Multidisciplinary Output Research For Actual and International Issue (MORFAI Journal) ISSN (e): 2808-6635
Volumes 5 No. 6 (2025)

THE EFFECT OF FINANCIAL TECHNOLOGY ON THE PROFITABILITY OF BANKING COMPANIES LISTED ON THE INDONESIA STOCK EXCHANGE

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Received	: 20 September 2025	Published	: 18 November 2025
Revised	: 10 October 2025	DOI	: https://doi.org/10.54443/morfai.v5i6.4477
Accepted	: 05 November 2025	Link Publish	: https://radjapublika.com/index.php/MORFAI/article/view/4477

Abstract

This study is motivated by the rapid growth of Indonesia's digital economy, marked by the emergence of financial technology (fintech) as a disruptive force in financial services. The research aims to analyze the influence of fintech, proxied by the number of ATMs, mobile banking transactions, and internet banking transactions, on bank profitability measured by Return on Assets (ROA) among banks listed on the Indonesia Stock Exchange during 2017–2023. Firm size and BOPO serve as control variables. A quantitative method with panel data regression was applied using EViews 13. The results show that the number of ATMs has a negative and significant effect on profitability, while mobile and internet banking transactions have positive and significant effects. Fintech enhances bank performance through cost efficiency, increased transaction volume, and non-interest income, with implications for future studies considering external factors.

Keywords: Financial Technology, Return on Assets, ATM, Mobile Banking, Internet Banking

INTRODUCTION

The development of the digital economy in Indonesia is driven by the rapid growth of financial technology (fintech), e-commerce, micro, small, and medium-sized enterprises (MSMEs) digitalization, and government support through various regulations and policies (Otoritas Jasa Keuangan, 2024). Fintech presents itself as an innovative solution offering accessibility, convenience, speed, and efficiency in financial services. Its presence not only creates new alternatives but also encourages conventional banking to adapt to customer demands for increasing transparency and effectiveness. Hadad (2017) emphasizes that disruptive innovation in the financial services industry has fundamentally transformed industry structures, intermediation technologies, and marketing strategies, giving rise to the phenomenon now widely recognized as financial technology. The increasing internet penetration in Indonesia has been a major driver of accelerated digitalization in financial services, expediting banking digital transformation and encouraging shifts in business strategies. This trend is consistent with the perspectives of Gomber et al. (2018) and Zalan & Toufaily (2017) regarding fintech disruption in the financial industry. Data released by the Indonesian Internet Service Providers Association (APJII) indicate a positive trend, with the number of internet users rising from 196,714,070 in 2019 to 221,563,479 in 2024, reaching a penetration rate of 79.50%. This demonstrates the growing digital connectivity of society, which in turn creates significant opportunities for the expansion of the digital economy and the adoption of fintech as a financial service. Despite its positive contributions, the development of fintech is not without challenges. Rustan (2025) states that fintech plays a major role in expanding access to financial services, particularly for communities underserved by traditional banks. However, obstacles such as low financial literacy, limited digital infrastructure, and data security concerns remain pressing issues. These challenges indicate that the successful implementation of fintech depends not only on technological innovation but also on societal readiness and regulatory frameworks to build an inclusive and secure digital financial ecosystem.

Table 1. Banking Profitability (ROA) for the 2017–2023 Period

Year	BCA	BNI	BRI	Mandiri	CIMB Niaga	MEGA
2017	3,90%	2,70%	3,69%	2,72%	1,70%	2,24%
2018	4,00%	2,80%	3,68%	3,17%	1,85%	2,47%
2019	4,00%	2,40%	3,50%	3,03%	1,99%	2,90%
2020	3,30%	0,50%	1,98%	1,64%	1,06%	3,64%
2021	3,40%	1,40%	2,72%	2,53%	1,88%	4,22%
2022	3,20%	2,50%	3,76%	3,30%	2,16%	4,00%
2023	3,60%	2,60%	3,93%	4,03%	2,59%	3,47%

Source : Indonesia Stock Exchange (IDX), 2025

In terms of banking profitability, Return on Assets (ROA) data for the 2017–2023 period show significant variation in performance across banks. Large banks such as BCA, BRI, and Mandiri consistently recorded high ROA, while BNI and CIMB Niaga demonstrated more fluctuating results. Interestingly, Bank Mega achieved the highest ROA in 2021 despite having smaller assets compared to major banks. This finding highlights that bank size (firm size) is not the sole determinant of profitability, operational efficiency and the ability to adapt to digitalization are also critical factors. Previous research also shows mixed findings regarding the influence of fintech on bank profitability. Some studies (Chen et al., 2021; Nwankwo, 2023; Pham, 2024) conclude that fintech has a significantly positive effect on profitability, particularly by increasing transaction volumes and reducing costs. Conversely, other research (Li, 2020; Aditya & Rahmi, 2022) shows that the impact of fintech is not always consistent and, in some cases, insignificant. These divergent results indicate a research gap that requires further investigation using more concrete and measurable indicators. Based on this background, the present study aims to analyze the impact of fintech, proxied by the number of ATMs, internet banking transactions, and mobile banking transactions, on the profitability of banks in Indonesia during the 2017–2023 period. The study also incorporates control variables such as bank size (firm size) and operational efficiency (BOPO) to provide more comprehensive results. This period is considered relevant as it encompasses both the pandemic and post-pandemic phases, during which the digitalization of banking services accelerated significantly. Thus, this research is expected to contribute both to the academic literature and to banking practices regarding the utilization of fintech to enhance profitability.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Financial Technology (FinTech)

Financial Technology (fintech) represents an innovation that integrates technology with financial services, including digital payments, peer-to-peer lending, mobile banking, internet banking, and blockchain (Jamal et al., 2023; Al-Amin et al., 2024). According to Bank Indonesia Regulation No. 19/12/PBI/2017, fintech refers to the use of technology within the financial system to generate new products, services, or business models that may affect monetary stability, the financial system, and payment efficiency. Similarly, the Financial Services Authority (OJK, 2017) defines fintech as an innovation in financial services that utilizes technology for transactions such as payment systems, funding, digital banking, capital markets, and insurance.The Financial Stability Board (2017) and the International Organization of Securities Commissions (IOSCO, 2017) describe fintech as a broad term encompassing innovative business models and emerging technologies that can significantly transform financial services delivery. McKinsey (2018) explains fintech as a harmonious combination of finance and technology that creates a synergistic effect greater than when used separately. Fintech contributes to financial inclusion, operational efficiency, and the acceleration of digital transformation in the banking sector (Cao et al., 2020; AlMomani & Alomari, 2021). However, it also presents challenges for conventional banks to adapt their business models to remain competitive. In summary, fintech can be defined as the integration of technology and finance that produces innovative financial products and services, enhances efficiency and accessibility, and serves as a key factor influencing banking profitability.

The Effect of Automated Teller Machine (ATM) on Banking Profitability (Return on Assets)

An Automated Teller Machine (ATM) is a banking innovation that allows customers to perform financial transactions such as withdrawals, deposits, transfers, and balance inquiries independently, 24 hours a day (O'Regan, 2018) This technology improves service efficiency and customer convenience while generating additional fee-based income for banks (Ayuningtyas & Sufina, 2023). According to the Technology Acceptance Model (TAM), customer adoption of ATMs depends on perceived ease of use and perceived usefulness, which ultimately increases transaction frequency. The Intermediation Efficiency Theory also explains that technological adoption in banking reduces operational costs and enhances intermediation efficiency (Hidayati & Hindrayani, 2024). Empirical studies consistently support the positive relationship between ATM usage and profitability. Orji et al. (2018) found that a higher number of ATMs significantly improves banks' Return on Assets (ROA). Similarly, Mukherjee & Gaur (2024) and Tazza & Sari (2024) found that a well-distributed ATM network enhances customer satisfaction, transaction volume, and profitability. Thus, ATMs are not only transactional tools but also strategic assets that improve both operational efficiency and financial performance.

H_1: ATMs have a positive and significant effect on banking profitability (ROA)

The Effect of Mobile Banking on Banking Profitability (Return on Assets)

Mobile banking is a technological innovation that allows customers to conduct financial transactions via mobile devices, increasing accessibility while reducing operational costs (OJK, 2018; Nwankwo, 2023). Its features include balance inquiries, transaction history, fund transfers, bill payments, and purchases (Medyawati et al., 2021). According to the Intermediation Efficiency Theory, mobile banking enhances operational efficiency by reducing transaction costs and expanding digital transaction volumes (Konstantakopoulou, 2023). It also broadens customer reach and increases non-interest income. Empirical studies demonstrate a positive relationship between mobile banking and profitability. Fentaw & Thakkar (2021), and Atasyadila & Muchlis (2022) found that mobile banking adoption improves operational efficiency (lower BOPO) and enhances ROA. However, the impact is not always positive—high development and maintenance costs without proportional revenue gains may reduce profitability. Overall, integrating theory and empirical evidence suggests that mobile banking enhances intermediation efficiency and profitability in the banking sector.

H_2 : Mobile banking has a positive and significant effect on banking profitability (ROA)

The Effect of Internet Banking on Banking Profitability (Return on Assets)

Internet banking enables customers to conduct financial transactions online at any time and from any location (OJK, 2015; Fentaw & Thakkar, 2021). This service increases accessibility, reduces transaction costs, and contributes to higher profitability. From the Technology Acceptance Model (TAM) perspective, customer perceptions of ease of use and usefulness are key drivers of internet banking adoption. Greater acceptance leads to higher transaction volumes and improved profitability (Akyuwen, 2019; Putri & Pangestuti, 2023). The Intermediation Efficiency Theory further explains that internet banking reduces dependency on physical branches, lowers intermediation costs, and optimizes asset utilization, leading to higher ROA. Empirical evidence by Fentaw & Thakkar (2021) and Nwankwo & Okoli (2023) confirms that internet banking has a positive and significant impact on profitability. Callaway (2011) highlighted that digital transactions cost only about $0.01 compared to $1.07 for branch transactions, demonstrating substantial efficiency gains from digital banking. Therefore, internet banking is a strategic digital service that improves cost efficiency, customer reach, and overall profitability.

H_3 : Internet banking has a positive and significant effect on banking profitability (ROA)

The relationship between variables is modeled as in the following picture.

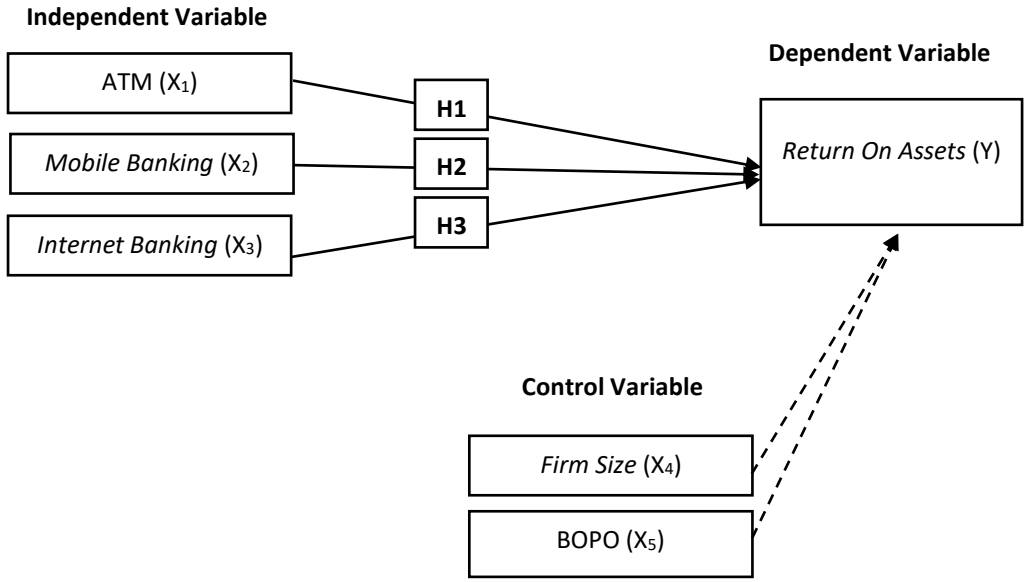

Figure 1. Research Model

METHOD

This study uses a quantitative approach with a causal design to analyze the effect of financial technology on banking profitability in Indonesia. Profitability is proxied by Return on Assets (ROA) as a dependent variable. Independent variables consist of the number of Automated Teller Machines (ATMs), the number of Mobile Banking transactions, and the number of Internet Banking transactions. Meanwhile, Firm Size and Operating Costs to Operating Income (BOPO) are used as control variables. The research population is all banking companies listed on the Indonesia Stock Exchange (IDX) for the 2017–2023 period. The sample was selected by purposive sampling technique, resulting in 6 banking companies, namely BCA, BNI, BRI, Mandiri, CIMB Niaga, and Bank Mega.

Table 2. Purposive Sampling Criteria

No	Criteria	Number of Sample
1	Conventional and Sharia Commercial Banks listed on the Indonesia Stock Exchange (IDX)	47
2	Banks that provide financial reports (annual reports) 2017-2023.	(3)
3	Banks that provide data reports on the number of transaction internet banking, mobile banking, and number of ATMs in detail.	(38)
Number of Sample		**6**
X 7 years of research		**42**

The research uses secondary data in the form of annual financial reports and publication reports from each bank, as well as supporting data from the Financial Services Authority (OJK), Bank Indonesia, and the Indonesia Stock Exchange (IDX). Data analysis was carried out using the panel data regression method using EViews 13 software. The selection of the panel regression model was carried out through the Chow test, the Hausman test, and the Lagrange Multiplier test. Before analysis, classical assumption tests (multicollinearity and heteroscedasticity) were performed to ensure the validity of the model. Hypothesis testing is conducted using the t-test to determine the partial effect of each independent variable on profitability, the F-test to evaluate the simultaneous influence of all

variables, and the coefficient of determination (R^2) to measure the ability of the independent variables to explain the variation in the dependent variable.

RESULT AND DISCUSSION

Descriptive Statistics

This study uses 42 observations from six Indonesian banks during 2017–2023, with summary statistics covering the mean, median, maximum, minimum, and standard deviation. The results show that profitability (ROA) remains relatively stable among large banks, while digitalization indicators such as mobile and internet banking increased sharply after the pandemic. Firm size varies significantly but is normally distributed, whereas BOPO indicates ongoing efficiency challenges across most banks.

Table 3. Descriptive Statistics

	ROA	ATM	MBanking	IBanking	Firm Size	BOPO
Mean	0.028607	12128.90	3.87E+11	3.75E+11	9.17E+14	0.666849
Median	0.028500	14163.00	1.76E+10	8.44E+09	9.42E+14	0.688700
Maximum	0.042200	24684.00	3.01E+12	4.16E+12	2.17E+15	0.933000
Minimum	0.005000	270.0000	15897640	76694300	8.23E+13	0.371331
Std. Dev	0.009018	7402.832	6.58E+11	8.65E+11	6.10E+14	0.145624

Source : Results of Data Processing Eviews 13, 2025

Based on the descriptive statistics presented in Table 3, which include 42 observations from 6 banking companies in Indonesia during the 2017–2023 period, it can be concluded that banking profitability (ROA) remained relatively stable among major banks. The mean ROA of 0.0286 with a small standard deviation (0.0090) indicates that the profitability performance across banks was fairly consistent, suggesting that banks were able to maintain stable returns despite economic fluctuations and the ongoing digital transformation during the study period. Meanwhile, fintech-related variables such as ATM, Mobile Banking, and Internet Banking show more dynamic developments. The number of ATMs still represents the traditional banking infrastructure, though variations among banks remain noticeable. On the other hand, Mobile Banking and Internet Banking demonstrate rapid growth and high variability, indicating a significant increase in the adoption of digital banking services—particularly after the COVID-19 pandemic. This reflects a major behavioral shift among customers toward digital transactions. Overall, these findings highlight that while banks have maintained stable profitability, the expansion of fintech services has become a crucial driver in supporting and enhancing banking performance in the era of digital transformation.

Results of Panel Data Regression Model Selection

The selection of the most suitable panel data regression model requires a series of diagnostic tests to compare the three estimation approaches, namely the Common Effects Model (CEM), the Fixed Effects Model (FEM), and the Random Effects Model (REM). These tests were conducted to identify the best-fitting model for the data and ensure the accuracy of the estimation results.

Table 4. Chow Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	48.942934	(5,31)	0.0000
Cross-section Chi-square	91.785931	5	0.0000

Source : Results of Data Processing Eviews 13, 2025

Based on the table above, the probability value of the cross section F is 0.0000 < 0.05, then the H1 hypothesis is accepted, namely the selected model is FEM, which will then be retested with a thirst test to test FEM and REM.

Table 5. Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	244.714669	5	0.0000

Source : Results of Data Processing Eviews 13, 2025

The probability value of the cross section F is 0.0000 < 0.05, then the H1 hypothesis is accepted, namely the selected model is FEM.
Selection of the panel data regression model that has been carried out through the Chow Test, and the Hausman Test. So it can be concluded that the selected panel data regression model is the Fixed Effects Model (FEM) which will be used to analyze the next data in this study.

Hypothesis Test

Table 6. F test results (Simultaneous)

F-statistic	**106.8505**
Prob(F-statistic)	0.000000
Durbin-Watson stat	1.952735

Source : Results of Data Processing Eviews 13, 2025

F value is calculated as 106.8505 with Prob. 0.000000 < 0.05, it can be concluded that all independent variables of Financial Technology (ATM, Mobile Banking, and Internet Banking) and control variables (Firm Size and BOPO) in this study have an effect on profitability (Return on Assets).

Table 7. Determination Coefficient Test Results (R2)

R-squared	**0.971805**
Adjusted R-squared	0.962710
S.E. of regression	0.001742

Source : Results of Data Processing Eviews 13, 2025

R-squared value is 0.971805 which means that the independent variables of Financial Technology (ATM, Mobile Banking, and Internet Banking) and control variables (Firm Size and BOPO) have an effect of 97.18% on profitability, and the remaining 2.82% is influenced by other variables that are not explained and not measured in this study.

Table 8. t-test results (partial)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.44E-18	0.000269	-2.40E-14	1.0000
LN_ATM_N	-0.002989	0.001407	-2.124217	0.0417
LN_MBANKING_N	0.001461	0.000565	2.586371	0.0146
LN_IBANKING_N	0.002004	0.000788	2.542724	0.0162
LN_FIRMSIZE_N	0.025592	0.003824	6.692234	0.0000
BOPO_C	-0.105789	0.005048	-20.95571	0.0000

Source : Results of Data Processing Eviews 13, 2025

Discussion

Analysis The Effect of Automated Teller Machine (ATM) on Banking Profitability (Return on Assets) in Indonesia

Based on table 8, the coefficient value of the ATM variable is -0.002989 and the value of Prob. The ATM variable is 0.0417 < 0.05, so it can be concluded that the ATM variable has a negative and significant effect on profitability, so H1 is rejected. This means that the increase in the number of ATMs tends to contribute to a decrease. The findings indicate that although Automated Teller Machines (ATMs) once served as the primary channel for banking transactions, their role has diminished as customers increasingly shift toward digital services such as mobile banking

and internet banking, which are more efficient, practical, and cost-effective. The Covid-19 pandemic further accelerated the adoption of digital services, leading to a steady decline in the number of ATMs among major Indonesian banks, with the exception of BCA and CIMB Niaga, which remained relatively stable. The reduced role of ATMs has a negative impact on profitability (ROA) due to high investment, maintenance, and operational costs reflected in the BOPO ratio, thereby failing to significantly enhance bank revenues. This result is consistent with previous studies that found a negative relationship between the number of ATMs and profitability, reinforcing the view that digitalization is a key driver of banking financial performance.

Analysis The Effect of Mobile Banking on Banking Profitability (Return on Assets) in Indonesia

The Coefficient value of the Mobile Banking variable on table 8 is 0.001461 and the value of Prob. The Mobile Banking variable is 0.0146 < 0.05, so it can be concluded that the Mobile Banking variable has a positive and significant effect on profitability, so H2 is accepted. Mobile banking transactions have been shown to have a positive and significant impact on banking profitability (ROA), especially since the surge in digital transactions during the Covid-19 pandemic. The shift from physical to digital services has driven increased transaction volume, commission-based revenue, and operational efficiency by reducing reliance on expensive physical infrastructure, while strengthening customer loyalty. Although ROA declined in 2020 due to pandemic pressures, its performance increased again in the 2021–2023 period along with increased mobile banking usage. This finding aligns with the theory of intermediation efficiency, which states that the adoption of digital technology can increase efficiency, expand service access, and reduce operational costs. The research results also support the findings of Agatha (2022), Fentaw & Thakkar (2021), Medyawati et al. (2021), and Hasna Atasyadila & Muchlis (2024), but differ from the research of Nwankwo & Okoli (2023), Sudaryanti (2017), and Al-Smadi (2011), which assessed that mobile banking does not always have a significant impact on profitability. Overall, mobile banking is a crucial factor in driving banking profitability, particularly during the post-pandemic recovery period.

Analysis The Effect of Internet Banking on Banking Profitability (Return on Assets) in Indonesia

Coefficient value of the Internet Banking variable on Table 8 is 0.002004 and the value of Prob. The Internet Banking variable is 0.0162 < 0.05, so it can be concluded that the Internet Banking variable has a positive and significant effect on profitability, so H3 is accepted. The results indicate that banking financial technology services, particularly internet banking, have a positive and significant effect on bank profitability (ROA) through improved operational efficiency and diversification of non-interest income, as evidenced by Atasyadila & Muchlis (2024), Nuralya et al. (2024), Dewi et al. (2019), and Nwankwo & Okoli (2023). Internet banking has proven effective in reducing conventional transaction costs, lowering administrative burdens, expanding the customer base, and enhancing financial performance, although Tazza & Sari (2024) found that income from internet banking has not yet fully covered the relatively high operational costs of technology. Overall, these findings highlight that digital transformation through internet banking plays a strategic role in improving bank profitability and competitiveness in the digital era.

CONCLUSION

The results of the study showed that the Automated Teller Machine (ATM) variable had a positive but insignificant effect on Return on Assets (ROA). This indicates that the number of ATMs is no longer the main factor in increasing the bank's profitability. This phenomenon can be explained by the increasing shift in customer preferences from physical-based services to digital services, such as mobile banking and internet banking. With the increasing use of digital services, the contribution of ATMs to profitability is decreasing. These findings are consistent with Li (2020) who stated that the adoption of conventional banking technology has limited influence as digital innovation grows. On the other hand, the Mobile Banking variable showed a positive and significant influence on ROA. This reflects that digitalization through mobile banking plays a major role in boosting the bank's financial performance. A significant surge in the use of mobile banking mainly occurred during the COVID-19 pandemic period, when people's mobility was limited, so digital transactions became the main choice. These results are in line with research by Deloitte (2020) and Pham et al. (2024) which found that digital services improve operational efficiency, expand customer base, and increase bank profitability. Similarly, the Internet Banking variable also has a positive and significant effect on ROA. This indicates that internet banking has become one of the main services used by customers in making transactions, especially on a large scale. The fluctuating but sharply increasing growth of internet banking transactions in certain periods illustrates the acceleration of digital adoption. These findings support the research of Chen et al. (2021) and Nwankwo (2023) who affirm that internet banking is one of the important factors for improving bank financial performance. Overall, the results of this study confirm that banking digitalization

through mobile banking and internet banking is the main driver of bank profitability in Indonesia, especially during the pandemic period which accelerates the adoption of digital services. However, achieving sustainable profitability still requires the support of operational efficiency and adequate asset capacity. In other words, while digital transformation makes a significant contribution, internal factors such as company size and cost management remain key in maintaining long-term financial performance.

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