, this study is the primary to provide an empirical analysis that proves that mandated CAR requirement has a moderator role that affects the relationship between FI and the banks' FP. Finally, this study included micro and macro-economic variables in the econometric model to capture the interaction impact of FI and CAR, on FP of Egyptian banks.

The rest of this paper proceeds as follows: Section "Theory, literature, and hypotheses development" covers the literature review and the development of hypotheses, whereas Section "Research method" outlines the sample and statistical technique employed in this research. In Section "Empirical findings and discussion of results," the empirical findings are explained, and the results are discussed. Section "Robustness tests" reports the robustness tests. Section "Conclusion, limitations, and suggestions for future research" includes the conclusion, practical implications, limitations, and proposals for future research.

Theory, literature, and hypotheses development
Theoretical review
This section discusses and integrates two theories—financial asymmetry theory and financial intermediation theory—to establish a coherent theoretical framework that will support the current research analysis of the effect of FI on banks' performance. Pecking order theory and trade-off theory are two theories that are discussed and integrated to investigate the second effect of FI on banks' performance through the moderating effect of bank regulation.

FI and bank's FP theories
The banking sector is essential to promote FI in emerging nations. FI has contributed to increasing the concern from various global organizations, including the World Bank and the governments in the context that less fortunate people still lack sufficient access to the financial services that they require. FI is described as "*the ability of people and businesses to obtain practical, cost-effective financial products and services that satisfy their transactional, payment, savings, credit, and insurance needs ethically and sustainably*" [78].

According to Hannig and Jansen [38], through FI, unbanked people are empowered to access all forms of financial services under the formal financial system, which they would not be able to access otherwise. FI promotes domestic savings, supports household resilience, promotes entrepreneurship, and preserves the financial sector's stability [74]. Furthermore, FI will help vulnerable communities have access to equivalent opportunities, and support them in decreasing poverty, which will lead to a decline in social inequality and, eventually, the accomplishment of sustainable development. Since FI may improve the capacity of vulnerable population families to withstand financial shocks, improve investments in human capital, or undertake a moderate asset accumulation to gain access to promising investments, which result in the accomplishment of sustainable development [78].

The association between FI and banks' FP has been established by employing Diamond's [29] theory of financial intermediation, where banks serve as an intermediary between savers and borrowers. Banks acquire access, financial diversity, and financial utilization through their role as financial intermediaries. The degree of inclusion influences the level of banks' FP. Diamond [29] also documented that banks can monitor borrowers effectively, and thus can play the role of a delegated monitoring agent. Competitive advantage is significantly impacted by lowering the monitoring expenses. Financial intermediation, according to Ndebbio [62], is the degree to which financial institutions combine surplus and deficit spending units. It is, therefore, suggested that FI improves bank's performance.

Conversely, Akerlof's financial asymmetry theory [3] has also been used to explain how FI affects a bank's FP. According to Boffondi and Gobbi [16], when loan contracts are restricted, adverse selection happens when a lender is unable to distinguish between borrowers who constitute different risks. Due to this, borrowers return their debts when they can afford to, which causes a rise in non-performing loans [16]. As defined by Hanning and Jansen [38], FI is "*the inflow of numerous, inexperienced, and new customers into commercial banks and other financial institutions*". Due to the difficulty of determining a credit rating for each customer and the possibility of default, banks' financial performance suffers due to this barrier. Therefore, banks have difficulty in determining if FI represents an appropriate and low-risk investment.

Richard [69] asserted that moral hazard and adverse selection brought on by the information asymmetry between lenders and borrowers might cause credit to contract, which will have an impact on banks' performance. When a customer gives false information regarding its assets, liabilities, or credit capacity, a moral hazard emerges. It has been recognized that this is a reason for non-performing loans. Thus, it proposed that FI undermines banks' performance.

FI, bank FP, and capital regulation theories
According to the pecking order theory, capital used to fund an organization's operations is prioritized according to a specific preference order [60]. In the long run, managers behave in the best interests of shareholders since they possess more insider knowledge than

investors due to the concept of information asymmetry and the occurrence of transaction costs. Organizations are going to prioritize using internal earnings for funding new investments, followed by loan financing and equity financing [34, 53]. Therefore, organizations with higher earnings should have a lower debt-to-capital structure ratio, assuming all other variables remain unchanged.

According to the trade-off theory, the organization evaluates the advantages and drawbacks of debt financing to establish the optimal ratio of debt financing to equity financing. One of the benefits of debt is tax savings, namely, tax shielding. According to Myers [59], the cost of debt is the price of being in a state of financial distress. Subsequently, the lesser costs (including bankruptcy costs and tax shield) are required to burden, the additional debt in capital structure should be predictable, and vice versa [52]. According to the trade-off theory, an organization should assess the benefits and drawbacks of debt before deciding on the right level of leverage.

In summary, trade-off theory confirms the idea that a reduced cost of debt increases the usage of leverage. Pecking order theory, on the other hand, indicates an opposition to leverage based on reflection of information asymmetry. Though these theories shed light on the factors influencing capital leverage from many angles, it is still unclear how FI affects a bank's FP when it comes to the moderating influence of the CAR. Yet FI has a significant influence on the usage of capital leverage from a sustainability perspective.

Empirical review
FI and bank's FP empirical review
Khatib et al. [46] investigated how FI affected commercial banks' performance. The authors concluded that there was a significant and positive relationship between FI and bank performance. They also documented that implementing innovation by starting new, improved services increases banks' profitability and that installing more ATMs lowers the cost of transactions for depositors. Additionally, Nizam et al. [65] revealed that FI (access to credit) significantly and positively affected banks' growth up to a specific level but negatively impacted it after that. In the same vein, Bolaji's et al. [17] results documented a significant positive effect of digital financial inclusion on the bank's efficiency.

Jajah et al. [43] investigated the impact of FI on banks' performance, and the results showed that the government initiatives to boost FI are likely to have a positive effect on bank profitability. Bose et al. [18] investigated the relationship between the banks' market-based performance and the disclosure of banks' FI activities in emerging markets. The results revealed a positive and significant relationship between FI and bank performance.

Furthermore, government ownership and market competition have a significant impact on the prior interaction.

Vo et al. [76] demonstrated a relationship between a higher degree of FI and increased bank resilience. FI allows banks to increase their market share, reduce costs, and enhance revenue. According to Ahamed and Mallick [2], banks can gain from FI by strengthening the currency market, lowering marginal borrowing costs, and introducing stability to their financial operations. The reductions in credit and borrowing are less likely to have an impact on banks with greater levels of FI.

Therefore, during periods of crisis, banks that have higher financial integration benefit from more flexible financial markets [51]. Therefore, financial services must be readily accessible to all segments of society, with a focus on those who are less fortunate. Furthermore, Neaime and Gaysset [63] proposed that the voluntary availability of current financial resources helps lower-income communities to overcome their difficult economic circumstances more effectively. Dabla-Norris et al. [25] indicated that country-specific characteristics affect the settlement of the trade-offs between FI and financial performance. The limitations on distance can be mitigated by making financial services more easily accessible through advancements in mobile banking and improving the financial infrastructure. As a result, nations with insufficient physical and financial infrastructure can depend on technological advancement to provide less fortunate consumers with financial literacy.

Moreover, Sedera et al. [71] investigated financial inclusion's impact on bank profitability in Indonesia. The results reveal a positive association between FI and a bank's profitability over the three dimensions of FI: access, availability, and usage. Furthermore, Bhatter and Chhatoi [14] assessed the moderating effect of CSR on the relationship between FI and FP. According to the results, CSR moderates the positive relationship between FI indicators and the FP of the bank in a significant and positive way.

In contradiction to the aforementioned research, Bhattacharyya et al. [13] showed an insignificant relationship between FI and banks' FP accounting metrics. The authors claimed that governmental banks prioritized serving society's needs over their financial interests by engaging in more inclusive transactions. Additionally, the results showed that FI harmed banks' market performance. In the same vein, Al-Eitan et al. [5] found that the number of loans and deposits accounts are negatively impacted the profitability of the commercial banks in Jordan. However, the number of branches and ATMs had no significant effect on the bank's profitability.

Similarly, Yakubu and Musah [77] examined the impact of FI on bank profitability sub-Saharan Africa

(SSA) over the period 2000–2017. The authors found that FI impacts negatively on the bank's profitability.

Further, Kumar et al. [49] documented mixed results regarding the association between FI and the bank's profitability. The authors found that the number of branches positively and significantly impacts the bank's profitability. However, the numbers of loan accounts and ATMs have no significant impact on the bank's profitability.

Based on the abovementioned discussion, there is an inconsistent association between FI and bank FP. Increased FI enables individuals and unbanked businesses to access the official banking system. It facilitates the diversification of loan portfolios and deposit bases for financial institutions. Financial institutions may be more resilient if they have more diversification [55]. According to Beck et al. [8], inclusive finance could lessen information asymmetries and agency issues between lenders and borrowers by increasing access to financial instruments and broadening financial sector accessibility. Since banks can collect deposits from a wide range of customers, low information asymmetries assist in reducing any sort of financing instability [37]. As a result, banks depend less on expensive and riskier money market funds, which lowers return volatility [10, 28, 45, 68]. Since inclusive banking offers several options for funding customer deposits, it could reduce the return volatility of banks.

On the other hand, in an inclusive financial sector, banks open branches in rural and underbanked areas. Senior managers find it harder to monitor remote branches as the distance between them and headquarters grows [20]. In this instance, senior managers' efficiency is challenged as they have to shift to other branches to improve the overall operating efficiency of these further branches from the headquarters [11]. Furthermore, banks must continue to offer a variety of products targeting different categories of customers to increase access to financial services for people from diverse economic levels. Thus, FI may thereby increase agency problems due to the wide range of products and complex organizational structure.

The contradictory impacts discussed above suggest that there is a need for empirical analysis to determine whether FI increases or decreases bank performance. However, an overall positive relationship between FI and the bank's FP would be expected if the advantages of FI exceed the disadvantages. Therefore, the first hypothesis is developed as follows:

H_1 There is a positive nexus between FI and the Egyptian banks' FP.

FI, bank FP, and capital regulation empirical review

Regulators from all around the world are still searching for appropriate financial regulations that encourage bank resilience while simultaneously supporting FI strategies. As a result, it is critical to evaluate how regulatory frameworks, in particular the Basel implementation of the minimum CAR can moderate the association between FI and bank's FP. Barth et al. [6] argued that high regulatory limits on banking operations may limit banks' prospects for diversification. Consequently, less diversification will lead to a reduction in income, which will lead to ineffective financial intermediation [7, 50].

Additionally, more restrictions on banks' operation may increase the holding of safe assets while decreasing the expected return of hazardous assets, this might increase bank performance. On the other hand, more regulations on banking operations would make it more difficult to use (invest) the additional funds when deposits rise because of FI, which would decrease banks' performance. Therefore, given the negative effects of regulation constraints, it is hypothesized that the net effect of FI could have an undesirable impact on a bank's FP for the banks functioning in a setting with rigid restrictions on banking operations [54].

In contrast, unregulated financial operations could exaggerate moral hazard issues and encourage banks to accept excessive risk investments [19]; this might decrease bank performance. Additionally, since managers' action is constrained by greater debt repayment requirements, higher capital regulations raise agency costs between insiders and outsiders [21]. As a result, a crucial role for regulatory capital requirements is based on the CAR in the relationship between FI and bank performance. Basel II capital regulations have the potential to increase bank FP, although FI might raise the upper bound on hazardous investments, it can also increase the expected return and mitigate any potential negative impact on bank performance.

Thus, this study supposes the legislative CAR to affect the relationship between FI and FP of Egyptian banks:

H_2 Compliance with CAR has a vital impact on the association between FI and the Egyptian banks' FP.

Research method

This study attempts to examine the influence of FI on the bank FP. Further, to investigate whether this association is affected by the bank regulation (CAR). Thus, this research uses the linear mixed model (LMM) to test the two empirical models. Since LMM modeling the autocorrelated error terms resulting from the repeated measures of the bank's FP over time. Furthermore, time

can be included and treated as a fixed or random effect by using the LMM. As a result, randomized effect modeling is improved, and biases and type I errors are less likely to occur [26].

The data were statistically analyzed using STATA 14 for descriptive and univariate analysis and SPSS software for applying the LMM technique. At the 1% and 99% levels, winsorizing was applied to all variables.

Data sources and the study sample

The population of the research is all the Egyptian banks registered with the Central Bank of Egypt (37 banks). The initial sample comprises all listed banks in the Egyptian Stock Exchange (EGX) (12 banks) from 2013 to 2021. We focused on listed banks since they are obliged to more restrictions and rules regarding the capital adequacy requirements. The bank to be included in the sample must meet the following criteria:

  (i) It is a commercial bank listed in the EGX.
  (ii) It is capital adequacy data available in the DataStream database over the study timescale from the year 2013–2022.
  (iii) Has available financial data in the DataStream database over the study timescale from the year 2013 to 2022.

It was noted that not all listed banks meet these criteria. Banque Du Caire and Faisal Islamic Bank were omitted due to their unavailability data of FI dimensions, CAR, and other financial data; hence, our final sample is composed of (10 banks) with 360 quarter-observations. Table 1 shows details of the sample selection.

FI dimensions, CAR, and other financial data related to banks' financial performance, size, leverage, intellectual capital, and efficiency ratio are collected from the DataStream database. The macroeconomic indicators, namely, inflation rate and GDP, are collected from the World Bank database.

Table 1 The study sample

Description	No. of banks
Initial sample (over 9 years)	12
International banks	2
National/public banks	3
Private banks	7
Less: banks with unavailable data	2
Final sample	10

Study variables and measurements

This study aims to investigate the nexus between FI and the bank's FP as well as the moderating role that CAR plays in this relationship.

Measurement of bank's FP This study follows prior studies and measures the bank's FP through the bank's return on assets (ROA) (e.g., [14, 22, 46, 49, 73, 75]).

Measurement of FI Prior related studies have utilized the following proxies for measuring FI, namely: the number of loan accounts, the number of bank branches, the number of ATMs, the number of credit cards, the number of debit cards, and the total deposits accepted (e.g., Kumar 2022; [14, 22, 40, 64]). This study uses the growth rate of the bank's loans, deposit accounts, and the number of employees as proxies for FI following [5, 14, 64], these data were collected from the DataStream database. Other proxies, such as the number of branches and ATMs, were unavailable as the Egyptian banks considered them confidential and did not publish them on their websites over the study timescale.

CAR A bank's capital adequacy is measured by dividing its core capital by its supplemental capital over its risk-weighted assets [12, 44]. This study measured CAR (Tier1) as the sum of common stockholder's equity, retained earnings, accumulated other comprehensive income, and minority interest as stated on the DataStream database.

Measures of control variables This study controls some of the bank-specific characteristics that could influence the bank's FP and some macroeconomic control variables. Referring to previous studies (e.g., [5, 14, 26, 49, 73]), the bank-specific control variables are: bank size (*Size*), leverage (*Lev*), intellectual capital (IC), efficiency ratio (ER), inflation rate (INF), and gross domestic product (GDP). All control variables' measurements are as referred to in Table 2.

Empirical models

This study investigates the link between FI and bank FP. In addition, to test whether the bank CAR has a moderating effect on this association. Therefore, we run the following two main models. The first regression model is as follows:

$$
\begin{aligned}
\mathrm{ROA}_{it} = {} & \alpha_0 + \beta_1 \mathrm{DG}_{it} + \beta_2 \mathrm{LG}_{it} \\
& + \beta_3 \mathrm{NE}_{it} + \beta_4 \mathrm{Size}_{it} + \beta_5 \mathrm{Lev}_{it} \\
& + \beta_6 \mathrm{IC}_{it} + \beta_7 \mathrm{ER}_{it} \\
& + \beta_8 \mathrm{INF}_{it} + \beta_9 \mathrm{GDP}_{it} + \varepsilon_{it}
\end{aligned}
\tag{1}
$$

where ROA_{it} is the bank (i) financial performance in the quarter (t), DG_{it} is the bank (i) total deposit growth

Table 2 Variable definitions, notation, measures, and source

Variable	Notation	Measure	Source
Dependent variable			
Financial performance (return on assets)	ROA	Earnings before taxes, depreciation, & amortization divided by total assets (e.g., [14, 49])	DataStream
Independent variable (FI constructs)			
Deposit growth (access)	DG	Increase in deposits from one-quarter to another (includes all types of deposits) [14, 64]	DataStream
Loan growth (usage)	LG	Fiscal interim net loans – net loans for prior interim divided by annual net loans of prior interim *100. [14, 64]	DataStream
Number of employees (availability)	NE	The natural logarithm of the bank's number of full-time employees [5]	Financial statements
Moderator variable			
Bank regulation (capital adequacy ratio)	CAR	The sum of common stockholder's equity, retained earnings, accumulated other comprehensive income, and minority interest [12, 44]	DataStream
Control variables (micro and macro-economic variables)			
Size	Size	The natural logarithm of bank's market capitalization	DataStream
Leverage	Lev	Total debt divided by total equity	DataStream
Intellectual capital	IC	Market-to-book ratio [22, 40]	DataStream
Efficiency ratio	ER	Sum of (total interest income, foreign exchange income, trading accounting income, investment income, and gain/loss on sale of securities pre-tax) divided by (average of last quarter and current quarter investment plus net loans) [49]	DataStream
Inflation rate	INF	Yearly percentage change in CPI (%) [49]	World Bank
Gross domestic product	GDP	Yearly GDP growth rate (%) [49]	World Bank

in the quarter (t), LG_{it} is the bank (i) loan growth ratio in the quarter (t), NE_{it} is the bank (i) number of employees in the quarter (t), $Size_{it}$ is the bank (i) size in the quarter (t), Lev_{it} is the bank (i) leverage in the quarter (t), IC_{it} is the bank (i) intellectual capital in the quarter (t), ER_{it} is the bank (i) efficiency ratio in the quarter (t), INF_{it} is the yearly inflation rate, GDP_{it} is the yearly GDP growth rate, and ε_{it} is the random error.

To test the interaction effect of both FI and bank's CAR on its FP, the second regression model is formulated as follows:

$$
\begin{aligned}
ROA_{it} = {} & \alpha_0 + \beta_1 DG_{it} + \beta_2 LG_{it} + \beta_3 NE_{it} + \beta_4 CAR_{it} \\
& + \beta_5 (DG_{it} \times CAR_{it}) + \beta_6 (LG_{it} \times CAR_{it}) \\
& + \beta_7 (NE_{it} \times CAR_{it}) + \beta_8 Size_{it} + \beta_9 Lev_{it} \\
& + \beta_{10} IC_{it} + \beta_{11} ER_{it} + \beta_{12} INF_{it} + \beta_{13} GDP_{it} + \varepsilon_{it}
\end{aligned}
\tag{2}
$$

where CAR_{it} is the bank (i) capital adequacy ratio in the quarter (t), $(GD_{it} \times CAR_{it})$, $(LG_{it} \times CAR_{it})$, and $(NE_{it} \times CAR_{it})$ are the interactive impact of both FI and CAR on the bank's FP. Other variables are as defined in the multiple regression Model (1).

Table 3 Descriptive statistics

Variables	Mean	Min.	Max.	Std.
Panel A: dependent variable				
FP	0.053	−0.005	2.544	0.242
Panel B: independent and moderator variables				
DG	0.047	−0.399	0.807	0.081
LG	0.045	0.071	−0.25	0.546
NE	7.612	6.512	8.897	0.645
CAR	0.145	0.057	0.983	0.061
Panel C: control variables				
Size	6.659	5.861	8.086	0.578
Lev	12.664	6.09	29.21	4.412
IC	1.086	0.17	3.48	0.703
ER	0.426	−0.218	2.157	0.163
INF	11.931	5.045	29.507	6.893
GDP	3.974	1.031	2.186	5.558

Empirical findings and discussion of results

Descriptive statistics and univariant analysis

Table 3 illustrates the descriptive statistics of the study's variables over the years 2013–2021. As shown

in Table 3, the overall average bank's FP is 5.3% (Std. = 0.24), ranging from − 0.005 to 2.544. This implies that there was a relatively low variability in the banks' FP over the period from 2013 to 2021.

Regarding the FI, the results reveal almost the same mean value for deposit growth and loan growth, 4.7% and 4.5%, respectively. However, the loan growth standard deviation is higher than the deposit growth with 54–8.1%, respectively. This implies that banks provided more loan services than deposit services over the years from 2013 to 2021. In addition, the results indicate a mean value of 14.5% for the bank capital adequacy, with a standard deviation of 6.1%, ranging from 0.057 to 0.983.

Table 4 reports Pearson correlation analysis for the tested variables. The bank's FP is not correlated with its deposit growth or loan growth. Further, the results show a low negative correlation between the bank's FP and the number of employees, size, and the GDP level at 10.3%, 10.4%, and 23.2%, respectively. Though the correlation coefficient of the number of employees and bank size is high (87.4%), none of the correlation coefficients among independent variables exceeds the critical value of 70%. Further, the variance inflation factor (VIF) analysis for all independent variables shows values less than 10, which implies no multicollinearity issues in our models.

Multivariate analysis

This section deliberates the empirical results of the two linear mixed models that were formulated to test: (i) the impact of FI on the bank's performance and (ii) the impact of the bank's CAR on the association between FI and bank FP. Table 5 illustrates the results of these two liner mixed models.

Table 5 Linear mixed model results

Estimates of fixed effects	Model (1)		Model (2)	
	Coef.	*t*-statistic	Coef.	*t*-statistic
Constant	− 0.0128	− 0.913	− 0.0175	− 1.146
DG	**− 0.0037***	− 1.930	**0.0424***	2.762
LG	**0.0068**	2.160	**− 0.0287**	− 2.080
NE	**0.0006**	2.070	**0.0018***	1.822
CAR	–	–	**0.1006***	1.743
Moderating effect				
DG × CAR	–	–	**− 0.2997***	− 3.130
LG × CAR	–	–	**0.2353**	2.283
NE × CAR	–	–	**− 0.0104**	− 1.515
Control variables				
Size	0.0064	3.285	**0.0051***	2.575
Lev	− 0.0015	− 8.758	**− 0.0015***	− 8.286
IC	0.0021	2.709	**0.0029***	3.713
ER	− 0.0058	− 3.200	**− 0.0059***	− 3.265
INF	− 0.0000	− 1.368	− 0.0000	− 1.198
GDP	0.0007	1.943	0.0008	1.795
Other statistics				
AIC	− 1959.872		− 1947.951	
No. of observations	360		360	

*Significant at level 10%, **significant at level 5%, and ***significant at level 1%

Model's (1) results reveal a significant negative relationship between a bank's deposit growth and FP at a significant level of 10%. However, the other two FI proxies, namely: Loan growth and number of employees have a significant positive association with the bank's FP at a significant level of 5%. This implies that exaggerating in offering deposit services, which increases the bank's liabilities, could harm the bank's FP. Meanwhile, expanding loan services and increasing workers

Table 4 Pearson coefficient correlation matrix

Variables	FP	DG	LG	NE	Size	Lev	IC	ER	INF	GDP
FP	1									
DG	− 0.046	1								
LG	− 0.063	0.550***	1							
NE	− 0.103**	− 0.038	− 0.069	1						
Size	− 0.104**	0.004	− 0.032	0.874***	1					
Lev	0.094*	0.077	0.120	− 0.375***	− 0.478***	1				
IC	0.034	0.093	0.096*	0.516***	0.645***	− 0.072	1			
ER	0.075	− 0.120	− 0.036**	− 0.216***	− 0.388***	0.337***	− 0.057	1		
INF	− 0.066	0.124	0.060**	− 0.001	0.082	0.206***	0.245***	− 0.075	1	
GDP	− 0.232***	− 0.005	0.080	0.121**	0.137***	0.136**	0.049	− 0.181***	0.250***	1
Multicollinearity diagnostics										
VIF	–	1.50	1.48	1.01	3.05	1.69	2.25	1.38	1.21	1.2

*Significant at level 10%, **significant at level 5%, and ***significant at level 1%

could increase the bank's operating FP. This result aligns with financial intermediation theory, extending loans and increasing the availability of financial services will improve the bank's FP. Thus, the first null hypothesis is rejected, and Model's (1) results support accepting H_1.

After considering the bank's CAR as a moderating variable in Model (2), the results indicate some slight changes. First, the moderation effect of CAR has strengthened the negative association between deposit growth and the bank's FP from a significant level of 10% to a significant level of 1% (highly significant). Further, the relationship between loan growth and the bank's FP remains constant at significant level of 5%. However, the relationship between the number of employees and the bank's performance has turned into an insignificant and negative relationship. Since Egyptian banks tend to increase lending rather than depositing, this result fits well with pecking order and trade-off theories. Consequently, the results support the acceptance of H_2 and reject the second null hypothesis.

Furthermore, the association between the bank's financial performance and other control variables, namely, size, lev, IC, and ER, were insignificant in Model (1) and turned into a highly significant relationship after adding the interrelation effect of the bank's CAR with FI components at a significant level of 1%. Size and IC have a significant positive relationship with the bank's FP; however; Lev and ER have a negative association with the bank's FP. Regarding the Akaike's Information Criterion (AIC) values, Model (2) has a better fit than Model (1) since it has a lower AIC value.

Discussion

From the statistical analysis of our linear mixed models that examined the interplay effect of CAR and FI on the bank's FP, we find a slight change between the two models. Our empirical results for Model (1) reveal a negative association between a bank's deposit growth and its FP. This suggests that providing deposit services to low-income groups excessively will raise bank liabilities and negatively impact the bank's FP through elevated transaction costs. This, in turn, will increase the information asymmetry among depositors and the bank. Our finding is consistent with the results of Bhattacharyya et al. [13], Al-Eitan et al. [5], Yakubu and Musah [77], and Bhatter and Chhatoi [14]. However, this result contradicts some prior studies in the FI and bank FP nexus (e.g., [46, 65, 75, 76]).

However, our results reveal that the Egyptian bank's FP rises as a result of over-lending and recruiting more staff. This implies that banks' expansion in credit services would attract low-income groups to be involved in FI, which, in turn, would increase the bank's cash inflow. As well as recruiting more employees to provide financial services to borrowers and depositors would enhance the bank's FP. Our results contradict Al-Eitan et al.'s [5] results, the

authors found no effect on the bank's number of employees and a negative effect on credit services on the bank's profitability while our results show a positive association for both dimensions of FI on the bank's FP. Similarly, Kumar et al. [49] found no effect of bank loan growth on its FP, while our results report a positive association between the two variables. On the other hand, this positive association between FI dimensions and FP is in line with the results of Bose et al. [18], Ahmed and Mallick [2], Nizam et al. [65], Vo et al. [76], Jajah et al. [43], and Khatib et al. [46].

Regarding the empirical findings of Model (2), which represents the moderation effect of the bank's CAR on the nexus between FI dimensions and the bank's FP. To the best of our knowledge, no previous studies explored the moderating effect of CAR on the relationship between FI and bank FP. Further, there is no consensus on the impact of CAR on bank FP, since Bitar et al. [15] and Khatib et al. [46] reported a negative relationship, while Islam and Nishiyama [42] documented a positive relationship. Though our results reveal a negative impact on the interaction between CAR and DG on the bank's FP, the bank's CAR strengthened the positive association between LG and the bank' FP. This result signifies that balancing the bank loan services and regulations together could mitigate potential risks [46]. This result is consistent with the trade-off theory since the Egyptian banks would swap the costs and benefits involved in offering deposits and loan services to maintain their FP.

Concerning the control variables in Model (1), none of the model controls is significantly associated with bank FP. However, Model's (2) results illustrate a positive association between bank size, intellectual capital, and FP. This result is rational due to the size effect assumption. However, our results are inconsistent with those of the related prior studies (e.g., [5, 14, 49]). Similarly, Model's (2) results reveal a negative association between both the bank leverage and efficiency ratio and FP. However, Al-Eitan et al.'s [5] and Bhatter and Chhatoi's [14] results document a positive association between bank leverage and its FP. These contradictory results might be due to the different variable proxies we used in our models.

Robustness tests

To assess the precision of our mixed models' results, and whether the bank CAR has a moderating impact on the nexus between FI dimensions and the bank FP, the two Models (1) and (2) were run after constructing an FI index using a factorial analysis of the principal components of the three determined FI dimensions.

Table 6 confirms the same conclusions of our original mixed models since Model (2) is a better fit than Model (1) with a lower AIC value. As shown in Table 6, Model's (2) results report a significant negative relationship between the FI and the bank's FP after considering the moderating

Table 6 Additional analysis: composite FI score

Estimates of fixed effects	Model (1)		Model (2)	
	Coef.	*t*-statistic	Coef.	*t*-statistic
Constant	− 0.00338	− 0.247	− 0.00191	0.890
Composite FI	0.00004	0.166	**0.00164***	0.082
CAR	–	–	**− 0.00254**	0.625
Moderating effect				
Composite FI × CAR	–	–	**− 0.012814***	**0.061**
Control variables				
Size	0.00574**	2.922	**0.005638**	2.839
Lev	− 0.00155***	− 9.187	**− 0.00160***	− 9.268
IC	0.00190**	2.416	**0.002188**	2.737
ER	− 0.00552***	− 2.992	**− 0.005895**	− 3.082
INF	0.00006	− 1.285	− 0.00004	− 1.123
GDP	0.00085**	2.365	0.00086**	2.328
Other statistics				
AIC	− 1972		− 1958	
No. of observations	360		360	

*Significant at level 10%, **significant at level 5%, and ***significant at level 1%

impact of the bank's CAR at a significant level of 10%. However, Model's (1) results reveal no association between the composite FI and the bank's FP. These contradictory results might be due to the differences in the relationship direction among the FI dimensions and the bank's FP. In addition, the association between the bank's FP and other control variables remains constant significant (but at a significant level of 5%) and with the same directions.

Conclusion, limitations, and suggestions for future research

The banking sector seeks to improve its financial services over the globe to people in rural and remote area to alleviate pressing issues such as poverty. Consequently, the economy will grow faster. Thus, this study aims to explore the moderation impact of capital adequacy requirements on the association between FI and the bank's FP in the Egyptian banking sector.

This study utilized a linear mixed model statistical technique for a sample comprised of 10 listed banks in the EGX over the period 2013–2021. The measures used to proxy FI are the bank's deposit growth, loan growth, and the number of bank employees. To gauge the risk and performance of banks, both macro and micro-control factors are employed. Our results reveal a significant negative association between a bank's deposit growth and FP and a positive relationship between a bank's loan growth and the number of employees and a bank's FP. However, after incorporating the CAR in our mixed model, the negative relationship between deposit growth and the bank's FP has been strengthened. Further, the relationship between loan

growth and the bank's FP remained constant, and the relationship between the number of employees and the bank's FP has changed into an insignificant relationship. Further, among the control variables, our results in Model (2) indicate that bank size, leverage, intellectual capital, and efficiency ratio are the main drivers of a bank's FP.

Our results suggest some practical implications. This study provides insights for policymakers toward a deeper understanding of the crucial role of complying with banking sector regulations (CAR) to enhance the offered financial services (FI) and improve the bank's FP. Further, banks should maintain their asset management to promote banking loans, which, in turn, will boost the bank's FP. Even though the results demonstrated that the FI activities affect the bank's performance. The low participation rate can be attributed to two factors: Either banks are not aware of the significance of disclosing financial inclusion activities, or there are additional activities related to financial inclusion that are unique to the Egyptian environment and are not included in the FI parameters used. This suggests that in addition to passing legislation and laws requiring all listed banks to disclose their financial inclusion activities as part of their social responsibility, the Central Bank of Egypt needs to work on creating an index of financial inclusion related to Egypt's environmental conditions.

This study has some limitations. First, this study focused on some of the FI proxies, not all of them. Hence, future research could examine the impact of FI on a bank's FP using other FI proxies such as the number of ATMs, the number of branches, and internet banking and mobile financial services. Second, our models use only one proxy

for bank FP. Thus, future research might examine the association between FI and bank FI utilizing other bank's FP proxies such as return on equity and Tobin's q. Further, future research could investigate the impact of FI on a bank's cost of capital since FI can increase the quality of banks' profits and reduce banks' cost of capital. Moreover, the research sample was limited to listed banks on the Egyptian Stock Exchange only, which led to a limited sample size. Future research in this field can study listed and unlisted banks because financial inclusion activities are equally applicable to both types of banks. Finally, the LMM was used without checking for endogeneity issues, so our models might suffer from endogeneity problems.

Abbreviations

AIC	Akaike's information criterion
AFI	Alliance for Financial Inclusion
CAR	Capital adequacy ratio
CBE	The Central Bank of Egypt
EGX	The Egyptian Stock Exchange
FI	Financial inclusion
FP	Financial performance
LMM	Linear mixed model
SDGs	Sustainable Development Goals
VIF	Variance inflation factor

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no conflict of interest.

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References
1. Abdel Karim RA (1995) The nature and rationale of a conceptual framework for financial reporting by Islamic banks. Account Bus Res 25(100):285–300
2. Ahamed MM, Mallick SK (2019) Is financial inclusion good for bank stability? International evidence. J Econ Behav Organ 157:403–427
3. Akerlof GA (1970) The market for "lemons": quality uncertainty and the market mechanism. Q J Econ 84(3):488–500
4. Al-Adwey MA (2019) Does financial inclusion improve the financial performance of commercial banks in Egypt? Pooled OLS approach. J Account Res 6:1–28
5. Al-Eitan G, Al-Own B, Bani-Khalid T (2022) Financial inclusion indicators affect profitability of Jordanian commercial banks: panel data analysis. Economies 10(38):1–13
6. Barth JR, Caprio G, Levine R (2008) Rethinking bank regulation: till angels govern. Cambridge University Press, Cambridge
7. Barth JR, Lin C, Ma Y, Seade J, Song FM (2013) Do bank regulation, supervision and monitoring enhance or impede bank efficiency? J Bank Finance 37(8):2879–2892
8. Beck T, Fuchs M, Singer D, Witte M (2014) Making cross-border banking work for Africa. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Eschborn
9. Beck T, Levine R, Levkov A (2007) Big bad banks? The impact of US branch deregulation on income distribution
10. Beltratti A, Stulz RM (2012) The credit crisis around the globe: Why did some banks perform better? J Financ Econ 105(1):1–17
11. Berger AN, DeYoung R (2001) The effects of geographic expansion on bank efficiency. J Financ Serv Res 19:163–184
12. Berger A, DeYoung R, Flannery M, Lee D, Öztekin Ö (2008) How do large banking organizations manage their capital ratios? J Financ Serv Res 34:123–149
13. Bhattacharyya A, Wright S, Rahman ML (2021) Is better banking performance associated with financial inclusion and mandated CSR expenditure in a developing country? Account Finance 61(1):125–161
14. Bhatter H, Chhatoi B (2023) Financial inclusion and financial performance: evaluating the moderating effect of mandatory corporate social responsibility. J Financ Econ Policy 15(3):208–225
15. Bitar M, Pukthuanthong K, Walker T (2018) The effect of capital ratios on the risk, efficiency and profitability of banks: evidence from OECD countries. J Int Finan Markets Inst Money 53:227–262
16. Bofondi M, Gobbi G (2003) Bad loans and entry in local credit markets. Bank Italy 1–29
17. Bolaji Y, Dauda A, Ayoola A, Olatunji O, Olayinka H (2023) impact of financial inclusion on bank's performance in Nigeria. Nigerian J Bank Financ Issues (NJBFI) 9(1):101–114
18. Bose S, Saha A, Khan HZ, Islam S (2017) Non-financial disclosure and market-based firm performance: the initiation of financial inclusion. J Contemp Account Econ 13(3):263–281
19. Boyd JH, Chang C, Smith BD (1998) Moral hazard under commercial and universal banking. J Money Credit Bank 30(3):426–468
20. Brickley JA, Linck JS, Smith CW Jr (2003) Boundaries of the firm: evidence from the banking industry. J Financ Econ 70(3):351–383
21. Calomiris CW, Kahn CM (1991) The role of demandable debt in structuring optimal banking arrangements. Am Econ Rev 497–513
22. Castro JP, Ramírez DF, Escobar JM (2021) The relationship between intellectual capital and financial performance in Colombian listed banking entities. Asia Pac Manag Rev 26:237–247
23. Central Bank of Egypt (2018). Financial stability report, (Accessed on 27 Jan 2023) from https://www.cbe.org.eg/-/media/project/cbe/page-content/rich-text/financial-stability/financial-stability-report-2018.pdf
24. Central Bank of Egypt (2021) Financial inclusion strategy report, (Accessed on 27 Jan 2023) from https://www.cbe.org.eg/en/financial-inclusion/financial-inclusion-strategy
25. Dabla-Norris Era, Ji Yan, Robert Townsend D, Unsal Filiz (2015) Identifying constraints to financial inclusion and their impact on GDP and inequality: a structural framework for policy. IMF Work Pap 15(22):1. https://doi.org/10.5089/9781498381598.001
26. Damrah S, Elian M, Atyeh M, Shawtari F, Bani-Mustafa A (2023) A linear mixed model approach for determining the effect of financial inclusion on bank stability: comparative empirical evidence for Islamic and conventional banks in Kuwait. Mathematics 11(7):1698
27. Dar AB, Ahmed F (2021) Financial inclusion determinants and impediments in India: insights from the global financial inclusion index. J Financ Econ Policy 13(3):391–408

28. Demirgüç-Kunt A, Huizinga H (2010) Bank activity and funding strategies: the impact on risk and returns. J Financ Econ 98(3):626–650
29. Diamond DW (1984) Financial intermediation and delegated monitoring. Rev Econ Stud 5(1):93–414
30. El-Ansary O, Hafez H (2015) Determinants of capital adequacy ratio: an empirical study on Egyptian banks. Corp Ownersh Control 13(1)
31. Fahmy M, Ghoneim H (2023) Financial inclusion demand-side determinants: analysis from Egypt. Manag Sustain Arab Rev 2(3):255–284
32. Fauzi F, Basyith A, Idris M (2013) The determinants of capital structure: an empirical study of New Zealand-listed firms. Asian J Finance Account 5(2):1
33. Frank MZ, Goyal VK (2005) Trade-off and pecking order theories of debt. Handb Empir Corp Finance 135–202
34. Gaud P, Jani E, Hoesli M, Bender A (2005) The capital structure of Swiss companies: an empirical analysis using dynamic panel data. Eur Financ Manag 11(1):51–69
35. Giuliani E (2016) Human rights and corporate social responsibility in developing countries' industrial clusters. J Bus Ethics 133:39–54
36. Grohmann A, Klühs T, Menkhoff L (2018) Does financial literacy improve financial inclusion? Cross country evidence. World Dev 111:84–96
37. Han R, Melecky M (2013) Financial inclusion for financial stability: access to bank deposits and the growth of deposits in the global financial crisis. World Bank Policy Res Work Pap (6577)
38. Hannig A, Jansen S (2010) Financial inclusion and financial stability: current policy issues
39. Hassouba TA (2023). Financial inclusion in Egypt: the road ahead. Rev Econ Polit Sci
40. Ilahiyah M, Soewarno N, Jaya I (2020) The effect of intellectual capital and financial services knowledge on financial inclusion. J Asian Financ Econ Bus 8(1):247–255
41. Inoue T (2019) Financial inclusion and poverty reduction in India. J Financ Econ Policy 11(1):21–33
42. Islam M, Nishiyama S (2016) The determinants of bank net interest margins: a panel evidence from South Asian countries. Res Int Bus Financ 37:501–514
43. Jajah Y, Anarfo EB, Aveh FK (2022) Financial inclusion and bank profitability in Sub-Saharan Africa. Int J Financ Econ 27(1):32–44
44. Jeitschko T, Jeung S (2005) Incentives for risk-taking in banking – a unified approach. J Bank Finance 29(3):759–777
45. Kacperczyk M, Schnabl P (2013) How safe are money market funds? Q J Econ 128(3):1073–1122
46. Khatib SF, Hendrawaty E, Bazhair AH, Rahma IAA, Al Amosh H (2022) Financial inclusion and the performance of banking sector in Palestine. Economies 10(10):247
47. Kim H, Berger PD (2008) A comparison of capital structure determinants: the United States and the Republic of Korea. Multinatl Bus Rev 16(1):79–100
48. Kumar S (2013) Banking reforms and the evolution of cost efficiency in Indian public sector banks. Econ Chang Restruct 46:143–182
49. Kumar V, Thrikawala S, Acharya S (2022) Financial inclusion and bank profitability: evidence from a developed market. Global Finance J 53:100609
50. Laeven L, Levine R (2009) Bank governance, regulation and risk taking. J Financ Econ 93(2):259–275
51. López T, Winkler A (2019) Does financial inclusion mitigate credit boom-bust cycles? J Financ Stab 43:116–129
52. Matemilola BT, Bany-Ariffin AN, Azman-Saini WNW, Nassir AM (2019) Impact of institutional quality on the capital structure of firms in developing countries. Emerg Mark Rev 39:175–209
53. Mazur K (2007) The determinants of capital structure choice: evidence from Polish companies. Int Adv Econ Res 13:495–514
54. Mehran H, Thakor A (2011) Bank capital and value in the cross-section. Rev Financ Stud 24(4):1019–1067
55. Mehrotra AN, Yetman J (2015) Financial inclusion-issues for central banks. BIS Q Rev Mar
56. Modigliani F, Miller MH (1958) The cost of capital, corporation finance and the theory of investment. Am Econ Rev 48(3):261–297
57. Modigliani F, Miller MH (1963) Corporate income taxes and the cost of capital: a correction. Am Econ Rev 53(3):433–443
58. Moyer SE (1990) Capital adequacy ratio regulations and accounting choices in commercial banks. J Account Econ 13(2):123–154
59. Myers SC (1984) Finance theory and financial strategy. Interfaces 14(1):126–137
60. Myers SC, Majluf NS (1984) Corporate financing and investment decisions when firms have information that investors do not have. J Financ Econ 13(2):187–221
61. Nasr AK, Alaei S, Bakhshi F, Rasoulyan F, Tayaran H, Farahi M (2019) How enterprise risk management (erm) can affect on short-term and long-term firm performance: evidence from the Iranian banking system. Entrep Sustain Issues 7(2):1387
62. Ndebbio JE (2004) Financial deepening, economic growth and development: evidence from selected sub-Saharan African Countries
63. Neaime S, Gaysset I (2018) Financial inclusion and stability in MENA: evidence from poverty and inequality. Financ Res Lett 24:230–237
64. Nguyen T (2020) Measuring financial inclusion: a composite FI index for the developing countries. J Econ Dev 23(1):77–99
65. Nizam R, Karim ZA, Rahman AA, Sarmidi T (2020) Financial inclusiveness and economic growth: new evidence using a threshold regression analysis. Econ Res-Ekonomska Istraž 33(1):1465–1484
66. Octavia M, Brown R (2009) Determinants of bank capital structure in developing countries: regulatory capital requirement versus the standard determinants of capital structure. J Emerg Mark 2:50–62
67. Ozili PK (2021) Bank profitability determinants: comparing the United States, Nigeria and South Africa. Nigeria South Africa (January 1, 2021)
68. Poghosyan T, Čihak M (2011) Determinants of bank distress in Europe: evidence from a new data set. J Financ Serv Res 40:163–184
69. Richard J (2011) Putting to hazard a certainty: Lotteries and the romance of gambling in eighteenth-century England. The romance of gambling in the eighteenth-century British novel. Palgrave Macmillan UK, London, pp 18–44
70. Sarma M, Pais J (2011) Financial inclusion and development. J Int Dev 23(5):613–628
71. Sedera R, Risfandy T, Futri I (2022) Financial inclusion and bank profitability: evidence from Indonesia. J Account Invest 23(3):398–412
72. Sethi D, Acharya D (2018) Financial inclusion and economic growth linkage: some cross-country evidence. J Financ Econ Policy 10(3):369–385
73. Shihadeh F (2020) The influence of financial inclusion on banks' performance and risk: new evidence from MENAP. Banks Bank Syst 15(1):59–71
74. Terzi N (2015) Financial inclusion and Turkey. Acad J Interdiscip Stud 4:269
75. Vo D, Nguyen N (2021) Does financial inclusion improve bank performance in the Asian region? Asian-Pacific Econ Liter 35(2):123–135
76. Vo DH, Van LT-H, Dinh LT-H, Ho CM (2020) Financial inclusion, corporate social responsibility and customer loyalty in the banking sector in Vietnam. J Int Stud 13(4):9–23. https://doi.org/10.14254/2071-8330.2020/13-4/1
77. Yakubu I, Musah A (2022) The nexus between financial inclusion and bank profitability: a dynamic panel approach. J Sustain Financ Invest 1–12
78. Ying Q, Hassan H, Ahmad H (2019) The role of a manager's intangible capabilities in resource acquisition and sustainable competitive performance. Sustainability 11(2):527

Publisher's Note

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