SCIENTIFIC CULTURE
www.sci-cult.com

SCIENTIFIC CULTURE, Vol. 12, No. 4, (2026), pp. 5600-5617
Open Access. Online & Print

DOI: 10.5281/zenodo.12426598

RISK-TAKING AND BANK PERFORMANCE IN DIGITAL BANKING: EVIDENCE FROM EMERGING MARKET INSTITUTIONS

Amerta Mardjono[1]*, Haris Maupa[2], Ignatius Roni Setyawan[3]

[1]Department of Doctoral Management Science, Faculty of Economics and Business, Universitas Tarumanagara, 11440, Indonesia; ORCID iD: https://orcid.org/0009-0005-1031-6847; Email: mardjonoa@gmail.com
[2]Department of Doctoral Management Science, Faculty of Economics and Business, Universitas Hasanuddin, 90245, Indonesia; ORCID iD: https://orcid.org/0009-0000-4721-5517; Email: harismaupa1959@gmail.com
[3]Department of Doctoral Management Science, Faculty of Economics and Business, Universitas Tarumanagara, 11440, Indonesia. ORCID iD: https://orcid.org/0000-0003-0678-4179; Email: ign.s@fe.untar.ac.id

Received: 07/11/2025
Accepted: 25/03/2026

Corresponding Author: Amerta Mardjono (mardjonoa@gmail.com)

ABSTRACT

This study examines the impact of risk behavior on the profitability of banks in digital banking institutions and those undergoing digital transformation. Referencing risk-return theory, moral hazard theory, agency theory, and charter value theory, this study analyzes how credit risk and liquidity risk affect bank profitability. Using panel data from 18 digital and hybrid banks for the period 2016–2023 (144 bank-year observations), panel regression techniques are used to estimate the impact of non-performing loans (NPLs) and the loan-to-deposit ratio (LDR) on return on assets (ROA) and return on equity (ROE). The empirical results show that credit risk, as measured by NPLs, has a statistically significant positive effect on ROA and ROE, suggesting that higher risk is associated with an increase in short-term profitability. These results point to an aggressive lending strategy and aggressive risk transfer behavior in digitally oriented banking models. On the other hand, the liquidity position measured by LDR shows a marginal negative impact on ROA and no significant impact on ROE, suggesting that liquidity aggressiveness plays only a minor role in shaping bank profitability. These findings contribute to the ongoing debate on the risk-return trade-off by showing that, in a digital banking environment, increased risk-taking can temporarily boost a bank's profitability on a balance sheet basis. However, such profitability gains may not be sustainable in the long term, as a sustained accumulation of credit risk can erode capital reserves and jeopardize financial stability. From a regulatory perspective, these findings underscore the importance of forward-looking supervision, dynamic provisions, and improved governance mechanisms to reduce incentives for excessive risk-taking in digital banking. The study enriches the literature by combining classical financial risk theories with the dynamics of modern digital banking and provides relevant insights for regulators overseeing technology-oriented financial institutions.

KEYWORDS: Digital Banking; Risk-Taking; Bank profitability; Credit Risk; Liquidity Risk.

1. INTRODUCTION

The global banking industry is currently undergoing profound change, driven by the emergence of digital banks and hybrid banking models. This digital transformation is rapidly changing the financial services landscape, particularly in developing countries, where financial technology innovations are increasingly providing a viable alternative to traditional banking services and expanding access for populations that have previously been underserved by banking services (Saal et al., 2017). Unlike traditional banking institutions, digital banks use technology platforms, big data analytics, and app-based distribution to achieve unprecedented speed in lending and customer acquisition (Bresciani et al., 2021; Gulati et al., 2025; Shonubi, 2025). However, this transformation leads to a fundamental duality: while digitalization promises more efficient cost structures and improved operational efficiency, it also creates new forms of credit and liquidity risks that are potentially more volatile (Allen et al., 2021; Mavlutova et al., 2025). In this purely digital environment, risk-taking goes beyond purely operational consequences and becomes a key strategic decision one that has direct and immediate implications for the bank's profits and its long-term viability.

The relationship between risk-taking and bank profits has long been a central topic in finance, but its manifestation in digital banking remains theoretically unclear. The classic risk-return trade-off paradigm suggests a positive relationship, whereby higher risk exposure must theoretically be offset by higher returns (Bannier et al., 2023). On the other hand, agency theory argues that misaligned incentives—particularly moral hazards arising from implicit deposit insurance schemes or government guarantees—can cause managers to take excessive risks that increase short-term profits at the expense of long-term stability (Bhagat & Laurion, 2024; Delis et al., 2022). A more bank-focused perspective, the charter value hypothesis, argues that banks with high charter value are incentivized to engage in prudent risk management practices to protect their future earnings and therefore predicts a negative relationship between risk and return (Arping, 2019; Chronopoulos et al., 2023). The realization of these conflicting theoretical predictions in the context of digital banks where the value of the license may not yet be proven, growth requirements are very high, and traditional regulatory safeguards may not fully apply remains an open and urgent empirical question.

At the operational level, the two most important risk dimensions for a bank's profitability are credit risk and liquidity risk. Credit risk, which is typically measured by the non-performing loan (NPL) ratio, reflects the quality of a bank's productive assets and the effectiveness of its credit risk management framework. An increase in NPLs indicates a deterioration in borrowers' ability to repay their debts, which ultimately depresses net income and reduces the bank's profits (Fallanca et al., 2020; Le et al., 2022; Vuong et al., 2024). For digital banks, which often rely on algorithmic underwriting and machine learning-based credit assessments to serve underserved populations with limited credit histories, the risk of rapid asset quality deterioration is a particularly important issue (Akinbowale et al., 2024; Singh et al., 2026). Liquidity risk, often measured by the loan-to-deposit ratio (LDR), reflects the aggressiveness of the bank's lending activities. While a high LDR ratio can increase interest income, it also increases vulnerability to funding shocks, especially when the deposit base is less "stable"—a common feature of app-based digital banks, where customers can switch service providers with a few clicks on their smartphones (He et al., 2025; Saeed & Donkoh, 2026).

The destructive potential of these risks when poorly managed has become clear in recent history. While the global financial crisis of 2007–2008 exposed the dangers of systemic credit risks and liquidity mismatches in complex and interconnected institutions (Andrieş et al., 2024; Elliott et al., 2021; Fang et al., 2025; Maghyereh, 2024), the collapse of Silicon Valley Bank (SVB) in 2023 is a more recent and digitally relevant warning. The collapse of SVB shows how a seemingly traditional liquidity crisis can be exacerbated by digital dynamics: the rapid spread of information via social media platforms and the ease of withdrawing funds via mobile banking apps triggered a bank run of unprecedented speed, compressing the classic liquidity spiral into a matter of hours (Larsson & Viitaoja, 2017; Mogaji & Nguyen, 2024). This event makes it clear that in the digital age, the transmission mechanisms from risk exposure to erosion of profitability are not only faster but also potentially more severe and less predictable than in traditional banking models.

From a measurement perspective, return on assets (ROA) and return on equity (ROE) remain fundamental indicators of a bank's profitability, as they reflect the efficiency of asset utilization and the effectiveness of capital management in generating profits for shareholders (Biswas et al., 2025; Hassan et al., 2026; Misra & Sahoo, 2026). ROA measures a

bank's ability to optimize its total assets to generate profits, while ROE reflects the final return to shareholders. In digital banking, a leaner cost structure characterized by lower branch costs and a higher degree of automation—can theoretically improve both ROA and ROE. However, these operational advantages can quickly be negated if the credit risks of digital loans materialize or if liquidity reserves prove insufficient in times of market stress (Ye & Zhao, 2024).

The empirical literature on the risk-return trade-off shows mixed and often contradictory results. Studies on traditional banks in emerging markets typically report negative effects of credit risk on returns, consistent with the view that poor assets reduce profits (Naouar et al., 2024). In contrast, studies focusing on emerging markets or fintech lenders sometimes document a positive or insignificant relationship, possibly due to higher interest margins that compensate for the higher risk, or because digital loans are relatively new and not yet mature and have not yet transitioned to "non-performing" status (Aleemi et al., 2023; Lavrinenko et al., 2023). These unclear results point to a more complex reality: the relationship may not be linear, may depend on the institutional context, or may be moderated by the characteristics of the business model—all of which are highly relevant to the rapidly growing field of digital banking.

This study fills an important research gap by focusing on the unique and under-researched context of digital and hybrid banks in emerging markets. Although there is a wealth of literature on the performance of conventional banks, empirical studies that simultaneously model the effects of credit risk (NPL) and liquidity risk (LDR) on the profitability (ROA and ROE) of digitally native or digitally transforming institutions remain very rare. Furthermore, the existing literature typically assumes a linear relationship between risk and profitability, potentially overlooking the existence of an optimal risk threshold the tipping point at which the marginal impact of risk on profitability changes from positive to negative. This nonlinear hypothesis is particularly relevant for digital banks, which often pursue aggressive growth targets in their early years, which can lead them to take risks that exceed sustainable levels. Furthermore, most previous studies analyze individual risk dimensions separately, even though credit and liquidity risks are inextricably linked in practice and should be analyzed within an integrated analytical framework (Greenwood & Warren, 2022; Guthrie et al., 2020; Rahma et al., 2025). Against this backdrop, this study aims to analyze the impact of risk appetite represented by non-performing loans (NPLs) and the loan-to-deposit ratio (LDR) on bank profitability, measured by return on assets (ROA) and return on equity (ROE), using a sample of digital and hybrid banks operating in emerging markets between 2016 and 2023. This study contributes to the literature in three key and innovative ways. First, given the uniqueness of the context, it provides the first systematic empirical evidence of the risk-return trade-off in the unique operating context of digital banks in emerging markets, thereby challenging the direct application of traditional banking theories and insights gained from samples of conventional banks. Second, in terms of analytical integration, this study expands on previous work by incorporating credit and liquidity risks into an integrated empirical framework, thereby overcoming the fragmentation common in the literature, where these two fundamental risk dimensions are typically analyzed separately. Third, with regard to deeper understanding, this study examines potential nonlinear effects in the risk-return relationship and offers a more detailed and policy relevant perspective on the optimal level of risk—an important contribution for bank managers designing growth strategies and for regulators tasked with ensuring financial stability while promoting innovation in technology driven financial institutions.

2. LITERATURE REVIEW

A. Theoretical foundations of risk appetite in banking

Risk–Return Trade-Off Theory

The risk-return trade-off is one of the fundamental principles of finance, which states that higher returns are associated with higher risk. In banking, this theory implies that banks that engage in risky lending activities such as lending to borrowers with high returns but high risk should earn higher profits, provided that the risk is appropriately priced (Hill & Pacces, 2018). The intermediary function of banks inherently involves risk transformation, whereby these institutions convert short-term deposits into long-term assets with higher returns. However, it is important to distinguish between ex-ante risk-taking and ex-post risk. Although risk-return theory predicts a positive relationship between expected risk and return, a deterioration in realized credit quality as measured by the proportion of non-performing loans (NPLs) may reflect the materialization of previously existing risks. After a loan is declared in default, banks

face higher provisioning expenses, lower interest income, and potential capital erosion (Begum et al., 2024). Therefore, according to strict risk-return logic, realized credit risk should have a negative impact on profitability unless the previous interest margins offset the subsequent losses. In digital banking models, where automated credit checks and rapid lending are common, ex ante risk assessment could be more aggressive, potentially reinforcing the short-term positive relationship between risk-taking and profitability (Hasan et al., 2025).

Moral Hazard Theory

Moral hazard theory offers an alternative explanation for the risk-taking behavior of banks. When banks operate under an explicit deposit insurance system or an implicit government guarantee, managers and shareholders may have incentives to take higher risks, as part of the risk of loss is transferred to external stakeholders (Chen et al., 2021; Delis et al., 2022). This risk transfer behavior can lead to aggressive lending strategies aimed at maximizing short-term profits. Under moral hazard conditions, banks may expand their loan portfolios into riskier segments in order to achieve higher interest margins. Although such strategies may increase the probability of loan defaults, profitability indicators such as ROA and ROE could initially improve before the losses are fully identified (Abdelsalam et al., 2024; Rahmania et al., 2024). Gueyie & Lai (2003) show that the risk behavior of banks is significantly influenced by ownership structure and governance incentives, further underscoring the relevance of moral hazard considerations. In a digital banking system where customer acquisition and lending are rapid, the speed of credit expansion can further exacerbate the tendency toward moral hazard. The absence of physical branches and the scalability of algorithmic credit models can further increase incentives for risk-taking, especially when regulation lags behind technological innovations.

Agency Theory

Agency theory emphasizes the conflict of interest between shareholders and managers (Aladwey et al., 2026; Al-Faryan, 2024; Mensah et al., 2025). In banking institutions, the compensation structure for managers often includes performance-related incentives linked to accounting metrics such as ROA and ROE (Salaudeen et al., 2026). As a result, managers may pursue risky and growth-oriented lending strategies to boost short-term performance and their personal compensation, even though such strategies may increase long-term risk. Mensah et al. (2025) notes that governance structure significantly influences the risk behavior of banks and points out that weak control mechanisms can encourage excessive risk-taking. Similarly, Brunner-Kirchmair & Wiener (2019) found that the incentive structure influenced risk behavior prior to the financial crisis. In the digital banking environment, agency conflicts may increase due to competitive pressures and technology investment costs. Managers of banks undergoing digital transformation may be under intense pressure to demonstrate rapid growth, customer expansion, and profitability improvements. As a result, high NPL rates may reflect previous aggressive lending decisions that temporarily improved reported performance.

Charter Value Theory

Franchise value theory states that banks with high franchise value have a stronger incentive to act prudently in order to secure their future economic returns (Naili & Lahrichi, 2022b). If competition increases and franchise value declines, banks may engage in risky activities to secure their profits. Foros et al. (2026) argues that increasing competition squeezes profit margins and weakens the incentive to be cautious. In the digital banking market, barriers to entry are often lower than in traditional banking due to technological innovations and regulatory sandboxes (Joia & Proença, 2022). This increased competition can reduce franchise value and lead to riskier behavior. With declining franchise value, banks may prioritize short-term profits over long-term stability, which may explain the positive relationship between realized credit risks and reported performance. Franchise value theory therefore suggests that the risk-return relationship depends on the intensity of competition and institutional structure.

B. Credit risks and bank profits

Credit risk, which is usually represented by the NPL ratio, reflects the deterioration in the quality of the loan portfolio that has already occurred (Bhowmik & Sarker, 2021). The "poor management" hypothesis Naili & Lahrichi (2022b) states that inefficiencies in monitoring and securing loans lead to higher default rates, which in turn reduce profits. An increase in the NPL ratio requires higher provisions and loan loss reserves, which directly leads to a decline in net profit and a reduction in ROA and ROE. Empirical studies largely confirm the negative relationship between credit risk and profitability. Qureshi & Lamarque (2023) found that higher credit risk significantly

reduces the profitability of banks in European institutions. Yahaya et al. (2022) show that bank-specific inefficiencies and macroeconomic shocks increase NPLs and weaken financial performance. Laryea et al. (2016) also report the negative impact of NPLs on capital adequacy and profits. However, alternative evidence suggests that moderate risk-taking can increase profitability through higher interest margins and credit growth (Tondi & Rintamäki, 2026). In a rapidly growing digital lending environment, interest income may increase before a deterioration in credit quality becomes apparent. Therefore, the empirical relationship between NPLs and profitability may reflect the dynamic interaction between risk pricing, credit growth, and provisioning.

C. Liquidity risk and bank profits

Liquidity risk arises from the role of maturity transformation performed by banks (Edwards, 2021). Since banks finance long-term loans with short-term deposits, they are inherently vulnerable to deposit withdrawal shocks. Wellink (2023) highlights how a liquidity spiral can quickly undermine financial stability in times of crisis. The loan-to-deposit ratio (LDR) describes the extent to which lending is financed by deposits. A higher LDR may indicate aggressive intermediation, potentially leading to higher interest income. However, an excessive LDR increases refinancing risk and vulnerability to liquidity shortages (M. H. Nguyen et al., 2025). Empirical results are still mixed. López-Penabad et al. (2022) and Mohammad et al. (2020) document a negative relationship between liquidity risk and profitability. On the other hand, Tripathi et al. (2019) show that a well-managed liquidity position can support profitability in emerging markets. In the context of digital banking, liquidity risk can be exacerbated by real-time transaction systems and the rapid dissemination of information. Recent bank failures in the digital age show how quickly liquidity pressure can increase when customer confidence declines.

D. Accounting-based profitability indicators

Bank profits can be measured using market-based indicators (e.g., Tobin's Q, market capitalization) or accounting indicators (e.g., ROA and ROE). In banking research, ROA and ROE are frequently used because they reflect operational efficiency and returns to shareholders (Lee & Suh, 2022; Salaudeen et al., 2026). ROA reflects the efficiency of management in using assets to generate income, while ROE measures the return to shareholders relative to equity (Gidage et al., 2025; Jensen & Kristensen, 2022; Salaudeen et al., 2026). Although these metrics do not directly reflect market valuation, they are highly relevant in emerging markets and partially listed banking systems where market-based indicators may be volatile or unavailable. Furthermore, accounting indicators provide direct insights into internal performance dynamics and are therefore well suited for analyzing how risk behavior affects the profits of banks in digital and hybrid banking institutions.

3. MATERIAL AND METHOD

1. Research objective, hypothesis development, and model specification

Research Objective

This study aims to empirically examine the impact of risk appetite on the profitability of digital and hybrid banks operating in emerging markets. Specifically, this study analyzes how credit risks, which can be approximated by the non-performing loan (NPL) ratio, and liquidity risks, which can be approximated by the loan-to-deposit ratio (LDR), together affect the profitability of digital and hybrid banks. NPL) and liquidity risks, measured by the loan-to-deposit ratio (LDR), jointly influence the profitability of banks, as measured by return on assets (ROA) and return on equity (ROE) in the period 2016–2023.

The objective of this study is based on three interrelated pillars of financial economics. First, the risk-return trade-off theory, Ansari (2018) states that rational risk-taking should lead to a corresponding return, suggesting a positive relationship between risk exposure and profitability when risks are accurately assessed and well managed. Second, agency theory (Orlando & Bace, 2021) introduces the possibility of moral hazard, whereby managers protected by limited liability or deposit insurance may take excessive risks that increase short-term profits but jeopardize long-term solvency. Third, the charter value hypothesis (Haq et al., 2024) offers a contrary prediction: banks with high charter value have a strong incentive to limit risk-taking in order to protect future profits, implying a negative relationship between risk and profit. The coexistence of these contradictory theoretical predictions leads to empirical tension that is particularly acute in the context of digital banking, where charter value is often untested, growth requirements dominate, and traditional governance mechanisms may lag behind technological innovations. This study was also inspired by three specific gaps in the existing literature. First, although many studies have examined the determinants of bank profitability in conventional banking (Al-Harbi, 2019; Bolarinwa et al., 2019; Le et al., 2022), there is

very little empirical evidence focusing specifically on digital and hybrid banks especially those operating in emerging markets. Second, previous studies typically analyze credit risk and liquidity risk separately, even though there are strong theoretical arguments that these two risk dimensions are inextricably linked and should be analyzed within an integrated framework (Alam et al., 2025; Zhao et al., 2025). Modeling these two types of risk simultaneously is extremely important in order to avoid biases due to missing variables and to capture potential interactions that may be particularly pronounced in digital banking models, where rapid credit expansion can strain the liquidity position. Third, the existing literature typically assumes a linear relationship between risk appetite and return (Bateman et al., 2020). However, recent theoretical arguments and empirical evidence suggest a possible nonlinear relationship specifically, an inverted U-shaped pattern in which moderate risk-taking increases profits, but excessive risk-taking reduces profits. This nonlinear hypothesis has important policy implications but has not yet been fully tested in the realm of digital banking.

Hypotheses Development

Credit Risk (NPL) and Bank profitability

The relationship between credit risk and bank profits can be understood from various theoretical perspectives. From a traditional banking perspective, it is assumed that a higher NPL ratio reduces profits through three main channels. First, non-performing loans do not generate interest income but still incur financing costs, which directly leads to a reduction in the net interest margin. Second, accounting standards require banks to make provisions for expected credit losses, which are recorded as costs that reduce net profit before the provisions are actually made. Third, high NPL ratios require greater administrative effort and more operational resources for collection and credit recovery measures, diverting focus from lucrative lending opportunities (Haile et al., 2025). The "poor management" hypothesis, formally formulated by Berger and DeYoung (Giannopoulos & Kariofyllas, 2025), provides a behavioral explanation for the negative relationship between NPLs and profitability. This hypothesis states that managers with poor credit assessment skills, weak underwriting standards, or inadequate monitoring skills simultaneously achieve higher NPLs and lower profits. Inefficient managers fail to control operating costs and maintain credit quality, leading to a simultaneous decline in performance indicators. This hypothesis has found considerable empirical support in various banking markets and institutional contexts (Chan et al., 2015). However, the agency theory perspective introduces a more nuanced possibility. Managers who are protected by limited liability or operate under moral hazard incentives may deliberately pursue a risky lending strategy that generates above-average interest income in the short term, even if these loans ultimately default (Bienz et al., 2026). In such cases, a short-term positive relationship between NPLs and profitability may emerge if the higher interest margins on risky loans exceed provision expenses—a phenomenon that may be particularly relevant in the context of digital banking, where the loan portfolio is still young and defaults have not yet fully materialized. The context of digital banking raises unique considerations that may weaken the link between credit risk and profitability. First, digital banks in emerging markets often use algorithmic underwriting and machine learning-based credit assessments to serve customer segments with limited traditional credit history (Bhatnagr et al., 2024). While these technologies can improve the efficiency of credit assessment, their performance during economic downturns has not been fully tested, leading to uncertainty about credit quality dynamics. Second, digital banks pursue aggressive growth strategies to gain size and market share, potentially taking on higher credit risks to rapidly expand their loan portfolios. Third, the young age of digital banks' loan portfolios means that many of the loans originated during the sample period may not yet be mature, so the default risk is not yet fully visible, potentially obscuring the true relationship between underwriting standards and profitability. Despite these nuances, most theoretical arguments and empirical evidence suggest that persistently high credit risk ultimately hurts profitability. While aggressive lending may temporarily boost profits, the accumulation of non-performing loans ultimately requires provisions that erode profits and capital. Furthermore, in a transparent and rapidly communicating digital environment, a deterioration in credit quality can trigger a market discipline effect that increases financing costs and further pressures profitability (Ghosh, 2023). Therefore, the following hypothesis is proposed:

H1a: Non-Performing Loan (NPL) ratio has a negative effect on Return on Assets (ROA) in digital and hybrid banks operating in emerging markets.

H1b: Non-Performing Loan (NPL) ratio has a negative effect on Return on Equity (ROE) in digital and hybrid banks operating in emerging markets.

Liquidity Risk (LDR) and Bank profitability

The relationship between liquidity risk and bank profits is theoretically unclear and reflects the

fundamental tension in the banking business model. On the one hand, banks are designed to convert liquid deposits into illiquid loans this maturity transformation function is the main source of bank profits and economic value (Vuong et al., 2023). A higher LDR indicates more intensive participation in this core function and implies a positive relationship between LDR and profitability, assuming other factors remain constant. Banks that maintain an excessively low LDR hold unused liquid assets that generate minimal returns and may thus forego lucrative lending opportunities (Eltweri et al., 2024). On the other hand, an excessive LDR makes the bank vulnerable to liquidity risks. If a bank with a very high LDR experiences unexpected deposit outflows, it may be forced to sell assets at a discount, borrow at high interest rates from emergency facilities, or reduce new lending—all of which would hurt profitability (Arnone et al., 2024). Furthermore, a high LDR ratio may signal to market participants that the bank is overly indebted, which could lead to a downgrade in its credit rating, higher wholesale funding costs, or deposit outflows, further exacerbating liquidity pressures (Grandi & Guille, 2023). This suggests a potential negative relationship at very high LDR ratios. The liquidity buffer hypothesis (Tran & Nguyen, 2025) integrates these opposing forces by proposing that there is an optimal LDR range. Within this range, banks balance the marginal benefits of additional loans with the marginal costs of reduced liquidity. Deviations below the optimal range lead to profit losses due to lost interest income; deviations above the optimal range increase vulnerability to liquidity shocks and may reduce overall profits when the probability and expected costs of these shocks are taken into account. This suggests a nonlinear, inverted U-shaped relationship between LDR and profit a possibility we explicitly explore in our empirical design. The context of digital banking fundamentally changes the dynamics of liquidity risk and its relationship to profit. Three distinctive features deserve particular attention. First, digital banks typically rely on a less stable deposit base than traditional banks. Customers who sign up via a mobile app can switch providers with minimal effort, and interest rate sensitivity may be higher due to easy access to competitors' offers. This means that digital banks are exposed to higher liquidity risk at a given LDR level, as their deposit funding is more vulnerable to rapid outflows (Isa et al., 2026). Second, the speed at which a bank run occurs is much higher in the digital age. The collapse of Silicon Valley Bank in 2023 shows how communication via social media and mobile banking apps can shorten a traditional bank run, which normally takes days or weeks, to a matter of hours (Cookson et al., 2026). This accelerated dynamic means that liquidity imbalances that may be manageable for traditional banks can be fatal for digital banks, as there is not enough time for corrective action. Third, digital banks in emerging markets often face less developed mechanisms of last resort and may have limited access to central bank liquidity facilities compared to established institutions. This exacerbates the consequences of poor liquidity management, as the safety net is thinner and less reliable. Based on theoretical and empirical arguments, the following hypothesis is proposed:

H2a: Loan-to-Deposit Ratio (LDR) has a significant effect on Return on Assets (ROA) in digital and hybrid banks operating in emerging markets.

H2b: Loan-to-Deposit Ratio (LDR) has a significant effect on Return on Equity (ROE) in digital and hybrid banks operating in emerging markets.

Integrated framework for risk appetite and bank profitability

Risk-taking at digital banks can be understood as a function of credit risk and liquidity risk, both of which affect the bank's profitability. Accordingly, the conceptual framework of this study can be expressed as follows:

Risk-Taking = f (Credit Risk, Liquidity Risk)

Bank profitability = f (Risk-Taking)

Where:

Credit Risk = f (NPL)

Liquidity Risk = f (LDR)

Bank profitability = f (ROA, ROE)

This integrated model is consistent with the theoretical thesis that the profitability of banking institutions depends on optimal risk management practices (Harb et al., 2023).

Model specifcation

Based on the latest empirical findings on bank failures and the three Basel Accords, we used capital adequacy ratios (capital risk), credit risk, and liquidity risk to describe basic risk scenarios for the banking sector. Therefore, three separate baseline models were developed for these three main risks in banking. With the aim of investigating risk-resistant strategies, the following multivariate regression equations were used to test the hypothesis:

$$ROA_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 LDR_{it} + \varepsilon it \quad (1)$$

$$ROE_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 LDR_{it} + \varepsilon it \quad (2)$$

Where:

i denotes individual digital banks

t denotes the time period

β_0 represents the constant term

β_1 and β_2 represent regression coefficients

ε_{it} denotes the error term

ROA and ROE are both expressed as percentages. The NPL ratio is calculated as the total amount of non-performing loans divided by the total amount of outstanding loans, in line with the measurement approach used by Cortés & Soriano (2024). The LDR ratio is calculated as total loans divided by total deposits, in line with the method proposed by Isa et al. (2026). Panel regression analysis is used because it can capture both cross-sectional and time series variations, thus allowing for more robust conclusions about the dynamic relationship between risk-taking and bank profits.

Variable definition

Return on Assets (ROA). ROA measures the efficiency of bank management in using its asset base to generate profits. As Eltweri et al. (2024) note, ROA is particularly meaningful in banking because it reflects the return on all financial and real assets under the bank's control, regardless of how they are financed. A higher ROA indicates more effective asset allocation and greater operational efficiency. In the context of digital banking, ROA is particularly relevant because digital banks typically operate with a leaner physical footprint and lower intensity of fixed assets, potentially enabling higher asset turnover and greater profits (Castilla-Polo & Sánchez-Hernández, 2025). In line with standard practice, we use the average of total assets (average of the beginning and ending values for the year) to smooth out temporal fluctuations in asset size.

Return on equity (ROE). ROE measures the return on capital invested by shareholders and is therefore an important metric for equity investors. From the shareholders' perspective, ROE reflects how effectively a bank uses its core capital to generate profits (Ali & Aysan, 2025). However, ROE is sensitive to leverage effects: banks can increase their ROE by taking on more debt, which also increases financial risk. Therefore, analyzing ROA and ROE together provides a more complete picture: ROA separates operating performance from financing decisions, while ROE includes the effects of financial leverage (Jha & Kumar Mittal, 2024). This dual measurement approach is particularly important for digital banks, whose capital structure may differ from that of traditional banks due to different regulatory treatment or investor expectations.

Non-performing loans (NPLs). Credit risk—the risk that borrowers will default on their obligations—is a traditional and significant risk for commercial banks. According to the Basel Committee on Banking Supervision guidelines and in line with regulatory reporting standards in most emerging markets (Figuet et al., 2015), loans are classified as non-performing if the payment of principal or interest is more than 90 days past due or if there are indications that full repayment is not possible, regardless of the duration of the payment delay. The NPL ratio reflects the deterioration in asset quality and provides information on both the effectiveness of a bank's lending standards and the performance of its loan portfolio (Naili & Lahrichi, 2022a). The theoretical relationship between NPL and profit is not clear-cut and depends on the context. Traditional banking theory assumes a negative relationship, as higher NPLs require higher provisions for loan losses, which directly reduces net profit and narrows the earnings base (Chronopoulos et al., 2023). However, in the context of digital banking, a positive relationship may emerge if banks with higher risk appetite charge sufficiently high interest rates to offset expected losses, or if aggressive lending strategies temporarily increase interest income before a full deterioration in credit quality occurs (Naveed et al., 2025). The empirical design of this study, particularly the examination of nonlinear effects, aims to decide between these conflicting possibilities. Loan-to-deposit ratio (LDR). Liquidity risk—the risk that a bank will be unable to meet its financial obligations when they fall due without incurring unacceptable losses—has received renewed attention following the collapse of Silicon Valley Bank in 2023. The LDR measures the proportion of a bank's customer deposits that is invested in illiquid loan assets. A higher LDR indicates more aggressive intermediation—the bank lends out a larger portion of its deposit base—which can increase interest income but also reduces the liquid reserves available to cover unexpected withdrawals (Yahyaei et al., 2024). In the context of digital banking, the LDR has additional significance, as digital banks often rely on less stable and interest-sensitive deposits that can be quickly withdrawn via mobile apps, increasing liquidity risk at a given LDR compared to traditional banks with a more stable retail deposit base (Arnone et al., 2024). The predicted relationship between LDR and profitability is also complex. A positive relationship could arise if a higher LDR reflects the placement of productive assets that generate interest income. However, a negative relationship could occur if a high LDR forces the bank to hold larger precautionary liquidity reserves or if it increases the likelihood of costly liquidity shortages. The net effect is an empirical question that this study aims to answer.

2. *Data and method*

Data collection

This study uses a quantitative research design with secondary panel data to analyze the impact of risk

behavior on the profitability of banks in Indonesian digital banks. The panel data approach is particularly well suited to banking research as it can capture cross-sector differences between banks and time series dynamics within banks while controlling for unobservable heterogeneities (Bhiri & BenMabrouk, 2026). By combining these two dimensions, panel estimation increases efficiency, reduces bias from unobserved variables, and strengthens the robustness of statistical conclusions. The sample was selected using a targeted sampling method to ensure suitability for the research objectives (Ahmed, 2024). This approach is necessary because not all banking institutions operate a digital banking model or provide complete information on financial risk indicators. The basic sample consists of 10 digital banks that are officially recognized as digital banking institutions under the supervision of the Financial Services Authority (OJK). The observation period covers the years 2016 to 2023. To increase statistical significance and broaden the generalization, the sample was expanded to include conventional commercial banks that operate digital banking units and have a clear digital transformation strategy, significant digital lending exposure, and a mobile banking model. The addition of these hybrid banks undergoing digital transformation allows for a broader representation of the ever-evolving digital banking landscape in Indonesia, while maintaining conceptual consistency with the research focus.

The data is sourced exclusively from credible institutional sources that are publicly available in Indonesia. These sources include audited financial statements published by individual banks on their official websites; financial reports available through the Indonesia Stock Exchange (IDX) for listed banks; and publications from the Financial Services Authority (OJK), such as the report on commercial bank disclosures, Indonesian banking statistics (SPI), and the banking industry profile. Additional macroeconomic and banking-related statistics are obtained from Bank Indonesia (BI), including publications such as Indonesian Economic and Financial Statistics (SEKI) and Financial Stability Reports. The use of audited financial reports and official regulatory databases increases the reliability, transparency, and objectivity of the data while minimizing measurement errors and reporting biases (Agostino et al., 2025).

All research variables were obtained from standard components of financial reports and expressed as percentages to ensure comparability between banks. Return on assets (ROA) is calculated as net profit divided by average total assets and reflects the efficiency of management in utilizing assets (Iswajuni et al., 2018). Return on equity (ROE) is calculated as net profit after tax divided by total capital and represents the return for shareholders (Zhang & Zhang, 2024). Credit risk is approximated by the non-performing loan (NPL) ratio, which is calculated as the sum of non-performing loans divided by the sum of outstanding loans, in accordance with the regulatory standards of the OJK and the Basel Committee, which classify loans as non-performing if the payment is at least 90 days past due. Liquidity risk is approximated by the loan-to-deposit ratio (LDR), which is measured as total loans divided by total deposits and reflects the aggressiveness of bank intermediation and its liquidity position (Rahmadany et al., 2024). After data collection, the data set was organized into a structured bank-year panel format. Data processing included cross-checking financial figures from various sources, handling missing values, and, where necessary, winsorization to reduce the influence of extreme outliers. The empirical analysis was performed using SPSS, applying panel regression techniques to estimate the effects of NPL and LDR on ROA and ROE.

3. Research method

This study uses a quantitative empirical strategy with panel data regression techniques to analyze the relationship between risk appetite and profitability of banks in digital banking institutions. Given the potential interdependence between risk indicators and profitability, as well as the possibility of bias due to uncontrolled variables and unobservable heterogeneity among banks, careful model specification is required to obtain reliable estimates. For example, while higher non-performing loans (NPLs) may reduce profitability, weak profitability may simultaneously deteriorate asset quality and thus increase credit risk. Similarly, the liquidity position, reflected in the loan-to-deposit ratio (LDR), can affect the bank's profitability, but profitability conditions can also influence lending behavior. This simultaneity requires the use of appropriate panel estimation techniques to minimize biased conclusions. In this study, the hypothesis was tested using a panel regression analysis implemented in SPSS. The empirical estimation uses an integrated multiple linear regression with panel-structured data (observations of banks and years). Since profitability indicators such as ROA and ROE may be persistent over time, the model assumptions were carefully evaluated in this study to ensure the robustness of the conclusions. Prior to the regression estimation, classical assumption tests were performed to validate the model suitability. These

tests included a correlation analysis and a multicollinearity test using the variance inflation factor (VIF) to ensure that the independent variables were not too strongly correlated (Cheng et al., 2022).

Correlation analysis

Table 2 contains information on the dependent and explanatory variables and their correlation with each other. It provides an initial overview of the correlation between the variables of interest. Furthermore, most correlation values are relatively low, which indicates that there are no significant concerns regarding multicollinearity in our proposed econometric model.

Table 2: Correlation matrix.

	ROA	ROE	NPL	LDR
ROA	1			
ROE	0.6227** (0.0000)	1		
NPL	0.1846* (0.0268)	0.2382** (0.0040)	1	
LDR	-0.1719* (0.0393)	-0.055808202 (0.5064)	-0.1664* (0.0462)	1
**. Correlation is significant at the 0.01 level (2-tailed) and *. Correlation is significant at the 0.05 level (2-tailed).				

Test of multicollinearity

Prior to estimating the regression model, this study rigorously evaluated the potential for multicollinearity among the explanatory variables. Multicollinearity can increase the standard error and weaken statistical inference, potentially obscuring the true relationship between risk appetite indicators and bank profits (Amin et al., 2024). Ensuring that no harmful multicollinearity is present is crucial for maintaining the robustness and interpretability of econometric results. To assess this issue, the variance inflation factor (VIF) and tolerance statistics were calculated. The VIF measures the extent to which the variance of the regression coefficients is increased due to linear dependencies between the predictors. In empirical finance and banking studies, a VIF value above 10 is generally considered an indication of a serious multicollinearity problem. Tolerance, defined as the opposite of VIF, reflects the proportion of independent variance in each predictor and must be above 0.10 to ensure the stability of the model. As shown in Table 3, both NPL and LDR have a VIF value of 1.028 in the ROA and ROE specifications, with a corresponding tolerance value of 0.973. These figures are well below the critical threshold and indicate negligible variance inflation. This result provides strong evidence that there is no multicollinearity in the proposed model. Consequently, the estimated coefficients can be reliably interpreted, and the regression results cannot be distorted by the dependence between the explanatory variables.

Table 3: Variance inflation factor (VIF).

Variable	Dependent (ROA)		Dependent (ROE)	
	VIF	1/VIF	VIF	1/VIF
NPL	1.028	0.9727626459	1.028	0.9727626459
LDR	1.028	0.9727626459	1.028	0.9727626459

4. RESULTS AND DISCUSSION

The quantitative analysis in Table 4 shows that the non-performing loan (NPL) ratio has a statistically significant positive impact on both return on assets (ROA) and return on equity (ROE). In particular, NPL has a positive coefficient in the ROA model ($\beta = 0.0842$, $p < 0.05$) and an even stronger positive impact in the ROE model ($\beta = 0.1268$, $p < 0.01$). These results show that higher credit risk is associated with higher profits at the analyzed banking institutions. This result appears to contradict the traditional risk-return perspective, which generally states that a deterioration in credit quality reduces banks' profits (Ozili & Outa, 2017). However, this finding can be interpreted in the context of a high-risk, high-return strategy. Banks that engage in aggressive credit expansion may achieve higher interest margins that exceed the short-term costs of the increase in non-performing loans. This pattern is often observed in emerging banking markets, where credit portfolio expansion precedes the decline in asset quality. Therefore, the positive correlation between NPLs and profitability may reflect a transitional phase of expansion rather than a structural inefficiency.

Table 4: Panel regression results.

Variable	Dependent (ROA)	Dependent (ROE)
NPL	0.0842221** (0.0554)	0.1268276*** (0.0052)
LDR	-0.0233965* (0.0825)	-0.0027494 (0.8413)
CONSTANT	4.3022618	4.1451375
n	144	144
R	0.234	0.239
R square	0.055	0.057
Adjusted R square	0.041	0.044

*Statistically significant at the 0.10 level, **Statistically significant at the 0.05 level and ***Statistically significant at the 0.01 level

With regard to the loan-to-deposit ratio (LDR), empirical results show a statistically significant negative effect on return on assets (ROA) ($\beta = -0.0234$, $p < 0.10$), while the impact on return on equity (ROE) remains statistically insignificant. The negative relationship with ROA shows that excessive lending relative to deposit mobilization can reduce asset efficiency and squeeze profit margins. From a liquidity risk perspective, aggressive intermediation increases financing vulnerability and refinancing risk, particularly in digital banking models that are heavily dependent on short-term deposits and platform-based

financing structures (Vuong et al., 2023). In a digital banking system where switching costs for customers are relatively low and deposits are highly interest-rate sensitive, a high LDR can exacerbate liquidity vulnerability and thus have a more direct impact on asset-based performance than on shareholder returns.

The relatively low R-squared value (0.055 for ROA and 0.057 for ROE) indicates that the basic specification has limited explanatory power. However, low R-squared values are common in studies on bank profitability due to the multidimensional nature of bank profitability, which is influenced by macroeconomic conditions, regulatory capital buffers, technology investment cycles, and competitive dynamics (Haddou & Boughrara, 2025). More importantly, the statistical significance and theoretical coherence of the coefficients in panel studies on banking have greater inferential value than model fit measures alone.

From a theoretical perspective, the positive relationship between NPL and both measures of profitability requires a careful reinterpretation of the conventional risk-return trade-off. Traditional banking literature typically documents a negative relationship between credit risk and profitability and emphasizes the negative impact of deteriorating credit quality on earnings through higher provisioning and monitoring costs (Bhowmik & Sarker, 2021). However, recent findings suggest that this relationship may be more dynamic and temporally asymmetric in a digitally oriented banking model.

In the context of the risk-return trade-off, higher returns are associated with higher risk (Bannier et al., 2023). In digital banking, business models often emphasize rapid expansion of the loan portfolio, data-driven credit assessments, and algorithmic underwriting processes. These mechanisms reduce transaction costs, shorten approval cycles, and facilitate scalable lending. As a result, banks may initially achieve higher interest margins and fee-based income before a full deterioration in credit quality occurs. In this context, a high NPL ratio may reflect the ex post implementation of an aggressive lending strategy that has generated short-term profits. This insight sharpens the traditional risk-return argument by showing that realized credit risks do not always imply an immediate decline in profits, especially in a rapidly growing digital lending ecosystem.

More importantly, these findings are consistent with the moral hazard and agency explanation of banks' risk-taking. Under an implicit deposit insurance system and regulatory guarantees, banks could internalize the profits from high-yield loans while partially externalizing the losses on the downside (Ozili & Outa, 2017). Managers whose compensation structure emphasizes accounting performance indicators such as ROA and ROE may be tempted to pursue an aggressive credit expansion strategy that improves short-term financial metrics (Q. Nguyen et al., 2024). Digital banking platforms can reinforce this incentive structure by facilitating customer acquisition and rapid credit scalability, thereby amplifying the dynamics of yield seeking under competitive pressure. As a result, the observed positive relationship between NPLs and profitability may not reflect superior credit risk management, but rather strategic risk-taking behavior shaped by governance incentives and technological acceleration.

At the same time, the sustainability of such profitability gains must be carefully assessed. Financial fragility theory emphasizes that sustained risk accumulation can erode solvency buffers and increase vulnerability to shocks (Arhinful et al., 2025). While aggressive credit expansion may temporarily boost ROA and ROE, a sustained deterioration in asset quality may ultimately lead to higher provisioning expenses, capital adequacy pressures, and more intense regulatory intervention. These findings point to a potential trade-off over time: short-term profitability gains may come at the expense of long-term stability. This interpretation contributes to the literature by highlighting the importance of distinguishing between near-term accounting and risk-adjusted sustainable value creation.

The limited and inconsistent effects of LDR underscore the structural differences between the transmission mechanisms of credit risk and liquidity risk in the context of digital banking. Unlike traditional banks, which are heavily dependent on the stability of their branches, digital institutions operate in an environment characterized by high deposit mobility and lower switching costs. In this context, liquidity risk is more closely linked to customer confidence, trust in the platform, and the volatility of funding than to the composition of the balance sheet. The negative correlation between LDR and ROA suggests that excess liquidity imposes direct operational constraints and reduces asset efficiency. However, the lack of a significant impact on ROE suggests that an aggressive liquidity policy may not directly affect short-term shareholder returns. This asymmetric pattern suggests that credit risks may increase profitability through the channel of return expansion, while liquidity risks limit profitability through the mechanism of funding stability. This difference has been little explored in previous empirical studies, which often treated bank risks as homogeneous determinants of performance. From a

regulatory perspective, these findings have significant implications. If a systematic increase in short-term profitability is accompanied by an increase in credit risk, regulators should interpret accounting performance measures with caution. Raising prospective provisioning standards, a dynamic stress testing framework, and risk-based capital calibration are essential in a digitally evolving banking system. Macroprudential instruments such as countercyclical capital buffers could be relevant during a period of rapid growth in digital lending. In addition, algorithmic lending models require increased supervision, as automated underwriting processes can mask underlying credit quality risks until losses occur.

5. CONCLUSION

This study aims to analyze the relationship between risk behavior and bank profits in digital banking institutions and those undergoing digital transformation. Using panel regression analysis, this study assesses how credit risk (represented by non-performing loans) and liquidity risk (represented by the ratio of loans to deposits) affect bank profits, measured by ROA and ROE. The results show a complex and context-dependent relationship between risk exposure and bank profitability in today's digital banking system. Empirically, credit risk has a statistically significant positive relationship with both ROA and ROE. These results suggest that higher credit risk exposure is associated with an increase in short-term profitability. From a financial theory perspective, these results can be interpreted through the lens of the risk-return trade-off, whereby higher exposure to high-yield credit segments increases return on assets. However, a more in-depth theoretical framework provides additional insights.

First, from a moral hazard theory perspective, banks operating under an implicit or explicit safety net—such as deposit insurance systems or expected regulatory support—may be tempted to pursue risky lending strategies in order to maximize their returns. Digital banking platforms, which are characterized by rapid lending and algorithmic credit protection, can further reinforce this incentive structure. The observed positive correlation between NPLs and profitability could be an expression of risk shifting, especially if losses on the downside are partially passed on to the deposit insurance system or broader financial stability mechanisms. Second, agency theory offers another level of explanation. Bank managers may pursue aggressive growth strategies and take risks to signal performance improvement, increase compensation linked to profitability metrics, or boost market valuation. In banks undergoing digital transformation, performance pressure often increases due to technology investment costs and competitive disruption. As a result, short-term profitability gains associated with higher credit risk may reflect management incentives that are not aligned with the long-term values of shareholders or stakeholders. Third, these results can also be interpreted using charter value theory. According to this framework, banks with strong franchise value tend to behave more cautiously to secure their long-term earnings. Conversely, banks facing intense competition—such as digital newcomers operating in an environment with low barriers to entry—may experience a decline in their franchise value, leading to riskier behavior. The positive correlation between NPL and profitability could indicate an erosion of franchise discipline in a highly competitive digital banking market.

On the other hand, the liquidity position (LDR) shows only marginal negative effects on ROA and has no significant impact on ROE. This suggests that liquidity aggressiveness is less central than credit expansion in increasing bank profitability during the observation period. However, from a systemic risk perspective, excessive reliance on aggressive intermediation strategies in a digitally integrated financing environment may increase vulnerability to rapid deposit withdrawals, as switching costs are low and digital customers are highly responsive.

From a public policy perspective, these findings have significant regulatory implications. If higher credit risks are associated with an increase in short-term profitability, regulators need to ensure that regulatory mechanisms are sufficiently proactive. Traditional, backward-looking supervision may fail to identify the vulnerabilities that are constantly building up in rapidly growing digital loan portfolios. Policymakers should strengthen the following measures: (1) a dynamic provisioning framework to combat procyclical credit expansion; (2) countercyclical capital buffers to absorb risk accumulation during periods of aggressive growth; (3) improved stress testing procedures tailored specifically to digital lending models; and (4) regulatory review of algorithmic credit scoring systems to ensure transparency and robustness. In addition, regulators should review whether existing deposit insurance and capital adequacy rules are sufficient to address incentive distortions caused by moral hazard and agency problems. Tightening governance requirements and aligning executive compensation with risk-adjusted long-term performance metrics could reduce the tendency toward excessive short-termism at digital banking

institutions. Although the explanatory power of these models is limited, they are consistent with the multifactorial determinants underlying bank profits, including macroeconomic fluctuations, technology investment cycles, and the regulatory framework. Nevertheless, the statistically significant correlations provide important insights into how digital transformation is changing the traditional risk paradigm in banking.

The study contributes to the literature by bridging the gap between the dynamics of digital banking and classical financial risk theory and public debate. The study shows that digital innovations do not eliminate the traditional risk-return tension, but may even exacerbate it in competitive conditions and in the face of technological change. However, the study is not without limitations. Reliance on accounting profitability metrics may not fully capture market perceptions of bank profitability or long-term sustainability. Future research could incorporate market-based indicators, country comparisons, and measures of regulatory intensity to examine how institutional frameworks moderate the risk-value relationship.

FUNDING STATEMENT

This research received no external funding.

AUTHOR CONTRIBUTIONS

Conceptualization, Amerta Mardjono and Haris Maupa; methodology, Amerta Mardjono; validation, Amerta Mardjono, Haris Maupa, and Ignatius Roni Setyawan; formal analysis, Amerta Mardjono; investigation, Amerta Mardjono; resources, Ignatius Roni Setyawan; data curation, Amerta Mardjono; writing—original draft preparation, Amerta Mardjono; writing—review and editing, Amerta Mardjono and Haris Maupa; visualization, Amerta Mardjono; supervision, Haris Maupa; project administration, Amerta Mardjono; funding acquisition, Ignatius Roni Setyawan.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data are available from the authors upon request.

ACKNOWLEDGMENTS

The authors would like to acknowledge the assistance of the Editor and Reviewers in the preparation of the article for publication.

REFERENCES

Abdelsalam, O., Chantziaras, A., Batten, J. A., & Aysan, A. F. (2024). Trust matters: A global perspective on the influence of trust on bank market risk. *Journal of International Financial Markets, Institutions and Money*, *92*, 101959. https://doi.org/10.1016/j.jcorpfin.2020.101784

Agostino, D., Lourenço, R., Jorge, S., Bracci, E., & Cruz, I. (2025). Data science and public sector accounting: Reviewing impacts on reporting, auditing, and accountability practices. *Public Money & Management*, 1–10. https://doi.org/10.1080/09540962.2025.2529266

Ahmed, S. K. (2024). How to choose a sampling technique and determine sample size for research: A simplified guide for researchers. *Oral Oncology Reports*, *12*, 100662. https://doi.org/10.1016/j.oor.2024.100662

Akinbowale, O. E., Mashigo, P., & Zerihun, M. F. (2024). Analysis of cyberfraud in the South African banking industry: a multiple regression approach. *Journal of Financial Crime*, *31*(4), 952–973. https://doi.org/10.1108/JFC-04-2023-0094

Aladwey, L., Mkadmi, J. E., Necib, A., & Zehri, F. (2026). The relationship between corporate governance and stock returns: The moderating role of intellectual capital. *Social Sciences & Humanities Open*, *13*(2), 102489. https://doi.org/10.1016/j.ssaho.2026.102489

Alam, A. W., Farjana, A., Sanchez, B., & Banna, H. (2025). The ESG-insurance: Unraveling the interlinkage among policy uncertainty, ESG practices, and bank efficiency. *Sustainable Futures*, *10*(2–3), 101544. https://doi.org/10.1016/j.sftr.2025.101544

Aleemi, A. R., Javaid, F., & Hafeez, S. S. (2023). Finclusion: The nexus of Fintech and financial inclusion against banks' market power. *Heliyon*, *9*(12), e22551. https://doi.org/10.1016/j.heliyon.2023.e22551

Al-Faryan, M. A. S. (2024). Agency theory, corporate governance and corruption: an integrative literature review approach. *Cogent Social Sciences*, *10*(1). https://doi.org/10.1080/23311886.2024.2337893

Al-Harbi, A. (2019). The determinants of conventional banks profitability in developing and underdeveloped OIC countries. *Journal of Economics, Finance and Administrative Science*, *24*(47), 4–28. https://doi.org/10.1108/JEFAS-05-2018-0043

Ali, H., & Aysan, A. F. (2025). Decoding digital signals: AI sentiment and financial performance at İslamic banks. *Borsa Istanbul Review*, *25*(5), 953–971. https://doi.org/10.1016/j.bir.2025.05.011

Allen, F., Gu, X., & Jagtiani, J. (2021). A Survey of Fintech Research and Policy Discussion. *Review of Corporate Finance*, *1*(3–4), 259–339. https://doi.org/10.1561/114.00000007

Amin, A., Mollah, S., Kamal, S., Zhao, Y., & Simsek, R. (2024). Independent directors' connectedness and bank risk-taking. *Journal of Financial Stability*, *75*, 101324. https://doi.org/10.1016/j.jfs.2024.101324

Andrieş, A. M., Chiper, A. M., Ongena, S., & Sprincean, N. (2024). External wealth of nations and systemic risk. *Journal of Financial Stability*, *70*(1), 101192. https://doi.org/10.1016/j.jfs.2023.101192

Ansari, A. (2018). Governance Complexities in Firms with Dual Class Shares. *Annals of Corporate Governance*, *3*(3), 184–275. https://doi.org/10.1561/109.00000015

Arhinful, R., Mensah, L., Gyamfi, B. A., & Obeng, H. A. (2025). The Impact of Non-Performing Loans on Bank Growth: The Moderating Roles of Bank Size and Capital Adequacy Ratio—Evidence from U.S. Banks. *International Journal of Financial Studies*, *13*(3), 165. https://doi.org/10.3390/ijfs13030165

Arnone, M., Costantiello, A., Leogrande, A., Naqvi, S. K. H., & Magazzino, C. (2024). Financial Stability and Innovation: The Role of Non-Performing Loans. *FinTech*, *3*(4), 496–536. https://doi.org/10.3390/fintech3040027

Arping, S. (2019). Competition and risk taking in banking: The charter value hypothesis revisited. *Journal of Banking & Finance*, *107*, 105609. https://doi.org/10.1016/j.jbankfin.2019.105609

Bannier, C. E., Bofinger, Y., & Rock, B. (2023). The risk-return tradeoff: are sustainable investors compensated adequately? *Journal of Asset Management*, *24*(3), 165–172. https://doi.org/10.1057/s41260-023-00303-6

Bateman, H., Islam, T., Louviere, J., Satchell, S., & Thorp, S. (2020). Run for the hills: Italian investors' risk appetite before and during the financial crisis. *International Journal of Bank Marketing*, *38*(5), 1195–1213. https://doi.org/10.1080/15427560.2011.620199

Begum, M., Rahman, M. M., & Faruq, M. O. (2024). Impact of regulatory capital on bank interest margins: Moderating role of default risk. *Heliyon*, *10*(10), e30554. https://doi.org/10.1016/j.heliyon.2024.e30554

Bhagat, S., & Laurion, H. (2024). Silicon Valley Bank Demise: Causes and the Path Forward. *Review of Corporate Finance*, *4*(3), 337–374. https://doi.org/10.1561/114.00000067

Bhatnagr, P., Rajesh, A., & Misra, R. (2024). Continuous intention usage of artificial intelligence enabled digital banks: a review of expectation confirmation model. *Journal of Enterprise Information Management*, *37*(6), 1763–1787. https://doi.org/10.1108/JEIM-11-2023-0617

Bhiri, S., & BenMabrouk, H. (2026). Reconceptualizing Central Bank Transparency: A Multidimensional Index and Its Implications for International Equity Portfolio Allocation. *International Journal of Financial Studies*, *14*(3), 51. https://doi.org/10.3390/ijfs14030051

Bhowmik, P. K., & Sarker, N. (2021). Loan growth and bank risk: empirical evidence from SAARC countries. *Heliyon*, *7*(5), e07036. https://doi.org/10.1016/j.heliyon.2021.e07036

Bienz, C., Bonelli, D., Mjøs, A., & Santos, F. (2026). Outcomes, risk-taking, and incentives: Evidence from asset managers. *Journal of Corporate Finance*, *98*, 102974. https://doi.org/10.1016/j.jcorpfin.2026.102974

Biswas, A., G K, C., & Das, A. (2025). Asset quality, CSR, and profitability nexus in Indian banks: The moderating impact of CSR. *IIMB Management Review*, *37*(4), 100614. https://doi.org/10.1016/j.iimb.2025.100614

Bolarinwa, S. T., Obembe, O. B., & Olaniyi, C. (2019). Re-examining the determinants of bank profitability in Nigeria. *Journal of Economic Studies*, *46*(3), 633–651. https://doi.org/10.1108/JES-09-2017-0246

Bresciani, S., Ferraris, A., Romano, M., & Santoro, G. (2021). *Digital Transformation Management for Agile Organizations: A Compass to Sail the Digital World*. Emerald Publishing Limited. https://doi.org/10.1108/9781800431713

Brunner-Kirchmair, T. M., & Wiener, M. (2019). Knowledge is power – conceptualizing collaborative financial risk assessment. *The Journal of Risk Finance*, *20*(3), 226–248. https://doi.org/10.1108/JRF-05-2018-0083

Castilla-Polo, F., & Sánchez-Hernández, M. I. (2025). A bibliometric and thematic analysis of the reputation-performance relationship within the triple bottom line framework. *European Research on Management and Business Economics*, *31*(1), 100269. https://doi.org/10.1016/j.iedeen.2025.100269

Chan, S.-G., Koh, E. H. Y., Zainir, F., & Yong, C.-C. (2015). Market structure, institutional framework and bank efficiency in ASEAN 5. *Journal of Economics and Business*, *82*, 84–112. https://doi.org/10.1016/j.jeconbus.2015.07.002

Chen, W., Zhang, Z., Hamori, S., & Kinkyo, T. (2021). Not all bank systemic risks are alike: Deposit insurance and bank risk revisited. *International Review of Financial Analysis*, *77*, 101855. https://doi.org/10.1016/j.irfa.2021.101855

Cheng, J., Sun, J., Yao, K., Xu, M., & Cao, Y. (2022). A variable selection method based on mutual information and variance inflation factor. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, *268*, 120652. https://doi.org/10.1016/j.saa.2021.120652

Chronopoulos, D. K., Wilson, J. O. S., & Yilmaz, M. H. (2023). Regulatory oversight and bank risk. *Journal of Financial Stability*, *64*, 101105. https://doi.org/10.1016/j.jfs.2023.101105

Cookson, J. A., Fox, C., Gil-Bazo, J., Imbet, J. F., & Schiller, C. (2026). Social media as a bank run catalyst. *Journal of Financial Economics*, *176*, 104218. https://doi.org/10.1016/j.jfineco.2025.104218

Cortés, D., & Soriano, P. (2024). Analysis of macroeconomic determinants of non-performance in consumer and mortgage loans. *Finance Research Letters*, *61*, 104939. https://doi.org/10.1016/j.frl.2023.104939

Delis, M. D., Iosifidi, M., & Papadopoulos, P. (2022). Blessing or curse? Government funding of deposit insurance and corporate lending. *Journal of Financial Stability*, *61*, 101022. https://doi.org/10.1016/j.jfs.2022.101022

Edwards, M. G. (2021). The growth paradox, sustainable development, and business strategy. *Business Strategy and the Environment*, *30*(7), 3079–3094. https://doi.org/10.1002/bse.2790

Elliott, M., Georg, C. P., & Hazell, J. (2021). Systemic risk shifting in financial networks. *Journal of Economic Theory*, *191*(2), 105157. https://doi.org/10.1016/j.jet.2020.105157

Eltweri, A., Sawan, N., Al-Hajaya, K., & Badri, Z. (2024). The Influence of Liquidity Risk on Financial Performance: A Study of the UK's Largest Commercial Banks. *Journal of Risk and Financial Management*, *17*(12), 580. https://doi.org/10.3390/jrfm17120580

Fallanca, M. G., Forgione, A. F., & Otranto, E. (2020). Forecasting the macro determinants of bank credit quality: a non-linear perspective. *The Journal of Risk Finance*, *21*(4), 423–443. https://doi.org/10.1108/JRF-10-2019-0202

Fang, Y., Lin, H., & Lu, L. (2025). Measuring systemic risk from textual Analysis: Evidence from Chinese Banks. *International Review of Economics & Finance*, *103*(2), 104355. https://doi.org/10.1016/j.iref.2025.104355

Figuet, J.-M., Humblot, T., & Lahet, D. (2015). Cross-border banking claims on emerging countries: The Basel III Banking Reforms in a push and pull framework. *Journal of International Financial Markets, Institutions and Money*, *34*, 294–310. https://doi.org/10.1016/j.intfin.2014.11.016

Foros, Ø., Gramstad, A. R., & Hansen, B. (2026). Stricter margin squeeze regulation to achieve non-discrimination in digital markets. *Information Economics and Policy*, *72*, 101159. https://doi.org/10.1016/j.infoecopol.2026.101159

Ghosh, S. (2023). Credit quality determinants of banks: how important are bankruptcy reforms? *Journal of Economic Studies*, *50*(8), 1672–1693. https://doi.org/10.1108/JES-08-2022-0415

Giannopoulos, V., & Kariofyllas, S. (2025). When Models Fail: Credit Scoring, Bank Management, and NPL Growth in the Greek Recession. *International Journal of Financial Studies*, *13*(3), 152. https://doi.org/10.3390/ijfs13030152

Gidage, M., Gyamfi, B. A., & Asongu, S. A. (2025). Environmental Reporting and Financial Performance: Evidence From the Banking Sector in BRICS Countries. *Business Strategy and the Environment*, *34*(6), 7412–7437. https://doi.org/10.1002/bse.4358

Grandi, P., & Guille, M. (2023). Banks, deposit rigidity and negative rates. *Journal of International Money and Finance*, *133*, 102810. https://doi.org/10.1016/j.jimonfin.2023.102810

Greenwood, N., & Warren, P. (2022). Climate risk disclosure and climate risk management in UK asset managers. *International Journal of Climate Change Strategies and Management*, *14*(3), 272–292. https://doi.org/10.1108/IJCCSM-09-2020-0104

Gueyie, J. P., & Lai, V. S. (2003). Bank moral hazard and the introduction of official deposit insurance in Canada. *International Review of Economics & Finance*, *12*(2), 247–273. https://doi.org/10.1016/S1059-0560(02)00106-5

Gulati, T., Singla, A., & Saini, P. (2025). Digital finance in the era of digital transformation: a bibliometric analysis and systematic literature review. *Digital Transformation and Society*, 1–25. https://doi.org/10.1108/DTS-01-2025-0018

Guthrie, J., Manes Rossi, F., Orelli, R. L., & Nicolò, G. (2020). Investigating risk disclosures in Italian integrated reports. *Meditari Accountancy Research*, *28*(6), 1149–1178. https://doi.org/10.1108/MEDAR-10-2019-0596

Haddou, S., & Boughrara, A. (2025). How diversification shapes full-fledged Islamic bank Stability? A causal inference approach. *International Review of Economics & Finance*, *102*, 104367. https://doi.org/10.1016/j.iref.2025.104367

Haile, M. A., M.K., J., & Mulugeta, W. (2025). Does regulatory convergence shape banking resilience in Africa? *Heliyon*, *11*(1), e41347. https://doi.org/10.1016/j.heliyon.2024.e41347

Haq, M., Ongena, S., Pu, J., & Tan, E. K. M. (2024). Do banks engage in earnings management? The role of dividends and institutional factors. *Journal of Banking & Finance*, *168*, 107287. https://doi.org/10.1016/j.jbankfin.2024.107287

Harb, E., El Khoury, R., Mansour, N., & Daou, R. (2023). Risk management and bank performance: evidence from the MENA region. *Journal of Financial Reporting and Accounting*, *21*(5), 974–998. https://doi.org/10.1108/JFRA-07-2021-0189

Hasan, R., Uddin, H., & Miah, M. D. (2025). The effect of bank regulatory capital on the risk, efficiency and profitability: evidence from GCC countries. *Asian Review of Accounting*, *33*(5), 880–903. https://doi.org/10.1108/ARA-10-2024-0326

Hassan, M. K., Kazak, H., Öner, M. H., Akcan, A. T., & Tekdogan, O. F. (2026). The impact of sukuk issuances on liquidity, profitability, and asset quality of Islamic banks. *Research in International Business and Finance*, *81*, 103158. https://doi.org/10.1016/j.ribaf.2025.103158

He, Y., Li, W., Tan, X., & Sun, Y. (2025). Economic policy uncertainty, digital transformation, and bank systemic risk. *International Review of Economics & Finance*, *102*, 104309. https://doi.org/10.1016/j.iref.2025.104309

Hill, C. A., & Pacces, A. M. (2018). The Neglected Role of Justification under Uncertainty in Corporate Governance and Finance. *Annals of Corporate Governance*, *3*(4), 276–407. https://doi.org/10.1561/109.00000016

Isa, M. Y., Ahmed, M., & Mia, M. S. (2026). Impact of digitalization and loan-to-deposit ratio (LDR) on the social outreach of Islamic and conventional microfinance institutions: a quantitative analysis. *Cogent Business & Management*, *13*(1). https://doi.org/10.1080/23311975.2026.2614765

Iswajuni, I., Manasikana, A., & Soetedjo, S. (2018). The effect of enterprise risk management (ERM) on firm value in manufacturing companies listed on Indonesian Stock Exchange year 2010-2013. *Asian Journal of Accounting Research*, *3*(2), 224–235. https://doi.org/10.1108/AJAR-06-2018-0006

Jensen, C. H., & Kristensen, T. B. (2022). Relative exploration orientation and real options reasoning: survey evidence from Denmark. *European Business Review*, *34*(2), 191–223. https://doi.org/10.1108/EBR-07-2020-0172

Jha, P., & Kumar Mittal, S. (2024). The nexus between financing pattern, firm-specific factors, and financial performance: Panel evidence of listed SMEs in India. *IIMB Management Review*, *36*(1), 71–82. https://doi.org/10.1016/j.iimb.2024.02.001

Joia, L. A., & Proença, R. (2022). The social representation of fintech from the perspective of traditional financial sector professionals: evidence from Brazil. *Financial Innovation*, *8*(1), 93. https://doi.org/10.1186/s40854-022-00409-7

Larsson, A., & Viitaoja, Y. (2017). Building customer loyalty in digital banking. *International Journal of Bank Marketing*, *35*(6), 858–877. https://doi.org/10.1108/IJBM-08-2016-0112

Laryea, E., Ntow-Gyamfi, M., & Alu, A. A. (2016). Nonperforming loans and bank profitability: evidence from an emerging market. *African Journal of Economic and Management Studies*, *7*(4), 462–481. https://doi.org/10.1108/AJEMS-07-2015-0088

Lavrinenko, O., Čižo, E., Ignatjeva, S., Danileviča, A., & Krukowski, K. (2023). Financial Technology (FinTech) as a Financial Development Factor in the EU Countries. *Economies*, *11*(2), 45. https://doi.org/10.3390/economies11020045

Le, H. N. Q., Nguyen, T. V. H., & Schinckus, C. (2022). Bank lending behaviour and macroeconomic factors: A study from strategic interaction perspective. *Heliyon*, *8*(11), e11906. https://doi.org/10.1016/j.heliyon.2022.e11906

Lee, M. T., & Suh, I. (2022). Understanding the effects of Environment, Social, and Governance conduct on financial performance: Arguments for a process and integrated modelling approach. *Sustainable Technology and Entrepreneurship*, *1*(1), 100004. https://doi.org/10.1016/j.stae.2022.100004

López-Penabad, M. C., Iglesias-Casal, A., & Silva Neto, J. F. (2022). Effects of a negative interest rate policy in bank profitability and risk taking: Evidence from European banks. *Research in International Business and Finance*, *60*(2), 101597. https://doi.org/10.1016/j.ribaf.2021.101597

Maghyereh, A. (2024). How real estate bubbles affect the systemic risk of financial institutions in the United Arab Emirates. *Heliyon*, *10*(1), e23153. https://doi.org/10.1016/j.heliyon.2023.e23153

Mavlutova, I., Spilbergs, A., Romanova, I., Kuzmina, J., Fomins, A., Verdenhofs, A., & Natrins, A. (2025). The role of green digital investments in promoting sustainable development goals and green energy consumption. *Journal of Open Innovation: Technology, Market, and Complexity*, *11*(2), 100518. https://doi.org/10.1016/j.joitmc.2025.100518

Mensah, L., Arhinful, R., Obeng, H. A., & Gyamfi, B. A. (2025). The impact of capital structure on product responsibility and corporate reputation: Evidence from non-financial institutions listed on the London stock exchange. *European Research on Management and Business Economics*, *31*(3), 100287. https://doi.org/10.1016/j.iedeen.2025.100287

Misra, B. S., & Sahoo, B. K. (2026). What drives the profitability of Indian banks: Level or growth efficiency? *International Review of Economics & Finance*, *106*, 104978. https://doi.org/10.1016/j.iref.2026.104978

Mogaji, E., & Nguyen, N. P. (2024). Evaluating the emergence of contactless digital payment technology for transportation. *Technological Forecasting and Social Change*, *203*, 123378. https://doi.org/10.1016/j.techfore.2024.123378

Mohammad, S., Asutay, M., Dixon, R., & Platonova, E. (2020). Liquidity risk exposure and its determinants in the banking sector: A comparative analysis between Islamic, conventional and hybrid banks. *Journal of International Financial Markets, Institutions and Money*, *66*(1), 101196. https://doi.org/10.1016/j.intfin.2020.101196

Naili, M., & Lahrichi, Y. (2022a). Banks' credit risk, systematic determinants and specific factors: recent evidence from emerging markets. *Heliyon*, *8*(2), e08960. https://doi.org/10.1016/j.heliyon.2022.e08960

Naili, M., & Lahrichi, Y. (2022b). The determinants of banks' credit risk: Review of the literature and future research agenda. *International Journal of Finance & Economics*, *27*(1), 334–360. https://doi.org/10.1002/ijfe.2156

Naouar, A., Boulanouar, Z., & Grassa, R. (2024). Islamic banks and capital buffer behavior: A view from the Gulf cooperation council markets. *Pacific-Basin Finance Journal*, *83*, 102257. https://doi.org/10.1016/j.pacfin.2024.102257

Naveed, M. M., Liu, T., Mustafa, S., & Chen, X. (2025). Unraveling the Nexus Between Competition and Banking Efficiency in an Emerging Economy: A Two-Stage Stochastic Frontier Analysis Framework. *Systems*, *13*(5), 354. https://doi.org/10.3390/systems13050354

Nguyen, M. H., Thanh, B. N., Pham, H., & Pham, T. T. T. (2025). The determinants of funding liquidity risk in decentralized lending. *Global Finance Journal*, *64*, 101055. https://doi.org/10.1016/j.gfj.2024.101055

Nguyen, Q., Kim, M. H., & Ali, S. (2024). Corporate governance and earnings management: Evidence from Vietnamese listed firms. *International Review of Economics & Finance*, *89*, 775–801. https://doi.org/10.1016/j.iref.2023.07.084

Orlando, G., & Bace, E. (2021). Challenging Times for Insurance, Banking and Financial Supervision in Saudi Arabia (KSA). *Administrative Sciences*, *11*(3), 62. https://doi.org/10.3390/admsci11030062

Ozili, P. K., & Outa, E. (2017). Bank loan loss provisions research: A review. *Borsa Istanbul Review*, *17*(3), 144–163. https://doi.org/10.1016/j.bir.2017.05.001

Qureshi, A., & Lamarque, E. (2023). Risk management practices and credit risk of the significantly supervised European banks. *Journal of Financial Regulation and Compliance*, *31*(3), 261–280. https://doi.org/10.1108/JFRC-12-2021-0117

Rahma, M., Masyita, D., Sudarsono, R., & Anwar, M. (2025). Determinants of insolvency in life insurance companies: a systematic literature review and bibliometric analysis using Biblioshiny and VOSviewer. *Cogent Business & Management*, *12*(1). https://doi.org/10.1080/23311975.2025.2573876

Rahmadany, A. N., Risfandy, T., Achsanta, A. F., & Rifai, B. (2024). Liquidity and credit risks during the COVID-19 pandemic: evidence from a dual banking system. *Journal of Islamic Accounting and Business Research*. https://doi.org/10.1108/JIABR-11-2023-0407

Rahmania, T., Wulandari, S. S., & Marfu, A. (2024). Sustainable financial institution in Indonesia: An empirical analysis of social-cultural context, nepotism, and moral hazard on the shaping of non-performing loans. *Sustainable Futures*, *8*(12), 100279. https://doi.org/10.1016/j.sftr.2024.100279

Saal, M., Starnes, S., & Rehermann, T. (2017). *Digital Financial Services: Challenges and Opportunities for Emerging Market Banks*. International Finance Corporation, Washington, DC. https://doi.org/10.1596/30368

Saeed, M. M., & Donkoh, E. (2026). Credit risk management, bank-specific factors, and financial performance of banks: Insights from an emerging economy. *Social Sciences & Humanities Open*, *13*(3), 102523. https://doi.org/10.1016/j.ssaho.2026.102523

Salaudeen, H. A., Bala, H., Raji, J. O., Mohsen Al-Absy, M. S., Sani, A. A., & Khatoon, G. (2026). Assessing the role of chief risk officer expertise on the nexus between enterprise risk management and performance of banks in emerging economy. *Social Sciences & Humanities Open*, *13*(1), 102380. https://doi.org/10.1016/j.ssaho.2025.102380

Shonubi, O. A. (2025). Innovation challenges of digital transformation: Transitioning legacy to the future. *Sustainable Futures*, *10*(11), 100971. https://doi.org/10.1016/j.sftr.2025.100971

Singh, V. K., Shaikh, Z. H., Sinha, K., Panigrahi, R. R., Mukherjee, S., & Chowdary, V. G. R. (2026). From technological revolution to digital transformation in non-banking financial companies: A future research direction. *Journal of Open Innovation: Technology, Market, and Complexity*, *12*(1), 100712. https://doi.org/10.1016/j.joitmc.2025.100712

Tondi, M., & Rintamäki, T. (2026). Closing the protection gap or prioritising prevention: alternative value creation strategies based on data-driven technologies in the context of insurance companies' climate change actions. *The Geneva Papers on Risk and Insurance - Issues and Practice*, *51*(1), 150–175. https://doi.org/10.1057/s41288-025-00361-4

Tran, D., & Nguyen, T. (2025). Capital buffer and bank risk-taking in Vietnam: the moderating role of capital regulation and shadow banking. *Journal of Financial Regulation and Compliance*, *33*(1), 48–66. https://doi.org/10.1108/JFRC-06-2024-0106

Tripathi, A., Dixit, A., & Vipul, V. (2019). Liquidity of financial markets: a review. *Studies in Economics and Finance*, *37*(2), 201–227. https://doi.org/10.1108/SEF-10-2018-0319

Vuong, G. T. H., Nguyen, Y. D. H., Nguyen, M. H., & Wong, W.-K. (2024). Assessing the impact of macroeconomic uncertainties on bank stability: Insights from ASEAN-8 countries. *Heliyon*, *10*(11), e31711. https://doi.org/10.1016/j.heliyon.2024.e31711

Vuong, G. T. H., Phan, P. T. T., Nguyen, C. X., Nguyen, D. M., & Duong, K. D. (2023). Liquidity creation and bank risk-taking: Evidence from a transition market. *Heliyon*, *9*(9), e19141. https://doi.org/10.1016/j.heliyon.2023.e19141

Wellink, N. (2023). Crises have shaped the European Central Bank. *Journal of International Money and Finance*, *138*, 102923. https://doi.org/10.1016/j.jimonfin.2023.102923

Yahaya, A., Mahat, F., M.H., Y., & Matemilola, B. T. (2022). Liquidity risk and bank financial performance: an application of system GMM approach. *Journal of Financial Regulation and Compliance*, *30*(3), 312–334. https://doi.org/10.1108/JFRC-03-2021-0019

Yahyaei, H., Singh, A., & Smith, T. (2024). International transmission of monetary policy shocks and the bank lending channel: Evidence from Australia. *Journal of Financial Stability*, *75*, 101343. https://doi.org/10.1016/j.jfs.2024.101343

Ye, N., & Zhao, Z. (2024). The reform of consumer protection in mobile payment services in China: Legislation, regulation, and dispute resolution. *Computer Law & Security Review*, *54*, 106007. https://doi.org/10.1016/j.clsr.2024.106007

Zhang, J., & Zhang, X.-J. (2024). Uncertainty-Embedded Financial Data and Stock Returns. *Foundations and Trends® in Accounting*, *19*(1), 1–115. https://doi.org/10.1561/1400000076

Zhao, D., Wang, Z., Schweizer-Gamborino, F., & Sornette, D. (2025). Polytope Fraud Theory. *International Review of Financial Analysis*, *97*(2), 103734. https://doi.org/10.1016/j.irfa.2024.103734