# THE EFFECT OF FINTECH ON BANKS' PERFORMANCE AND ACCOUNTABILITY IN TUNISIA: AN EMPIRICAL ANALYSIS

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## Abstract

The development of financial technology (FinTech) systems by banks to support businesses helps them meet community needs, support the national economy, and promote job creation and investment (Almashhadani & Almashhadani, 2023). The main goal is to determine the impact of FinTech on the performance of Tunisian banks, in particular, the impact of FinTech on the profitability of 12 Tunisian banks for the period from Q2 2020 to Q3 2022, collected from quarterly financial statements. The generalized least squares (GLS) method is used to estimate the panel models. On the other hand, to improve the credibility of the results, several generalized method of moments (GMM) estimation robustness tests were carried out to confirm the GLS results. The analysis used the return on assets (ROA) as an index to determine the level of profitability. The result of this study showed that bank profitability was significantly affected by FinTech services, including payment technology and artificial intelligence (AI). The implications of this analysis are reflected in better-informed decisions on the part of investors. This gives inventors and innovators a chance to emerge, as banks seek to improve their efficiency through FinTech (Dasilas & Karanović, 2023; Phama et al., 2024). Banks will be encouraged to use FinTech, and the more customers they attract, the higher the bank's productivity and profit will be. This study is one of the first conducted in Tunisia. It has contributed to the enrichment of research on FinTech and its impact on bank efficiency.

**Keywords:** FinTech, Payment Technology, Artificial Intelligence, Banking Profitability, Tunisian Banks

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## 1. INTRODUCTION

Financial technology (FinTech) is considered as a financial service or financial management that is based on technology and aims to create innovations in the financial sector (Puschmann, 2017). In addition, FinTech encompasses electronic payment services such as virtual currencies, financing, financial advisors, and bots. It involves the creation of new or existing financial products and services that improve security, reduce costs, and promote financial inclusion, leading to better economic growth and financing (Mention, 2019). FinTech is characterized by enormous heterogeneity, which has led to the birth of multiple forms of FinTech, including blockchain, Ethereum, Bitcoin, and cryptocurrency in general (Thakor, 2020). Therefore, the study of the relationship between FinTech and traditional financial institutions has interested many researchers, such as Milian et al. (2019), who show that FinTech occupies an essential place in finance. On the other hand, the impact of FinTech on banks is still questionable, which suggests that more empirical work should be conducted to study the relationship between FinTech and bank performance.

Disclosed data has an important role to play in company performance in finance. Leung and Ton (2015) found that data in the Australian stock market had a significant influence on share performance. Similarly, Li et al. (2018) and Audrino et al. (2020) found the same result. Among these data are social media, press articles, etc In terms of the relationship between FinTech and banks, they may be competitive or associated (Navaretti et al., 2018; Vives, 2019); furthermore, FinTech information is likely to influence bank performance. These studies demonstrate that FinTech can be measured by information on the Internet, which encourages research into the influence of FinTech on bank performance. Consequently, this work examines the connection between FinTech and bank performance in countries undergoing growth, where FinTech represents the most essential factor in the distribution of financial products to bank users who do not have a bank account. Tunisia is an appropriate example for this work. There isn't a huge amount of FinTech data on finance websites in Tunisia, which can be exploited to study the progress of FinTech. Examples of data such as payment technology and artificial intelligence (AI) promote the development of the transaction process in the banking sector (Farishy, 2023).

The most important aspect of this essay is its discussion of how AI could benefit the banking sector. In addition, we note that research into the measurement of FinTech indicators through this data is very limited. Thus, it emerges that there is a shortage of research findings and that this needs to be addressed. This is why the problem of our research is the following:

*RQ: Is there an effect between FinTech and the performance of Tunisian banks?*

Therefore, this research paper examines the link between FinTech and bank performance, where FinTech is the most vital means of supplying financial services to banked users. This gap shows the contribution to the existing literature on considering this effect.

Previous research into the relationship between FinTech and performance in the banking sector has produced mitigated outcomes. For example, Sheng (2021) and Dasilas and Karanović (2023) found a positive connection between FinTech and performance. This positive effect means that the significance of FinTech practices for financial performance has improved. Other authors found a negative connection between these two variables. This negative effect means that the primary obstacle to applying FinTech was the absence of appropriate government and other stakeholders.

In this research, we aim to investigate in more detail the role of FinTech in influencing the financial profitability of banks, using FinTech information from banks in Tunisia over the period from Q2 2020 to Q3 2022. The sample for this research was provided by bank websites. We study the influence of FinTech scores, AI, and payment technology on a bank's financial profitability (ROA). The panel data methodology with generalized least squares (GLS) estimates is employed to measure the influence of FinTech on performance.

This study presents a number of contributions on bank performance. Firstly, it analyzes the FinTechs of Tunisian banks, which have so far not been studied in academic research. Subsequently, this study explores the two FinTech indices in more detail in order to clarify which one is most appropriate for the Tunisian banking sector. Finally, this study includes a detailed look at the two main FinTech criteria.

The rest of the paper is presented as follows. Section 2 reviews the literature, identifies research gaps, and develops the hypothesis. Section 3 presents the research methodology. Section 4 provides the results and discussion. Finally, Section 5 concludes the paper.

## 2. LITERATURE REVIEW

With the advancement of technology, the banking industry faces increasing competitive pressures that require institutions to enhance their ability to maximize performance in pursuit of sustainable competitive advantages (Murinde et al., 2022).

FinTech has assumed an increasingly vital role in banking technology innovation. Its impact can be seen in various areas, such as profitability, customer experience, operational efficiency, risk management, and product development (Chen et al., 2021).

The review of previous studies will focus on the studies in the past five years. Eltweri (2020) analyzed the impact of FinTech services on the performance of financial indicators. He stated that FinTech challenges the traditional structures of financial services and aims to optimize them and increase their degree of efficiency. Therefore, FinTech plays a role in the performance of banks, and many previous studies have focused on identifying various factors that affect business profitability, such as Li et al. (2018), Ntwiga (2020), Alkhazaleh and Haddad (2021), Hornuf et al. (2021), Alwi (2021), Ebrahim et al. (2021), Pollari (2016), Sheng (2021), Dasilas and Karanović (2023), Kayed et al. (2024), and De Boyrie and Pavlova (2025).

Li et al. (2018) found a positive interaction between FinTech and the revenue and profit of banks. In addition, Ntwiga (2020) verified the effective and positive impact of FinTech on the banking sector. In his study, he used the financial statement data of five banks from 2009 to 2018 and divided them into two periods: before the use of FinTech from 2009 to 2014 and the period of using FinTech from 2015 to 2018. The result showed a positive and effective impact between FinTech and banks, and that the performance of banks improved during the period of using FinTech. Similarly, Alkhazaleh and Haddad (2021) found a positive link between the two, as customers' trust in the banks grows after the use of FinTech. In addition, Hornuf et al. (2021) pointed out that FinTech has a positive impact on banks, as they have entered into agreements with FinTech companies to create their own software. In addition, Alwi (2021) in his review indicated that FinTech helps customers to carry out banking transactions while staying at home. It applied control measures in banks, such as share price, profits, and losses, over the period 2015–2019. There is a positive impact on bank profits and stock prices. Ebrahim et al. (2021) argued that FinTech is much preferable to traditional transactions because it makes it easier to serve users and retains information better, and makes it more useful. Again, according to Pollari (2016), FinTech enables electronic payments, which help maintain distance and safety between people during the pandemic. In addition, bank customers and managers prefer electronic payments due to lower costs and fees.

In addition, Sheng's (2021) study also examined the impact of FinTech on bank efficiency and the credit level behavior of institutions. This author used the method of analyzing the financial statements and records of banks from 2011 to 2018. Their results show that FinTech improves the ability of banks to obtain loans for institutions and that FinTech is useful in strengthening small banks. Dasilas and Karanović (2023) investigated the impact of FinTech on bank efficiency using the United Kingdom (UK) banking sector data for the period from 2010 to 2019. Using panel data regression, the results show that FinTech firms have a positive impact on bank efficiency. Kayed et al. (2024) aimed to study the impact of FinTech on the efficiency of 13 Jordanian banks from 2010 to 2019. Using panel data analysis to estimate the impact of FinTech development on banks. The results show that FinTech development in banks significantly increases bank profitability, indicating a significant and positive impact on financial performance. De Boyrie and Pavlova (2025) analyzed the impact of FinTech innovation on bank efficiency for the period from 2010 to 2022 using system generalized method of moments (GMM) estimators to examine this impact. The results show a positive impact between these variables.

In summary, the impact of FinTech on bank profitability is a multifaceted and complex topic that warrants new developments in empirical research. The existing literature highlights the need for a qualified understanding of how FinTech affects various aspects of banking. As FinTech increasingly displaces the financial sector, it is essential for academics and professionals to keep up with these changes and develop their approaches. Consequently, we investigate the impact of FinTech on the profitability of Tunisian banks. Therefore, we formulate the following hypothesis:

*H1: There is a positive relationship between FinTech and bank profitability.*

## 3. RESEARCH METHODOLOGY

### 3.1. Model

To study the relationship between FinTech and performance, we estimate a panel data model from a representative sample of Tunisian banks' data from Q2 2020 to Q3 2022. Our sample consists of the FinTech of Tunisian banks from financial statements. For this investigation, we selected 12 conventional Tunisian banks. In fact, this data covers the period from Q2 2020 to Q3 2022. Since Q1 2020 is a transition period, it was not included in the data collection.

To study the impact of FinTech on ROA, we establish an empirical model by estimating a regression model.

$$ROA_{it} = \alpha_0 + \alpha_1 PT_{it} + \alpha_2 AI_{it} + \varepsilon_{it} \quad (1)$$

where,

- $ROA_{it}$ explains the performance of bank $i$ at time $t$;
- $PT_{it}$ and $AI_{it}$ explain the financial ratios of bank $i$ at time $t$;
- $\varepsilon_{it}$ is the error term;
- $\alpha_0$ is the constant and $\alpha_1$–$\alpha_2$ are the vectors of coefficient estimates.

### 3.2. Performance variable

According to Almashhadani and Almashhadani (2023), Alnsour (2023), and Pham et al. (2024), the banking performance variable has been defined by return on assets (*ROA*). This ratio is a dependent variable.

### 3.3. FinTech variables

Regarding the independent variables, this study was based on two variables: artificial intelligence (*AI*) and payment technology (*PT*). These variables are defined as dichotomous variables. According to Farishy (2023), the development of AI has helped to optimize e-finance as transactions based on manual or statistical models have become smarter, more reliable, and innovative. The second variable— *PT* — is determined by the preferences of bank customers for technological payments, which makes it possible to make financial transactions and receive account information through their smartphones (Tiyan et al., 2021; Anindyastri et al., 2022; Alghadi, 2024). This payment method includes a more effective security system. Table 1 below summarizes all the variables.

**Table 1.** Variable measurements

| *Variables* | *Abbreviation* | *Formulas* |
|---|---|---|
| ***Dependent variable*** | | |
| Return on assets | *ROA* | Net income / Total assets |
| ***Independent variables*** | | |
| Artificial intelligence | *AI* | Dichotomous variable that takes the value 1 if the variable applies to the bank and 0 otherwise |
| Payment technology | *PT* | |

*Source: Author's elaboration.*

## 4. RESULTS AND DISCUSSIONS

### 4.1. Descriptive statistics

Table 2 presents the results of the descriptive statistical analysis conducted to assess the contribution of FinTech to the profitability of Tunisian banks. For *ROA* (the dependent variable), the mean value of bank profitability is 0.0237, the standard deviation is 0.0316, and the min/max values are 0.0002 and 0.1087, respectively.

In contrast, for *PT*, the mean is 0.8500 and the standard deviation is 0.3585, with the minimum and maximum values being 0.000 and 1.000, respectively. Similarly, for the second variable, *AI*, the mean is 0.9000 and the standard deviation is 0.3012, with the minimum and maximum values being 0.000 and 1.000, respectively.

**Table 2.** Descriptive statistics

| *Variables* | *Mean* | *Standard deviation* | *Minimum* | *Maximum* |
|---|---|---|---|---|
| *ROA* | 0.0237 | 0.0316 | 0.0002 | 0.1087 |
| *PT* | 0.8500 | 0.3585 | 0.000 | 1.0000 |
| *AI* | 0.9000 | 0.3012 | 0.000 | 1.0000 |

*Source: Author's elaboration.*

## 4.2. Correlation matrix

Table 3 illustrates the relationship between the variables and their variance inflation factor (VIF). It is obvious that multicollinearity does not occur. The optimal correlation value is 0.793, which is less than 0.8 (Gujarati & Porter, 2009). As for the independent variables, their VIF value is below 10 (Hair et al., 2010).

**Table 3.** Correlation matrix

| *Variables* | *ROA* | *PT* | *AI* |
|---|---|---|---|
| ***Panel A: Correlation matrix*** | | | |
| *ROA* | 1.000 | | |
| *PT* | 0.205** | 1.000 | |
| *AI* | 0.177* | 0.793*** | 1.000 |
| ***Panel B: Variance inflation factor*** | | | |
| VIF | | 3.28 | 2.71 |

*Note: ***, **, and * indicate the significance level of 1%, 5%, and 10%, respectively.*
*Source: Author's elaboration.*

According to the correlation matrix, FinTech measures (*PT* and *AI*) are positively related to *ROA*. This means that improving these factors can lead to higher *ROA*. These results are consistent with the studies of Almashhadani and Almashhadani (2023), Alnsour (2023), Alghadi (2024), and Phama et al. (2024).

## 4.3. Panel data tests

### *4.3.1. Hausman test*

The Hausman test is designed to distinguish between the fixed-effects (FE) model and the random-effects (RE) model. When the p-value ratio for the RE is less than 5%, the FE model should be used. The RE model is chosen when the p-value level is greater than 5%.

**Table 4.** Hausman test

| *Equation* | *p-value* |
|---|---|
| *ROA* | 0.9962 |

We found that the Hausman p-value is greater than 5%, which leads us to choose the RE panel data. In this case, the RE panel data is retained. And according to the Hausman test, we found that the effects are random for this regression.

### *4.3.2. Heteroscedasticity and autocorrelation test*

We apply the modified Wald test to check for heteroscedasticity. The modified Wald test is significant for all variables (p-value = 0.000), indicating the problem of heteroscedasticity of RE.

We performed the Wooldridge test to validate the autocorrelation test. This test is significant for all variables (p-value = 0.000). This leads us to assert the necessity of an autocorrelation problem.

**Table 5.** Test for heteroscedasticity and autocorrelation

| *Equation* | *Heteroscedasticity test* | *Autocorrelation test* |
|---|---|---|
| | *p-value* | *p-value* |
| *ROA* | 0.000*** | 0.000*** |

*Note: *** indicates the significance level of 1%.*
*Source: Author's elaboration.*

## 4.4. Empirical results

Table 6 shows the regression results between the dependent variable (*ROA*) and the independent variables using the GLS model.

**Table 6.** Impact of the FinTech on the profitability of Tunisian banks

| *Variables* | *Coefficients* | *P > \|Z\|* |
|---|---|---|
| *PT* | 0.0019 | 0.0511*** |
| *AI* | 0.0004 | 0.0885*** |
| Constant | 0.6922 | 0.0578*** |
| $R^2$ | | 0.0429** |
| Wald $Chi^2$ | 8.46 | 0.0132*** |

*Note: This table presents the GLS regression results for the impact of the FinTech on the profitability of Tunisian banks. The p-value is shown in parentheses. ***, **, and * indicate the significance level of 1% , 5%, and 10% levels, respectively.*
*Source: Author's elaboration.*

Regarding the coefficient of determination ($R^2$), in this study, the *ROA* variable has a value of $R^2 = 0.0429$, which explains that 4.29% of the conflict in banks' profitability (*ROA*) can be clarified by the FinTech variable.

Table 6 confirms that all assumptions were valid. The findings show that FinTech has a positive and significant correlation with *ROA*, with the *PT* variable having p = 0.0511 and the *AI* variable having p = 0.0885. In this case, we can see that FinTech has a significant positive impact on banks' profitability. This result is consistent with previous research by Li et al. (2018), Ntwiga (2020), Alkhazaleh and Haddad (2021), Hornuf et al. (2021), Alwi (2021), Ebrahim et al. (2021), Pollari (2016), Sheng (2021), Almashhadani and Almashhadani (2023), who

proved a strong correlation between FinTech and banking performance. The increasing consumer awareness of FinTech and technology-based banking products has led to an increase in the demand for banking products, as well as an increase in bank revenues.

### 4.5. Discussions

The results are very important for understanding the complex relationship between FinTech and bank profits in Tunisia. Firstly, the results of this study appear to indicate an encouraging and statistically significant positive impact of the use of FinTech on the banking sector. The correlation metric indicates a high and statistically significant positive relationship between these variables. This is why FinTech acts as a stimulus for competitors, as banks use technology to help guide this growth and the implementation of their strategies and procedures (Hair et al., 2017).

The methodology of this study includes different sample types and sizes, as well as data collection approaches, which include validation within a regional reference framework. Although the results help to clarify the overall socio-economic and regulatory structures of the banking sector in Tunisia, it is essential to consider them in this broader context.

Moreover, it's vital to appreciate that the FinTech ecosystem is a rapidly changing and highly dynamic area in which to innovate. The rapid adoption of new technologies and the evolution of customer needs oblige banks not to adopt a rigid approach. Therefore, they must remain proactive and continuously evaluate their FinTech strategies to achieve a sustainable competitive advantage in the market and improve their performance in the long term (Dwivedi et al., 2022).

## 5. CONCLUSION

In this research paper, a panel model was developed to study the impact of FinTech on bank efficiency, using quantitative studies that exist on the determinants of banks' performance. We use the financial reports from Q2 2020 to Q3 2022 of the 12 Tunisian banks to extract FinTech data. The results of the estimation in this paper are the findings of the GLS method.

According to the findings, it is obvious that FinTech, represented by two independent variables in this study, plays a positive and important role in the financial performance of banks. This means that the more reliable the FinTech services in banks, the better the financial performance. In addition, this study found that as the quantity of virtual financial services offered to customers increases, the quality and performance of banks increase.

The results are scientifically significant indicators for banks and FinTech companies. This study has established a link between new FinTech companies and the performance of banks. Against this background, we propose that banks should create a service to collect FinTech information and then evaluate and take it into account as an indispensable tool to adapt to the evolution of FinTech. In addition, FinTech companies will likely work with the media to increase the amount of FinTech information, focusing on FinTech products. This helps to stimulate consumer adoption of FinTech companies' financial products. We believe that FinTech companies will benefit from competing with commercial banks.

The findings are critical not only to improve understanding of the links between FinTech and banking performance, but also offer industry experts and policymakers ideas to address the impact of FinTech on their financial systems. Financial institutions in this region need to focus their efforts on creating comprehensive FinTech strategies that consider financial abilities and policy approaches to obtain the highest value and sustainable results.

The study has certain limitations. For example, we used a short period. In future research, we will expand the period. Thus, we chose only two FinTech variables and a single performance variable. This will guide us in using other variables.

Thus, this study was intuitive for future research as there are other factors whose impact on financial performance needs to be clarified. In particular, other FinTech services are provided by new companies, particularly banks. Again, other financial indices, such as liquidity ratios and solvency ratios, can be used in our study instead of ROA. We can use financial institutions other than banks in future surveys and also choose another Middle East and North Africa region to study and analyze this impact, which will make future studies more relevant for researchers.

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