Investigating The Impact of Adopting Financial Technology on commercial Banks' Profitability: An Empirical Study

Ramy Ebada Zidan[1]

Abstract

This paper aims to understand the impact of adopting FinTech in the commercial banking industry and to quantify the impact of adopting FinTech on the commercial bank's profitability in Egypt, assessing performance with several measures. The study sample consists of 15 Egyptian commercial Banks. The study period from 2017 to 2022. The study hypothesis has been tested using multiple regression analysis to estimate the impact of financial technology on commercial bank's profitability in Egypt. The study results showed that only asset leverage has significant effect on the dependent variable (ROA), while the other studied variables (Independent variables) have no significant impact on bank's profitability.

Keywords: Financial Technology, Egyptian banking sector, Bank's Profitability, Financial inclusion, Central bank of Egypt.

[1] Teaching Assistant at Modern University for Technology & Information (MTI)

التحقيق فى تأثير الاعتماد على التكنولوجيا المالية على ربحية البنوك التجارية: دراسة تطبيقية

الملخص

تهدف هذه الدراسة إلى محاولة فهم تأثير تبني FinTech فى القطاع المصرفى، كما تهدف إلى تحديد تأثير تبني FinTech على ربحية البنوك التجارية العاملة فى مصر. تتمثل عينة الدراسة فى 15 بنك عامل فى البيئة المصرية. تمتد فترة الدراسة من 2017 إلى 2022. وقد تم تحليل نتائج الدراسة باستخدام تحليل الانحدار المتعدد لتقدير تأثير التكنولوجيا المالية على ربحية البنوك فى مصر.

وقد توصلت الدراسة إلى أن الرافعة المالية فقط لها تأثير ذات دلالة إحصائية على المتغير التابع معدل العائد على الأصول (ROA)، في حين أن المتغيرات الأخرى المدروسة (المتغيرات المستقلة) ليس لها تأثير كبير على ربحية البنك.

الكلمات المفتاحية: التكنولوجيا المالية، القطاع المصرفى المصرى، ربحية البنك، الشمول المالى، البنك المركزى المصرى.

I. Introduction

Banks are trying hard to provide easier, faster, more comfortable, secure services and to convey the modern technology age, but on the other hand, they are facing several challenges, especially with the development of financial technology companies that have forced banks to keep pace with technology. Financial technology, abbreviated as FINTECH, is an invention that intends to contest with established financial approaches in the supply of financial services. The first word (fin) indicates finance, and the second word (tech) implies technology. It is a novel industry that employs technology to advance financial activities by depending on much more intense use of information technology. Furthermore, it made the financial transactions too simple, as you can with one click convert money or open a checking account, bank certificate, or depositing a check etc., (Leong and Sung, 2018). FinTech's advantages concern all users of financial services; it has an impact on the economy because of its effect on GDP and financial inclusion. Where financial inclusion refers to the access of individuals and businesses, to the products and services of formal financial institutions– transactions, payments, savings, credit and insurance– at a reasonable cost and in a sustainable mode. Financial inclusion has been broadly recognized as critical tool in reducing poverty and achieving inclusive economic growth. It boosts the gross domestic product (GDP) of digitalized economies by giving individuals and small, medium, and big companies suitable entrees to a variety of financial products and services (as well as credit facilities), which can increase

total consumption and ultimately GDP levels. In banks, FINTECH is interested in connecting the IT department with the financial department to enhance the system's infrastructure and programming capabilities, the development of FINTECH business models around technology and software to be flexible to any business needs without affording huge costs and preparatory work as well. Egyptian banks cooperate with the Central Bank of Egypt and the regulatory bodies to achieve economic growth to transform the Egyptian society into a non-monetary society where technical expertise is shared to provide financial services to people who do not deal with banks to enhance financial inclusion in Egypt.

II. Significance of the Study

The significance of this research is to find out how financial technology affects Egyptian banks' Profitability and the relationship between them. The research aims as well to introduce innovative ways to encourage banks to finance and invest in more FINTECH start-ups to increase the number of FINTECH firms in Egypt to improve the efficiency of banks and understand the challenges that face FINTECH spread and analyze the FINTECH strategy to enter the financial service sector and how banks response the financial technology movement in the digital era since the fierce competition required banks and FINTECH to become more innovative. FINTECH is relatively new with significant development which provides both challenges and opportunities.

III. Literature Review

There are many previous studies has been focused on the relation between financial technology and bank profitability. The term (Fin-tech) is a made-up word that combines the words “financial” and “technology” to describe the intersection of new web-based technologies and existing banking sector business operations (**Gomber, P., et al.,2017**). It is a combination of finance and technology or a computer-centered application that allows customers to conduct electronic financial transactions without binding them to a certain physical presence (**Parameshwar et al., 2019**).

Marwa Rabe, (2022) financial technology is now critical for each firm to ease and simplify commercial transactions. The purpose of this study is to examine the efficiency of the banks in Egypt after the spread of FINTECH. The shortage of studies in this field in Egypt is presented as the paper's concern. Financial statement data were used for a period from 2014-2020 from the CBE Egyptian bank with FINTECH collaborations. Three alternative models with different input-output combinations were developed, based on production, profitability, and intermediation dimensions to evaluate the banks' efficiency using DEA technique. The input variable are customer deposits, total loans and interest expenses while the output variables are total loans, deposits and interest income. The results revealed that the Egyptian banks' efficiency does not relatively improved by introducing the financial technology except for deposits and total loans.

Chhaidar, A., Abdelhedi, M., & Abdelkafi, I. (2022). This paper examines the dynamic relationship between FinTech investments and financial performance, and it explores whether the bank size could influence the performance in the context of the digital transformation (digitization). The fully modified ordinary least squares (FMOLS) model is estimated for 23 European banks throughout the whole period ranging from 2010 to 2019 and for the two sub-periods spanning from 2010 to 2014 and from 2015 to 2019. The financial profitability is the dependent variable in this study. Profitability was measured by the return on asset (ROA) which was calculated by net income divided by total assets. The main independent variable is the measure of a bank investment in financial technology. The econometric results evince that FinTech are positively and significantly related to the bank profitability, inferring that the greater the digital engagement of banks is, the higher the profitability is. Our findings provide evidence that the bank size is a moderator factor in affecting the relationship between digital investments and the profitability. Hence, larger banks benefit more from investments in the financial technology so as to improve their performance. Our study has substantial policy implications as we suggest that the increased investment in the FinTech is a possible channel through which banks improve their performance, particularly when the bank size is considered large.

Eman Salman, (2021) Banking performance cannot be good without the Banking clients' satisfaction. The study investigates the impact of FinTech on financial

performance and client satisfaction. A sample of seven banks represented in Egyptian banks over the period from 2016 to 2020, in addition to 396 banking clients. Finally, the study found a significant impact both of "banking investments on FinTech" and "number of Fitch's drives" (ATMS, Credit card, Debit Card and E-wallets) on the rate of return on bank assets under the types of ownership (Domestic/Foreign/Mix) as a control variable. In addition to the significant impact of FinTech service characteristics on bank clients' satisfaction. Egyptian banks should consider financial technology as one of the tools of non-price competition that works to support the competitive position of the bank that agree with (Kemunto, and Kagiri, 2018; Chen et. al. 2021). In addition, the study recommends expanding studies related to the regulatory aspects of financial technology, which is known as RegTech.

Athanasoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008).The aim of this research is to examine the effect of bank-specific, industry-specific and macroeconomic determinants of bank profitability, using an empirical framework that incorporates the traditional Structure-Conduct-Performance (SCP) hypothesis. To account for profit persistence, we apply a GMM technique to a panel of Greek banks that covers the period 1985-2001. The estimation results show that profitability persists to a moderate extent, indicating that departures from perfectly competitive market structures may not be that large. All bank-specific determinants, with the exception of size, affect bank profitability significantly in the anticipated way. However, no evidence is found in support of the

SCP hypothesis. Finally, the business cycle has a positive, albeit asymmetric effect on bank profitability, being significant only in the upper phase of the cycle. The variables used in this study. The profitability variable is represented by two alternative measures: the ratio of profits to assets, i.e. the return on assets (ROA) and the profits to equity ratio, i.e. the return on equity (ROE). In principle, ROA reflects the ability of a bank's management to generate profits from the bank's assets.

Li et al. (2017), indicated the ability of FinTech on digital banking. The sample taken for the study is 47 incumbent US retail banks from 2010 to 2016. ROA-ROE is the measurement of FinTech on digital banks. The results indicate a positive relationship exists between the growths in FinTech funding or deals and the concurrent stock returns of incumbent retail banks. Although these results suggest complementarity between FinTech and traditional banking, the results at the banking industry level are not statistically significant, and that the coefficient signs for about one-third of the banks are negative, but not statistically significant. Since the FinTech industry is young and our sample period is short, they stated that they cannot exclude that their findings are spurious.

Gohary (2019), clarified that e-government in Egypt needs FinTech companies to improve and facilitate its services. The sample was a questionnaire for 400 respondents that indicate that 70% of respondents found difficulties in using the website, shortage in employee's efficiency, poor services and transactions in the system, and the slow internet speed so, the study suggests

cooperation with FINTECH to solve the problems and awareness campaign to increase trust as 30% of the respondents didn't use e-government. The findings found that bank accounts with e-government did not influence any of the dimensions of the enabling service, whereas the remaining components affect some aspects but not others.

Ntwiga (2020), investigated the influence of FINTECH on banks' collaboration by measuring the technical efficiency in the Kenyan banking sector. The sample taken for this study is five banks for the period from 2009-2018 in Kenyan. The results showed a positive relationship between financial technology and banks efficiency, as financial technology helped to increase technical efficiency on a large scale. The results showed that the period before the use of technology was suffering from a lack of efficiency and high productivity.

Wu, G., & Yuan, H. (2021, June), FINTECH is the innovative use of technology in the design and delivery of financial products and services. This study aims to statistically investigate the FINTECH and other determinants that affect the profitability of six state-owned commercial banks (SOBs) in China using the data from the 2014-2019 periods. Theoretically, FINTECH serves as a disruption for its banking services through adverse impacts on asset business, liquidity business and intermediary business. Empirically, the result shows that the development of FINTECH has a negative impact on the profitability of SOBs and the regression results from the OLS estimation, the FGLS estimation, the Prais-Winsten estimation and the FE estimation are compared

to ensure the validity of the statistical inference. This study is based on the data collected from the Wind and iFinD database with a selection of six listed state-owned commercial banks in China for the 2014-2019 period. A panel data estimation model is used to explore the determinant factors of state-owned banks' profitability (measured by ROE), especially the effect of financial technology (FT). ROE is a primary proxy for the level of bank profitability and it measures a bank's ability to reward its shareholders through the increase in retained earnings and additional paid-in capital.

Wang et al. (2021), tested the influence of FinTech development on banks risk-taking on a database of 320 banks in China and found that the FinTech development reduces banks risk-taking especially in banks with low efficiency, and the banks with more shadow banking business are available mostly for the negative impact of FinTech. They suggest cooperation between banks and FinTech to reduce risk-taking and recommend more researches in different countries to enable more generalization of the results.

Chen, X., You, X., & Chang, V. (2021), As the impacts of the COVID-19 pandemic play out globally, the banking industry has been affected in both positive and negative ways, with the crisis creating both opportunities and threats for the collaborations between FINTECH and banks. The aim of this study is to investigate the impact of FINTECH products (FTPs) on commercial bank's performance in China. Required data are collected with a quantitative approach and two self-designed questionnaires were distributed to customers and

employees of commercial banks in China. The gathered data were examined using the structural equation modeling technique. The results of this study reveal that the perceived usefulness (PU) of FTPs has positive and significant impacts on customer satisfaction, low expectation of bank employee assistance, bank's service quality and employee work efficiency. Additionally, the perceived difficulty of use (PD) of FTPs has negative and significant impacts on customer satisfaction and low expectation of assistance. Interestingly, there is a positive and significant relationship between PD and banks' service quality and work efficiency, meaning that the service quality and work efficiency can reduce some shortcomings of using FTPs. This study recognizes the need to enhance the understanding of FTPs on non-financial firm performance.

Wiranatakusuma, D., & Jami, D. (2022, August). The objective of this study is to determine how the development of FINTECH in Indonesia may impact the performance of Indonesian banks. This study seeks to determine the number of lenders (JL), borrowers (JB), and loans (J) in the United States (JP). Secondary data from Bank Indonesia and the Financial Services Authority were used for this investigation. The sample used is the statistics report on FINTECH Lending from July 2018 to September 2021. The employed method of analysis is the Vector Error Correction Model (VECM) method. This study's dependent variable is banking performance (ROA), while its independent variables are the number of lenders, the number of borrowers, and the quantity of loans. The data indicate that there is no

statistical correlation between FINTECH institutions and the short-term development of banks. On the other hand, the performance of banks is disturbed in the long run by the large number of loans disbursed by FINTECH organizations. Due to market segmentation based on customer level and background, banks' performance is not significantly impacted by the large number of lenders and borrowers inside FINTECH organizations.

Wang et al. (2021), FinTech's possible impact on the banking industry was investigated from 2009 to 2018, 113 Chinese banks were sampled, there are 18 national banks (six state-owned big banks and twelve joint-stock banks), 72 urban commercial banks, and 72 rural commercial banks (a total of 72). 23 TFP was used to assess bank competitiveness, the DEA Malmquist technique was used to calculate TFP, SYS-GMM, and DFF-GMM were used to enhance the results. FINTECH development has a favorable impact on earnings, financial innovation, and risk management, according to the findings. Commercial banks can improve their performance by implementing financial technology.

Based on the previous preliminary literature review, many studies have found that financial technology enhances bank's profitability. Furthermore, financial technology is a new area of research that lacks investigation in Arab countries especially in Egypt.

Research problem

This research will attempt to measure the impact of financial technology adoption on bank's profitability in Egypt.

Research Objectives:

The research main objective is to "**increase bank's profitability**" and this objective can be conducted through fulfilling the following sub-objectives:

1. Determine the aspects of financial technology service quality that may influence people's intent to utilize it through analyzing the data of the Egyptian banks.
2. Examine if FINTECH can help to improve banks financial performance and reducing the costs, which will affect positively on bank profitability.

Research Questions

The questions that lead this research study are framed as follows:

1. What is the relationship between adoption FINTECH and Egyptian Banks Profitability?
2. How has FINTECH affected the banking industry in Egypt? And what's the best practice?

Research Hypothesis:

The study examines the following testable hypotheses.

H_0: There is no significant impact of adoption of FINTECH on the profitability of Egyptian banks

H_1: There is significant impact of adoption of FINTECH on the profitability of Egyptian banks.

Research Methodology:

The study uses deductive approach where the variables are known from the literature and the hypotheses have already been drawn from theories and are then tested on Egyptian Banks. deductive study starts from the more generic to the more specific. It starts with a general theory, and then

it narrows down the theory into specific hypotheses that can be tested.

The research is a quantitative study; it relies on collecting and analyzing quantitative data in order to identify the main factors that affect adopting financial technology of Egyptian banks. Quantitative research is research in which statistical procedures are employed in order to explore, describe, explain, control, and predict a phenomenon. It usually aims to test theories in a deductive manner to search for evidence to support or to disprove the hypotheses.

The descriptive research design is employed in the study to investigate the determinants adopting financial technology of Egyptian banks. Descriptive research aims to describes a situation, phenomenon, or population in a systematic manner as they exist and is able to answer questions as what, when, where, and how.

The previous part showed an overview of the literature dealing with the adoption of financial technology and bank's profitability.

This part addresses the research data and sample, research model and estimation.

Data collection and Sample

The data used in this study are obtained from CBE Egyptian Bank. The sample includes operating banks in Egypt during the period of 2017-2022. In this study, the FINTECH periods are used to cover FINTECH cooperation in the banking sector.

The Model

The following model(s) is (are) to be estimated:

Dependent Variables (Y):

Y: Bank Profitability will be measured by return on assets (ROA)

Independent and Control Variables (Xs):

X_1 Financial Technology (Independent Variable) will be measured by credit cards.

X_2 Bank Size (Control Variable)

X_3 Bank Leverage (Control Variable)

Descriptive statistic:

To provide an overview of the key features of study variables, some of the concepts of descriptive statistics of these variables, including the number of observations, mean, median, standard deviation, are illustrated in Table (1). The results show that:

- The average ROA of banks is (0.0144). The minimum size between the study sample is (-0.019) and the maximum is (-0.047).
- The average size of banks is (8.7036). The minimum size between the study sample is (6.208) and the maximum is (11.678).
- The average of leverage level between the study sample is (0.903). The minimum leverage level is (0.801) and the maximum is (0.960).

- The average of credit card is (14.1968). The minimum log credit card is (6.3065) and the maximum is (21.1821).

Table (1) Descriptive Statistic

	Mean	**Minimum**	**Maximum**	**SD**	**N**
Return on Assets	0.0144	-0.019	-0.047	0.0116	87
Credit Card	14.197	6.306	21.182	3.649	87
Leverage	0.903	0.801	0.960	0.0334	87
Bank Size	8.703	6.208	11.678	1.516	87

Correlation Analysis:

Before estimating regression models, one should ensure that there is no correlation between independent variables. Customarily, coefficients of less than 50% between each of the independent variables are considered acceptable. A correlation analysis was performed using the Pearson correlation test for the variables. Results are presented in Table (2). Results prove that there is no problem of multicollinearity between independent variables, with a maximum value of 0.834 for the correlation between bank size and log credit cared . Also, we found low VIF scores with a maximum value of 3.329 and a mean value of 0.300.

Table (2) Pearson Correlation for the research variables

	Return on Assets	**Credit Card**	**Leverage**	**Bank Size**	**VIF**
Return on Assets	**1**				
Credit Card	0.126	**1**			3.282
Leverage	-0.412**	0.254*	**1**		1.086
Bank Size	0.068	0.834**	0.218*	**1**	3.329

Linear Regression Analysis for the study variables:

Table (3) Regression Results without control variables

Independent variables	**B**	**T- Test**		**F-Test**		**R^2**
		Value	**Sig.**	**Value**	**Sig.**	
Constant	0.009	1.826	0.071	1.363	0.246	1.6%
Log Credit Card	0.000	1.167	0.246			

From table (3) it is clear that:

1. **Coefficient of determination (R2):**
   R^2 shows that the independent variable explains (1.6%) of the total variation in the dependent variables (ROA) and the rest of the ratio is due to random error in the equation, or perhaps the lack of inclusion of independent variables, that was supposed to be included within the form.
2. **Test the significant of the independent variable:**

- The independent variable Log credit card has insignificant effect on the dependent variable (ROA) as the value of "t" is (1.167) with significant level greater than (0.05).

3. **Test of total regression model (F-Test):**
   To test the quality of the model as a whole, (F-test) has a value of (1.363), with insignificant level greater than (0.01), with indicating no goodness of fit of the model.
4. **The relationship is represented by the following regression equation:**
   ROA= 0.009+ 0.000 Log Credit Card

Therefore, H_0: "There is no significant impact of adoption of FINTECH on the profitability of Egyptian banks" is accepted.

Regression Analysis with control variables:

Table (4) Regression Results with control variables

Independent variables	**B**	**T- Test**		**F-Test**		**R^2**
		Value	**Sig.**	**Value**	**Sig.**	
Constant	0.144	4.480	0.000	6.643	0.000	19.9%
Log Credit Card	0.001	1.927	0.057			
Leverage	-0.151	-4.085	0.000			
Bank Size	-0.001	-0.744	0.459			

From table (4) it is clear that:

5. **Coefficient of determination (R^2):**

R^2 shows that the independent variables explains (19.9%) of the total variation in the dependent variables (ROA) and the rest of the ratio is due to random error in the equation, or perhaps the lack of inclusion of independent variables, that was supposed to be included within the form.

6. **Test the significant of the independent variable:**
    - The independent variable log credit card has insignificant effect on the dependent variable (ROA) as the value of "t" is (1.927) with significant level greater than (0.05).
    - The independent variable asset leverage has significant effect on the dependent variable (ROA) as the value of "t" is (-4.085) with significant level lower than (0.05).
    - The independent variable bank size has insignificant effect on the dependent variable (ROA) as the value of "t" is (-0.744) with significant level greater than (0.05).
7. **Test of total regression model (F-Test):**
   To test the quality of the model as a whole, (F-test) has a value of (6.643), with significant level less than (0.01), with indicating goodness of fit of the model.
8. **The relationship is represented by the following regression equation:**

ROA= 0.144+0.001 Log Credit Card -0.151 Leverage -0.001 Bank Size

Therefore, H_0: "There is no significant impact of adoption of FINTECH on the profitability of Egyptian banks" is accepted.

References

- Alwi, S. (2021). Fintech As Financial Inclusion: Effect of FinTech on the share price and profitability of commercial banks in Malaysia, Indonesia and Singapore. **Turkish Journal of Computer and Mathematics Education (TURCOMAT)**, 12(11), 5338-5349.
- Chen, X., You, X., & Chang, V. (2021). FinTech and commercial banks' performance in China: A leap forward or survival of the fittest?. **Technological Forecasting and Social Change**, *166*, 120645.
- Dapp, T., Slomka, L., AG, D. B., & Hoffmann, R. (2015). Fintech reloaded–Traditional banks as digital ecosystems. **Publication of the German original**, 261-274.
- Ghebrial, F. (2019). Financial Inclusion in Egypt: Opportunities and Challenges.
- GOHARY, E. E. (2019). The impact of financial technology on facilitating e-government services in Egypt. **Journal of Distribution Science**, 17(5), 51-59.
- Gomber, P., Koch, J. A., & Siering, M., (2017), "Digital Finance and FinTech: current research and future research directions", **Journal of Business Economics**, 87(5).
- Hannoon, A., Al-Sartawi, A., Musleh, M. A., & Khalid, A. A. (2021). Relationship between financial technology and financial performance. In *The Big Data-Driven Digital Economy:* **Artificial and Computational Intelligence** (pp. 337-344). Springer, Cham.
- HASAKA, K. (2019). The Impact of fintech innovations and financial standards on bank performance: Evidence from selected commercial banks in ASEAN.

- Li, Y., Spigt, R., Swinkels, L. 2017. The impact of FinTech start-ups on incumbent retail banks' share prices. **Financial Innovation**, 3(1), 1-16.
- Lv, S., Du, Y., & Liu, Y. (2022). How Do Fintechs Impact Banks' Profitability?—An Empirical Study Based on Banks in China. **FinTech**, 1(2), 155-163.
- Mohamed, N. A. (2020). The effect of innovation on financial performance of listed banks in Kenya (**Doctoral dissertation, JKUAT-COHRED).**
- Ntwiga, D.B. 2020. Technical efficiency in the Kenyan banking sector: Influence of FinTech and banks collaboration. **Journal of Finance and Economics**, 8(1), 13-22.
- Painoli, G. K., Dhinakaran, D. P., & Vijai, C. (2021). Impact of Fintech on the Profitability of Public and Private Banks in India. **Annals of the Romanian Society for Cell Biology**, 25(6), 5419-5431.
- Pu, R., Teresiene, D., Pieczulis, I., Kong, J., Yue, X.G. 2021. The Interaction between Banking Sector and Financial Technology Companies: Qualitative Assessment: A Case of Lithuania. **Risks**, 9(1), 21.
- Painoli, G. K., Dhinakaran, D. P., & Vijai, C. (2021). Impact of Fintech on the Profitability of Public and Private Banks in India. **Annals of the Romanian Society for Cell Biology**, *25*(6), 5419-5431.
- Sayed, M. N., & Shusha, A. (2019). Determinants of financial inclusion in Egypt. **Asian Economic and Financial Review**, *9*(12), 1383-1404.
- Singh, R., Malik, G., & Jain, V. (2021). FinTech effect: measuring impact of FinTech adoption on banks' profitability. **International Journal of Management Practice**, *14*(4), 411-427.
- Vives, X. (2017). The impact of FinTech on banking. **European Economy**, (2), 97-105.
- Wang, R., Liu, J., Luo, H. 2021. Fintech development and bank risk taking in China. **The European Journal of Finance**, 27(4-5), 397-418.

- Wang, Y., Xiuping, S., Zhang, Q. 2021. Can fintech improve the efficiency of commercial banks? An analysis based on big data. **Research in International Business and Finance**, 55, 101338.