The impact of Financial Technology Innovation on Bank's Financial Performance: Evidence from Egypt

by

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Abstract:

Purpose: Financial technology is now critical for each firm to ease and simplify commercial transactions. Due to the ongoing global debate regarding the relationship between FinTech and banks, including developing countries, the purpose of this study is to examine the efficiency of the banks in Egypt after the spread of FinTech.

Design/Methodology/Approach: This study investigates the impact of bank-level Financial Technology (FinTech) innovations on banks' performance in Egypt. 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 2018-2022 from the CBE Egyptian bank with FinTech collaborations. Annual data of banks listed in EGX100 has been utilized to achieve this objective. Two alternative models with different combinations were developed, based on bank profitability, and bank stock returns to evaluate the banks' efficiency using SEM technique.

Findings: A key finding of this study is the presence of a simultaneous positive change and causality between FinTech and bank stock returns. Furthermore, several other interesting findings were discovered: (1) the causal relationship from FinTech to bank profitability is insignificant. (2) Insignificant causality exists between different types of FinTech, such as influence from DigPayment to FinProfitability, from DigPayment to BankReturn, from FinInc to FinProfitability, from FinInc to BankReturn; and (3) there is an equal occurrence of simultaneous increase between certain types of FinTech and bank stock returns, specifically between NeoBank and BankReturn, as well as TrsAcc and BankReturn.

Research implications: This study contributes to the literature on the adoption status of FinTech services in Egypt and its impact on the banks' efficiency. This study shed light on the complex relationship between FinTech and banks, offering insights that contribute to the understanding of this dynamic interplay in the context of Egypt’s emerging FinTech landscape.

Originality/value: Egyptian banks need to find more innovative ways to accelerate the transforming of the Egyptian society into a non-monetary society. Policymakers and investors should pay close attention to facilitate ongoing FinTech innovations in Egypt to create opportunities and build a more inclusive and efficient financial sector.

Keywords: FinTech, Bank Stock Return, Bank Performance, SEM, Egypt

JEL Classification: G20, G23.

1. INTRODUCTION

The recent revolution of Financial Technology (FinTech) has distinctly directed the intersection of Finance and Technology, both leading sectors around the world. The initiation of FinTech was created by the Financial Services Technology Consortium, which was developed in the early 1990s by Citigroup (Schueffel, 2016). FinTech, an emerging industry, uses technology and innovation techniques to improve financial activities and compete with traditional financial methods. Day-to-day financial transactions such as cash payments have been challenged with the takeover of Apple Pay, an online cashless payment. Thus, FinTech refers to the new financial model involving technology as the carrier providing financial services such as mobile payments, financial management, cloud computing, as well as other emerging scientific and technological means (Schueffel, 2016). S&P Analysts believe that FinTech could have a tremendous impact on the financial industry worldwide, causing a mega transformation in traditional financial products and services. According to the KPMG report (2019), the global investment in FinTech indicates a growth rate of 120% in 2018, reaching $111.8 billion dollars. Therefore, a robust establishment of the technological innovation development strategy and corresponding mechanism process would gradually form a new competitive advantage.

Banks, for instance, are enhancing their digital services through internet banking, mobile banking, face-voice-fingerprint recognition, and anti-fraud technology. In addition, the findings demonstrate that banks have widely utilized intuitive banking apps that bring together the platforms used for cashless transactions and data management, and to ensure sustainable

banking. FinTech considers as the main banking tool to achieve a high level of financial inclusion (Anwar et al., 2020). According to the World Bank in 2014, only about 12% of Egyptians and 14% of adults had a bank account in Egypt, one of the world's lowest penetration rates, while the mobile penetration rate of 102% and 33.9% of internet users, which proven that FinTech is the great development that banks need to improve its services, efficiency and increasing the inclusion (Nabil, 2019; Demirguc-Kunt et al., 2018).

According to Mroczkowska (2020) there was more than one FinTech application. First, trading online apps have enabled everyone with internet access to invest in the market, analyze risk immediately, and spread expertise inside the online platform itself. Banking for Individuals customers might now govern their finances through the internet. Banks and start-ups in this field are evolving online wallets and profiles to follow services, resulting in an improved and faster user experience that enhances the digitalization of the world. Second, digital solutions are being used by InsurTech insurance businesses to improve client experience. Users can sign up for new services and submit claims directly from the app at any time, without consuming time that they had to go through previously. Third, Personal wealth management is a category of FinTech applications that focuses on improving the wealth management procedures of enterprises and individuals. Fourth, Blockchain technology has become an important part of today's financial scene. This cutting-edge technology provides a transparent method of tracking financial transactions throughout their full existence. Fifth, the Financial Conduct Authority (FCA) established RegTech (Regulatory applications) in 2015. Innovative

solutions are used in this industry to improve compliance and give secure, cost-effective services. Its goal is to standardize and improve reg ulatory processes' transparency, as well as to automate features like risk management, transaction monitoring, and regulatory reporting to some extent.

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. Financial inclusion in Egypt need more bank branches in every place for easy access to customers in all parts of Egypt, and consequently, the ATMs to provide financial services and products at an affordable cost, to reduce poverty, achieve economic growth, and financial illiteracy (sustainability report 2019 'CIB').

To emphasize the role of FinTech transformation, this research uses panel data of ten banks that are listed in Egypt Stock Exchange over the period from 2018 to 2022. In addition, different types of bank level FinTech have been used to examine the relationship between a bank's Fintech level and its performance measured by bank's return on assets (ROA, ROE, ROI), and its return measured by (EGX Bank Index). Using different panel data estimators, such as SEM, results show that FinTech innovations increase banks' return.

This paper contributes to the existing literature in several ways. First, we contribute to the literature by examining the impact of FinTech adoption in two main banking systems including conventional and Islamic banking. Second, this paper extends the investigation to examine whether embracing

FinTech results in different outcomes among various bank's performance measures. Third, while literature has paid little attention to bank's level FinTech measures, we have used different types of bank level FinTech.

The rest of the paper proceeds as follows. Section 2 summarizes the literature review, Section 3 explains the methodology and discusses the results. Section 4 summarizes the results. Section 5 concludes the paper. Section 6 explains the research recommendations. Finally, section 7 discusses the research limitations and future studies.

2. LITERATURE REVIEW

The development of FinTech has sparked a scholarly debate concerning its relationship with traditional commercial banks (Milian et al. 2019). In quantitative studies, the findings on this relationship are not consistent. Phan et al. (2020) suggested that FinTech reduces bank profitability. Conversely, Li et al. (2017) demonstrated that FinTech support enhances bank performance.

However, Wang et al. (2021) identified a U-shaped pattern in the relationship between FinTech and bank risk-taking, where bank risk-taking initially increases but subsequently decreases with the advancement of FinTech. Given these contrasting outcomes, further investigations are necessary to establish a comprehensive understanding of the relationship between FinTech and banks, presenting a significant research problem.

The existing quantitative publications about fintech and bank performance have revealed various ways to measure the fintech variable. Ky et al. (2019) measured the fintech variables of 170 banks from 2009 to 2015 based on the involvement of banks with mobile money via mobile network operators. In detail, the fintech variables consist of dummy

variables (involving or not), the number of involving years, the number of users, and transaction values. The finding revealed a strong positive relationship between fintech and bank performance.

In the United Arab Emirates, Saudi Arabia, and Bahrain, Almulla and Aljughaiman (2021) formulated the bank fintech score from the existence of fintech services in a bank and used the number of fintech firms to measure fintech variables from 2014 to 2019. The estimation results revealed that bank fintech is a negative factor in bank profitability, and the growth of fintech firms negatively affects conventional banks but is insignificant for Islamic banks.

Cornelli et al. (2020) and Nguyen et al. (2021) used the ratio of fintech credit to GDP to proxy fintech variables and investigated its impact on bank performance. Based on the dataset of 73 countries from 2013 to 2018, Nguyen et al. (2021) indicated that fintech credit is a negative factor in bank profitability, but with the moderating role of regulation, fintech credit is positive for bank stability.

Moreover, numerous quantitative studies have confirmed the significant relationship between fintech and banks, particularly in terms of bank performance, which may also impact bank stock performance. We contend that this relationship serves as a crucial reference point. Phan et al. (2020) and Zhao et al. (2022) suggested that the rise of fintech leads to a decrease in bank profitability.

Additionally, Sheng (2021) found that fintech development increases credit supply to SMEs. Furthermore, Chen et al. (2021) demonstrated that fintech enhances customer satisfaction and improves employee work

efficiency. These and other noteworthy studies have provided valuable insights into the relationship between fintech and bank stock.

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.

Siek and Sutanto (2019) explained the influences of fintech on the conventional banking industry in Indonesia and that FinTech can be a great competitor for banks especially in payment gateway and peer-to-peer (P2P) services that affect traditional financial business. To expose a range of value propositions that dominantly impact the adoption of fintech or banking products, this study looked at several crucial and practical criteria, such as customer satisfaction, net promotion score, promotion, ease of use, etc. The results demonstrate that the banks have been disrupted by the payment fintech since the appearance of fintech companies in around 2015. Furthermore, fintech startups have digital strategies for approving a customer-centric mindset and developing a product that provides high customer satisfaction. P2P fintech, on the other hand, does not now pose a serious threat to banks, since clients place a higher priority on security.

Pu et al. (2021) illustrated the interaction between banks industry and FinTech in Lithuania by collecting annual reports from Lithuanian banks during 2003-2019 and analyzing the FinTech sector by SWOT & PESTEL

analysis. Regression analysis results reveal that FinTech companies improve banks' efficiency especially in payment services and increase customer satisfaction and FinTech affects economic growth by financial inclusion.

Interestingly, few researchers also discovered that financial digitization is negatively associated with the performance of banks using panel data of China’s bank industry from 2013 to 2019. Further investigation into the moderating effect also reveals that the cycle of monetary policy easing, the environment of high financial friction, and the preference of banks for taking risks could all help to lessen the adverse impact of fintech development on bank performance (Wang et al., 2022).

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.

The literature review reveals that there is a significant relationship between bank stock returns and FinTech. However, the different estimation methods employed in these studies led to inconsistent findings regarding the nature of this relationship. From the above review, we expect that

FinTech adoption improves banks performance in Egyptian banks. So, we put up the following hypothesis:

H1: Financial technology has a positive significant impact on bank's performance (ROA, ROE, and ROI)

H2: Financial technology has a positive impact on bank's stock return (EGX Bank Index).

3. RESEARCH METHODOLOGY

Based on the theoretical background section above, the research methodology is designed as follows:

3.1 Data:

The data source, data analysis methodologies, and the definition and measurement of variables are all discussed in this part. The analysis used financial statement data for a period of five years (2018-2022) from the CBE Egyptian bank with FinTech collaborations. Where Egyptian Central Bank became a principal member of the AFI in July 2013. In 2015, financial inclusion was inserted in Egypt's 2030 Sustainable Development Plan, it becomes a national priority (Egypt SDS 2015). In this study, the FinTech periods are used to cover FinTech cooperation in the banking sector. As there are ten listed retail banks in Egypt Stock Exchange, all the ten banks are included in this investigation including the main two categories of Conventional and Islamic banks. The list of the banks includes (Egyptian Gulf Bank, Suez Canal Bank, QNB Al Ahli, Housing & Development Bank, Al Baraka Bank, Faisal Islamic Bank of Egypt, Export Development Bank of Egypt, Abu Dhabi Islamic Bank, Commercial International Bank (Egypt), and Credit Agricole Egypt).

3.2 Variables Definition and Measurements

Table 1 shows the variables for the SEM model utilizing the intermediation dimension: (TLTD, Economic Growth, Inflation, and Islamic Banks). The SEM model are used to determine the impact of FinTech variables (Neo Bank, DigPay, TrsAcc, and WomFin) on Bank Performance variables (ROA, ROE, ROI, and EGX Bank). A neobank is a type of direct bank that operates exclusively using online banking without traditional physical branch networks that challenge traditional banks.

Table (1): Variables Measurements and Definition

Dependent Variables	**Abbreviations**	**How to measure**
Return on Asset	ROA	$\frac{NET\ PROFIT\ BEFORE\ TAX}{TOTAL\ ASSETS}$
Return on Equity	ROE	$\frac{NET\ PROFIT\ BEFORE\ TAX}{SHARE\ HOLDER\ EQUITYN}$
Return of Investment	ROI	$\frac{NET\ PROFIT\ BEFORE\ TAX}{INVESTMENTS}$
Bank Stock Return	EGX Bank Index	From Egyptian Stock Exchange
Independent Variable	**Abbreviations**	**How to measure**
Neo Bank	Neo Bank	Usage of NeoBank by citizens.
Digital Payment	DigPay	Usage of digital payments by citizens.
Transaction Accounts	TrsAcc	Progress of transaction accounts by citizens' rate.
Women Financial Inclusion	WomFin	Progress of women financial inclusion rate.
Control Variables	**Abbreviations**	**How to measure**
Economic Growth	EG	From World Bank
Inflation	INF	From World Bank
Islamic Banks	Islamic	Dummy variable (Islamic Bank=1)
Total Loan and Total Deposit	TLTD	$\frac{Total\ loans}{Total\ deposits}$

3.3 Empirical Model

To test the effect of Financial Technology on Bank Financial Performance, this paper utilizes SEM technique to deal with the endogeniety problem between FinTech and Bank Performance through the following two stages: model specification, and model estimation (Hair et al., 2006). In this paper we investigate the interrelationships between FinTech, and Bank Performance simultaneously. To check the robustness of the findings, we use robust statistical techniques:

- SEM + panel data: a recursive structural equation model has causation which flows in one direction.

Based on the variables that we selected, panel data regressions are employed on the empirical model. We have four empirical models as discussed below:

Model (A): (Neo Bank and Bank Performance)

Model (A) investigates the relationship between Financial Technology measured by **NeoBank and Bank Performance**. Since there are three different measures of performance (ROA, ROE, and ROI), we end up with three estimates. The model using ROA, ROE, and ROI are respectively named as Model 1, Model 2, and Model 3. We illustrate the path diagram of the three endogenous variables in Figure 1, Figure 2, and Figure 3.

Model (1):

The first equation of the SEM can be modelled by the following specification:

$$\boldsymbol{Return_{ROA}} = \alpha_{it} + \alpha_1 (\boldsymbol{Neo_{Bank}}) + \alpha_2 \left(Dig_{Pay}\right) + \alpha_3 (TLTD_{Firm}) + \alpha_4 (ECon_{Growth}) + \alpha_5 (Islamic_{Bank}) + \varepsilon_1$$

Next, the determination of the FinTech is also endogenized using the following specification:

$$\boldsymbol{Neo_{Bank}} = \beta_{it} + \beta_1 \left(Dig_{Pay}\right) + \beta_2 \left(TLTD_{Firm}\right) + \beta_3 \left(ECon_{Growth}\right) + \beta_4 \left(Econ_{Inf}\right) + \varepsilon_1$$

Model (2):

The first equation of the SEM can be modelled by the following specification:

$$\boldsymbol{Return_{ROE}} = \alpha_{it} + \alpha_1 \left(\boldsymbol{Neo_{Bank}}\right) + \alpha_2 \left(Dig_{Pay}\right) + \alpha_3 \left(TLTD_{Firm}\right) + \alpha_4 \left(ECon_{Growth}\right) + \alpha_5 \left(Islamic_{Bank}\right) + \varepsilon_1$$

Next, the determination of the FinTech is also endogenized using the following specification:

$$\boldsymbol{Neo_{Bank}} = \beta_{it} + \beta_1 \left(Dig_{Pay}\right) + \beta_2 \left(TLTD_{Firm}\right) + \beta_3 \left(ECon_{Growth}\right) + \beta_4 \left(Econ_{Inf}\right) + \varepsilon_1$$

Model (3):

The first equation of the SEM can be modelled by the following specification:

$$\boldsymbol{Return_{ROI}} = \alpha_{it} + \alpha_1 \left(\boldsymbol{Neo_{Bank}}\right) + \alpha_2 \left(Dig_{Pay}\right) + \alpha_3 \left(TLTD_{Firm}\right) + \alpha_4 \left(ECon_{Growth}\right) + \alpha_5 \left(Islamic_{Bank}\right) + \varepsilon_1$$

Next, the determination of the FinTech is also endogenized using the following specification:

$$\boldsymbol{Neo_{Bank}} = \beta_{it} + \beta_1 \left(Dig_{Pay}\right) + \beta_2 \left(TLTD_{Firm}\right) + \beta_3 \left(ECon_{Growth}\right) + \beta_4 \left(Econ_{Inf}\right) + \varepsilon_1$$

Figure 1: Path Diagram of the Structural Equation Model (1)

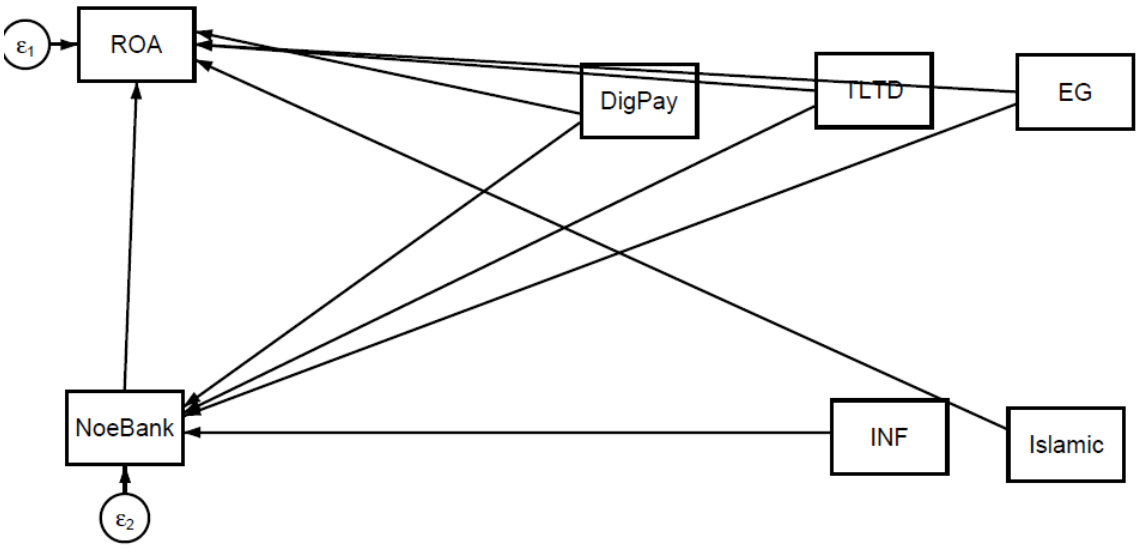


Figure 2: Path Diagram of the Structural Equation Model (2)

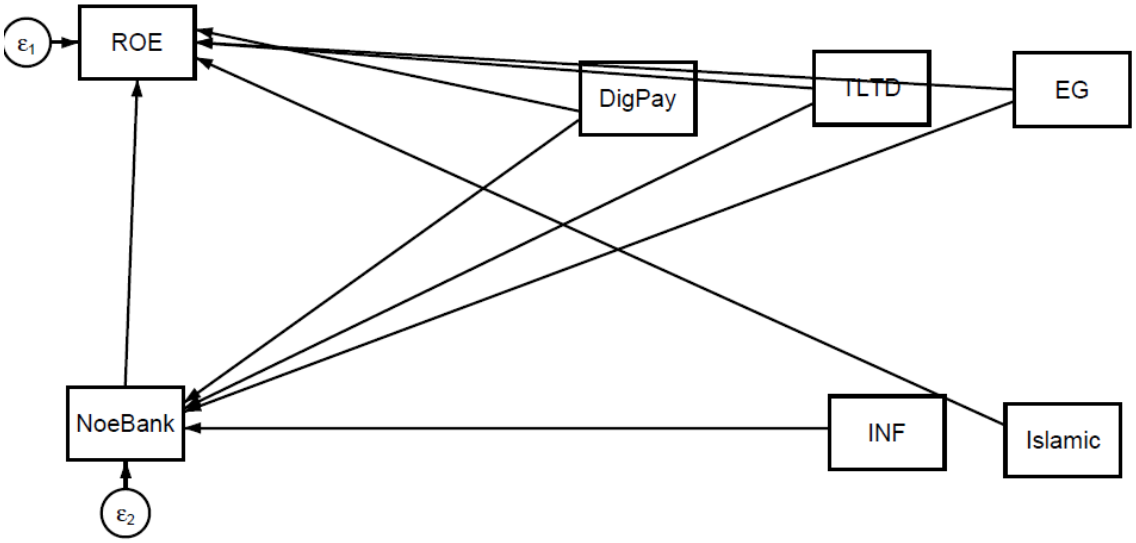
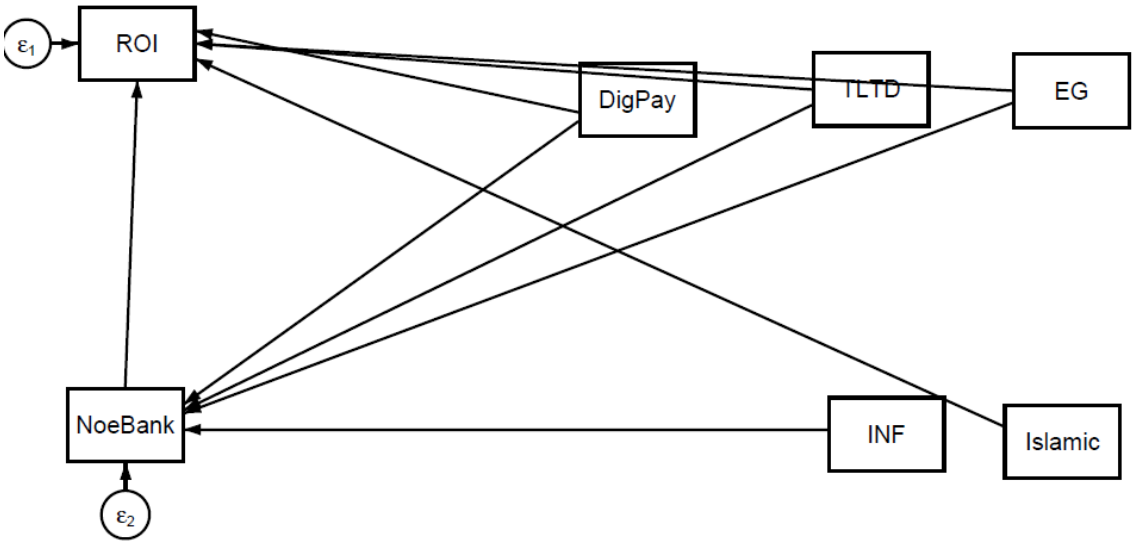


Figure 3: Path Diagram of the Structural Equation Model (3)



The results about the estimation of the structural model (1), and (2), and (3) are presented in Table 2.

Table 2: Estimated Path Coefficients of the SEMs

NoeBank	**Model 1**	
NoeBank	**1**	**2**
DigPay	0.019293	**0.000**
TLTD	-200.012	0.968
EG	-7542.65	**0.000**
INF	4017.056	**0.000**
Constant	-223920	0.000
ROA	**1**	**2**
NoeBank	-8.50E-10	0.993
DigPay	-1.58E-10	0.928
TLTD	0.000882	0.925
EG	0.000944	0.451
Islamic	-0.0033	0.336
Constant	0.029371	0.166
NoeBank	**Model 2**	
NoeBank	**1**	**2**
DigPay	0.019293	**0.000**
TLTD	-200.012	0.968
EG	-7542.65	**0.000**
INF	4017.056	**0.000**

Constant	-223920	0.000
ROE	**1**	**2**
NoeBank	-5.9E-05	0.903
DigPay	1.05E-06	0.910
TLTD	-259.431	**0.000**
EG	0.788616	0.906
Islamic	48.37723	**0.008**
Constant	111.3583	0.325
NoeBank	**Model 3**	
NoeBank	**1**	**2**
DigPay	0.019293	**0.000**
TLTD	-200.012	0.968
EG	-7542.65	**0.000**
INF	4017.056	**0.000**
Constant	-223920	0.000
ROI	**1**	**2**
NoeBank	1.79E-06	0.322
DigPay	-3.35E-08	0.333
TLTD	-0.11638	0.532
EG	0.012837	0.605
Islamic	-0.13988	**0.040**
Constant	0.570982	0.175

Note: This table provides results from SEM of the effect of **Financial Technology measured by NeoBank on Bank Performance** from January 2018 to December 2022. A robust t-statistics test is conducted. Column (2) provides p-values. Column (1) presents the path coefficients of the model (1), (2), and (3). * Statistical significance at 10% level, ** Statistical significance at 5% level, *** Statistical significance at 1% level.

Model (B): (Trs Acc and Bank Performance)

Model (B) investigates the relationship between Financial Technology measured by **Trs Acc and Bank Performance**. Since there are three different measures of performance (ROA, ROE, and ROI), we end up with three estimates. The model using ROA, ROE, and ROI are respectively

named as Model 1, Model 2, and Model 3. We illustrate the path diagram of the three endogenous variables in Figure 4, Figure 5, and Figure 6.

Model (1):

The first equation of the SEM can be modelled by the following specification:

$$\boldsymbol{Return_{ROA}} = \alpha_{it} + \alpha_1 (\boldsymbol{Trs_{Acc}}) + \alpha_2 (Wom_{Fin}) + \alpha_3 (TLTD_{Firm}) + \alpha_4 (ECon_{Growth}) + \alpha_5 (Econ_{Inf}) + \alpha_6 (Islamic_{Bank}) + \varepsilon_1$$

Next, the determination of the FinTech is also endogenized using the following specification:

$$\boldsymbol{Trs_{Acc}} = \beta_{it} + \beta_1 (Wom_{Fin}) + \beta_2 (TLTD_{Firm}) + \beta_3 (ECon_{Growth}) + \beta_4 (Econ_{Inf}) + \beta_5 (Islamic_{Bank}) + \varepsilon_1$$

Model (2):

The first equation of the SEM can be modelled by the following specification:

$$\boldsymbol{Return_{ROE}} = \alpha_{it} + \alpha_1 (\boldsymbol{Trs_{Acc}}) + \alpha_2 (Wom_{Fin}) + \alpha_3 (TLTD_{Firm}) + \alpha_4 (ECon_{Growth}) + \alpha_5 (Econ_{Inf}) + \alpha_6 (Islamic_{Bank}) + \varepsilon_1$$

Next, the determination of the FinTech is also endogenized using the following specification:

$$\boldsymbol{Trs_{Acc}} = \beta_{it} + \beta_1 (Wom_{Fin}) + \beta_2 (TLTD_{Firm}) + \beta_3 (ECon_{Growth}) + \beta_4 (Econ_{Inf}) + \beta_5 (Islamic_{Bank}) + \varepsilon_1$$

Model (3):

The first equation of the SEM can be modelled by the following specification:

$$\boldsymbol{Return_{ROI}} = \alpha_{it} + \alpha_1 (\boldsymbol{Trs_{Acc}}) + \alpha_2 (Wom_{Fin}) + \alpha_3 (TLTD_{Firm}) + \alpha_4 (ECon_{Growth}) + \alpha_5 (Econ_{Inf}) + \alpha_6 (Islamic_{Bank}) + \varepsilon_1$$

Next, the determination of the FinTech is also endogenized using the following specification:

$$\boldsymbol{Trs_{Acc}} = \beta_{it} + \beta_1 (Wom_{Fin}) + \beta_2 (TLTD_{Firm}) + \beta_3 (ECon_{Growth}) + \beta_4 (Econ_{Inf}) + \beta_5 (Islamic_{Bank}) + \varepsilon_1$$

Figure 4: Path Diagram of the Structural Equation Model (1)

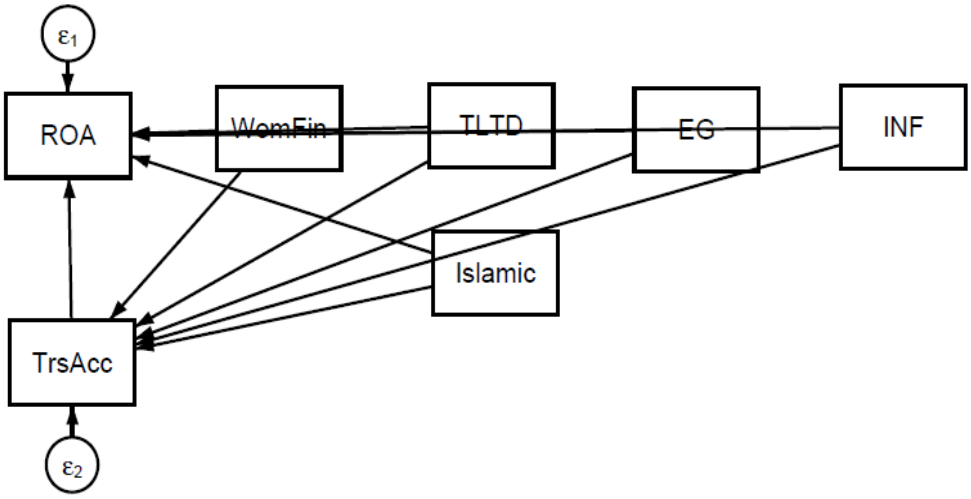
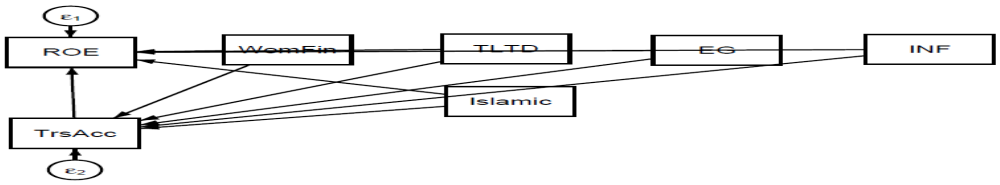


Figure 5: Path Diagram of the Structural Equation Model (2)



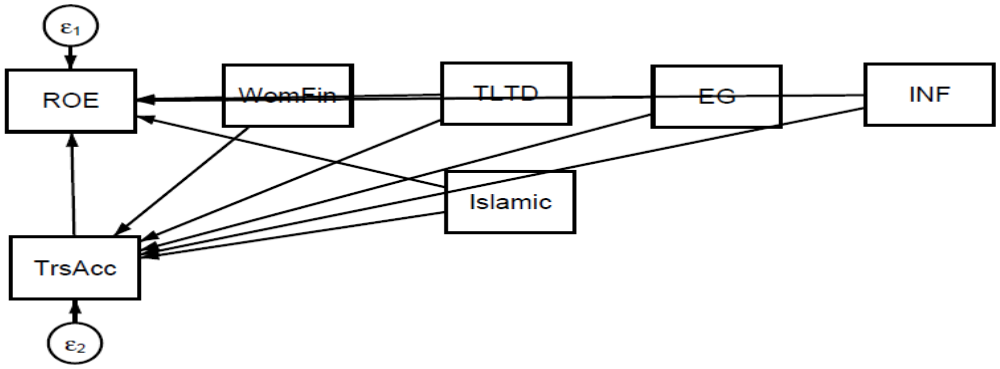
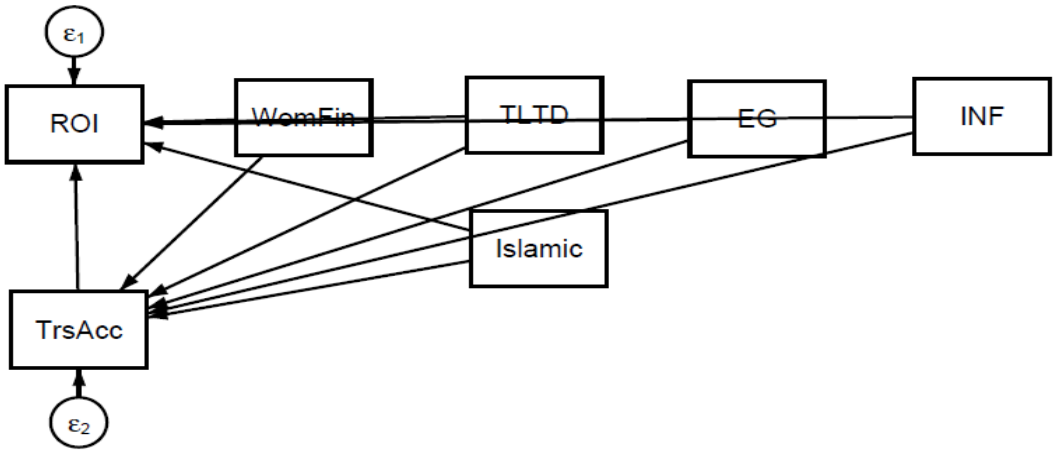


Figure 6: Path Diagram of the Structural Equation Model (3)



The results about the estimation of the structural model (1), and (2), and (3) are presented in Table 3.

Table 3: Estimated Path Coefficients of the SEMs

TrsAcc	**Model 1**	
TrsAcc	**1**	**2**
WomFin	0.911361	**0.000**
TLTD	-0.00039	0.932
EG	-0.00156	**0.024**
INF	0.002494	**0.000**
Islamic	-5.8E-05	0.972
Constant	0.09527	0.000
ROA	**1**	**2**
TrsAcc	-0.32537	0.257
WomFin	0.290462	0.268
TLTD	0.001025	0.912
EG	0.00027	0.854
INF	0.000931	0.261
Islamic	-0.00328	0.334
Constant	0.059364	0.043
TrsAcc	**Model 2**	
TrsAcc	**1**	**2**
WomFin	0.911361	**0.000**
TLTD	-0.00039	0.932
EG	-0.00156	**0.024**
INF	0.002494	**0.000**
Islamic	-5.8E-05	0.972
Constant	0.09527	0.000
ROE	**1**	**2**
TrsAcc	-155.8674	0.920
WomFin	138.6126	0.922
TLTD	-259.3986	**0.000**
EG	0.9737741	0.902
INF	0.1678827	0.970
Islamic	48.38195	**0.008**
Constant	139.0961	0.379
TrsAcc	**Model 3**	
TrsAcc	**1**	**2**
WomFin	0.911361	**0.000**
TLTD	-0.00039	0.932
EG	-0.00156	**0.024**
INF	0.002494	**0.000**

Islamic	-5.8E-05	0.972
Constant	0.09527	0.000
ROI	**1**	**2**
TrsAcc	0.895995	0.876
WomFin	-0.75923	0.885
TLTD	-0.1156	0.534
EG	-0.00119	0.968
INF	0.006116	0.712
Islamic	-0.13976	**0.040**
Constant	0.078859	0.893

Note: This table provides results from SEM of the effect of **Financial Technology measured by TrsAcc on Bank Performance** from January 2018 to December 2022. A robust t-statistics test is conducted. Column (2) provides p-values. Column (1) presents the path coefficients of the model (1), (2), and (3). * Statistical significance at 10% level, ** Statistical significance at 5% level, *** Statistical significance at 1% level.

Model (C): (Neo Bank and Bank Stock Return)

Model (C) investigates the relationship between Financial Technology measured by **NeoBank and Bank Stock Return.** The model using EGX Bank Index - to measure bank stock return - named as Model 1. We illustrate the path diagram of the endogenous variable in Figure 7.

Model (1):

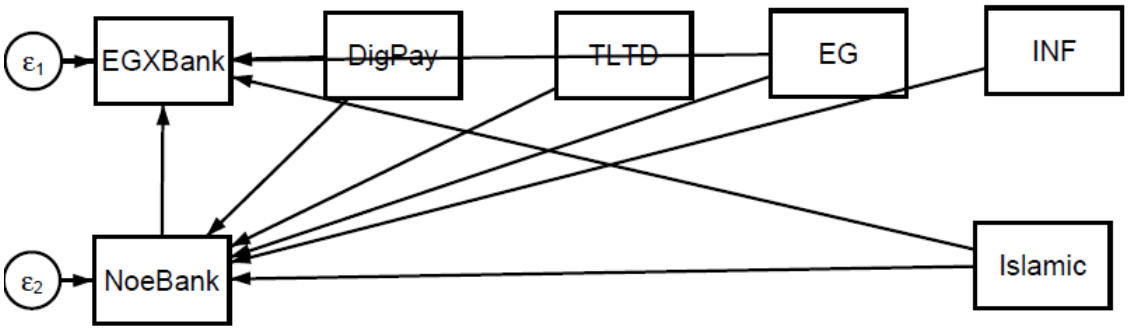
The first equation of the SEM can be modelled by the following specification:

$$\boldsymbol{EGX_{Bank}} = \alpha_{it} + \alpha_1 (\boldsymbol{Neo_{Bank}}) + \alpha_2 (Dig_{Pay}) + \alpha_3 (ECon_{Growth}) + \alpha_4 (Islamic_{Bank}) + \varepsilon_1$$

Next, the determination of the FinTech is also endogenized using the following specification:

$$\boldsymbol{Neo_{Bank}} = \beta_{it} + \beta_1 \left(Dig_{Pay}\right) + \beta_2 \left(TLTD_{Firm}\right) + \beta_3 \left(ECon_{Growth}\right) + \beta_4 \left(Econ_{Inf}\right) + \beta_5 \left(Islamic_{Bank}\right) + \varepsilon_1$$

Figure 7: Path Diagram of the Structural Equation Model (1)



The results about the estimation of the structural model (1) is presented in Table 4.

Table 4: Estimated Path Coefficients of the SEMs

NoeBank	**Model 1**	
NoeBank	**1**	**2**
DigPay	0.019293	**0.000**
TLTD	-239.018	0.965
EG	-7542.4	**0.000**
INF	4016.965	**0.000**
Islamic	-35.2955	0.986
Constant	-223892	0.000
EGXBank	**1**	**2**
NoeBank	1.06E-06	**0.000**
DigPay	-1.86E-08	**0.001**
EG	-0.0112	**0.008**
Islamic	3.31E-18	1.000
Constant	0.257049	0.000

Note: This table provides results from SEM of the effect of **Financial Technology measured by NeoBank on Bank Stock Return** from January 2018 to December 2022. A robust t-statistics test is conducted. Column (2) provides p-values. Column (1) presents the path coefficients of the model (1). * Statistical significance at 10% level, ** Statistical significance at 5% level, *** Statistical significance at 1% level.

<u>Model (D):</u> (Trs Acc and Bank Stock Return)

Model (D) investigates the relationship between Financial Technology measured by **Trs Acc and Bank Stock Return.** The model using EGX Bank Index - to measure bank stock return - named as Model 1. We illustrate the path diagram of the endogenous variable in Figure 8.

Model (1):

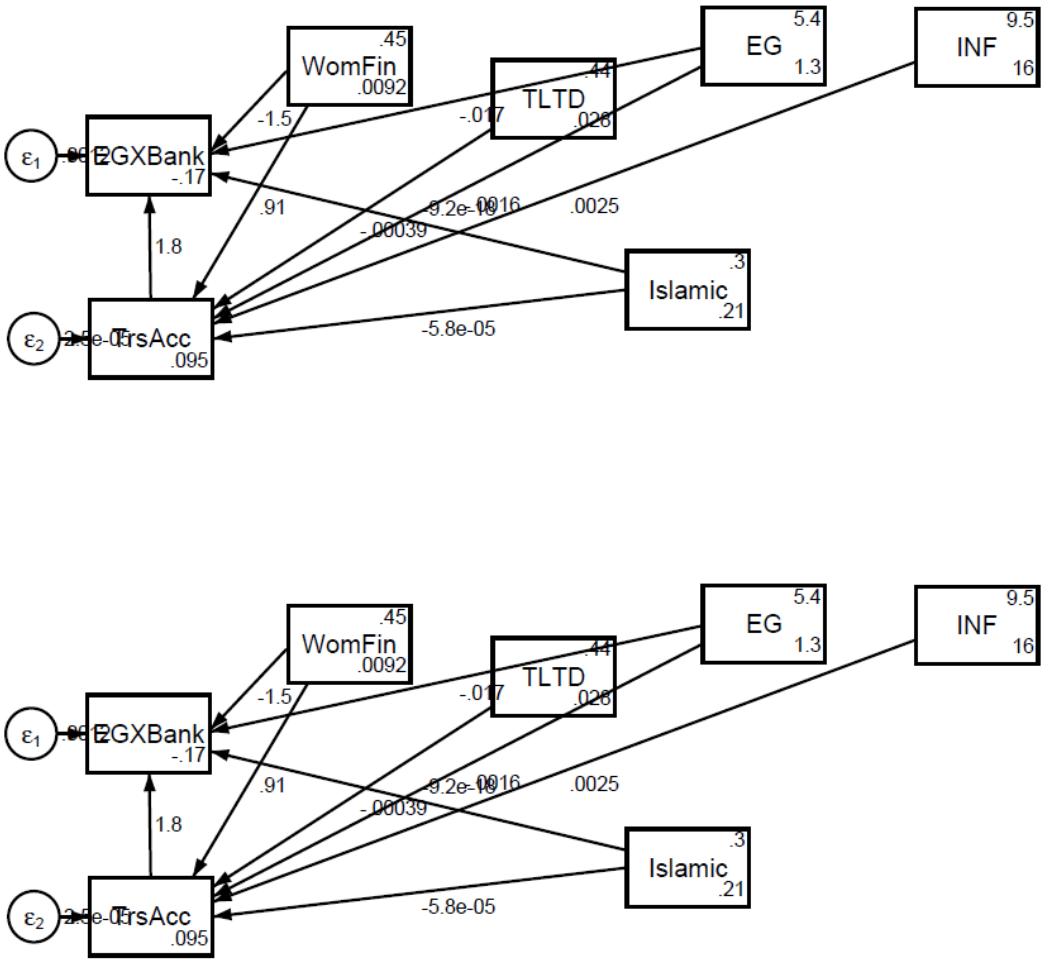
The first equation of the SEM can be modelled by the following specification:

$$\boldsymbol{EGX_{Bank}} = \alpha_{it} + \alpha_1 (\boldsymbol{Trs_{Acc}}) + \alpha_2 (Wom_{Fin}) + \alpha_3 (ECon_{Growth}) + \alpha_4 (Islamic_{Bank}) + \varepsilon_1$$

Next, the determination of the FinTech is also endogenized using the following specification:

$$\boldsymbol{Trs_{Acc}} = \beta_{it} + \beta_1 (Wom_{Fin}) + \beta_2 (TLTD_{Firm}) + \beta_3 (ECon_{Growth}) + \beta_4 (Econ_{Inf}) + \beta_5 (Islamic_{Bank}) + \varepsilon_1$$

Figure 8: Path Diagram of the Structural Equation Model (1)



The results about the estimation of the structural model (1) is presented in Table 5.

Table 5: Estimated Path Coefficients of the SEMs

TrsAcc	**Model 1**	
TrsAcc	**1**	**2**
WomFin	0.911361	**0.000**
TLTD	-0.00039	0.932
EG	-0.00156	**0.024**
INF	0.002494	**0.000**
Islamic	-5.8E-05	0.972
Constant	0.09527	0.000
EGXBank	**1**	**2**
TrsAcc	1.761299	**0.000**
WomFin	-1.45818	**0.001**
EG	-0.01748	**0.000**
Islamic	-9.17E-18	1.000
Constant	-0.17213	0.007

Note: This table provides results from SEM of the effect of **Financial Technology measured by TrsAcc on Bank Stock Return** from January 2018 to December 2022. A robust t-statistics test is conducted. Column (2) provides p-values. Column (1) presents the path coefficients of the model (1). * Statistical significance at 10% level, ** Statistical significance at 5% level, *** Statistical significance at 1% level.

4. DISCUSSION and RESULTS

The data is analyzed empirically to test the research hypotheses by measuring the variables concluded from the literature review through a descriptive and regression analysis using STATA. Testing the first research hypothesis for the relationship between financial technology and bank's performance measured by (ROA, ROE, and ROI), it was found that there is no significant relationship between financial technology and bank's performance measured by (ROA, ROE, and ROI). According to the previous, in testing the hypotheses, results reveal that H1 is not supported.

The result is agreed with Almulla and Aljughaiman (2021) which found an insignificant relationship between bank FinTech and bank profitability. This means that there is a need to improve financial technology in banking sector in Egypt.

Testing the second research hypothesis for the relationship financial technology and on bank's stock return measured by (EGX Bank Index). The estimation results from multiple approaches reveal the existing significant relationship between financial technology (Neo Bank, Trs Acc, Dig Pay, and Wom Fin) and bank's stock return (EGX Bank Index) indicating both positive relationships between financial technology (Neo Bank, and Trs Acc) and bank's stock return (EGX Bank Index), and negative relationships between financial technology (Dig Pay, and Wom Fin) and bank's stock return (EGX Bank Index). This confirms that FinTech presents both opportunities and threats for banks, aligning with the arguments made in previous studies, such as those by Elsaid (2021) and Suryono et al. (2020). FinTech supports the scaling up of bank businesses by enhancing technology and reducing operational costs (Lee et al. 2021; Ruhland and Wiese 2022). However, FinTech also offers advanced products that meet customers' requirements in the digital era, posing a significant challenge to banks. Particularly, FinTech companies' retail financial products are highly appreciated for their cost, convenience, and user experience than those offered by traditional banks.

Agarwal and Zhang (2020) and Omarini (2018) stated that FinTech has disrupted the traditional market of commercial banks in payment and lending, necessitating suitable adaptation strategies by banks to cope with the rise of FinTech. Many previous studies, such as those by Enriques and

Ringe (2020) and Fang et al. (2022) have revealed that collaboration between banks and FinTech is the optimal strategy for both entities and consumers in reshaping the financial landscape. FinTech companies bring innovation, agility, and technology-driven solutions to the table, while banks offer stability, regulatory compliance, and customer trust. This collaborative approach allows banks to leverage FinTech expertise and technological advancements to enhance their services and remain competitive. Moreover, FinTech companies gain access to the established customer base and regulatory frameworks provided by banks. Together, they can create a more seamless and inclusive financial ecosystem, benefiting all stakeholders involved. According to the previous, in testing the hypotheses, results reveal that H2 is partially supported. Table6 shows a summary for the conducted analysis.

Table 6: Summary of Research Hypotheses

Hypothesis	Description	Results
H1	Financial technology has a positive significant impact on bank's performance (ROA, ROE, and ROI).	Not Supported
H2	Financial technology has a positive impact on bank's stock return (EGX Bank Index).	Partially Supported

5. CONCLUSION

Given the rapid growth of FinTech in the digital era and the ongoing debate surrounding the relationship between FinTech and banks, the objective of this paper is to investigate and enhance the understanding of this relationship in Egypt, where the FinTech industry has experienced significant growth. Financial technology is a relatively new technology that has become more important for businesses to streamline and speed up

company processes and transactions. The purpose of this study and the main research question address the assessment of the effectiveness of Egypt's banks following the adoption of FinTech.

After reviewing relevant literature, it was discovered that Technical expertise is shared to provide financial services to people who do not deal with banks to enhance financial inclusion in Egypt. However, according to sustainability report, 2019 'CIB', financial inclusion in Egypt need more bank branches in every place for easy access to customers in all parts of Egypt, and consequently, the ATMs to provide financial services and products at an affordable cost, to reduce poverty, achieve economic growth, and financial illiteracy**.**

This study is designed to find out whether there is a direct impact on Egyptian banks since the announcement of the expansion in the use of financial technology or not. To enable the ecosystem and establish a healthy atmosphere for startups and entrepreneurship, the association will continually contact regulators such as the Central Bank of Egypt, the Financial Regulatory Authority. This is on top of working with the government at all levels to promote the FinTech ecosystem in Egypt. The Egyptian government and the Central Bank of Egypt's initiatives to rapidly expanding number of FinTech businesses. These initiatives include establishing organizations that link all FinTech ecosystems such as: Egyptian FinTech Association, and CBE FinTech Hub.

According to Adam (2021), in the Egyptian financial market, banks are the most important service providers. They control the majority of the market's financial assets and flows. Egypt government exert huge effort to grow FinTech services and make it available to each individual in the

society. Payment services, mobile cash, and smart wallets are the most developed sectors in the Egyptian FinTech startups. Savings and investments, insurance, financial management, crowd funding, and blockchain are among the other industries covered by Egyptian FinTech. For example: Payment service providers, Micro-savings, Mobile wallets, and Micro-Insurance.

To underline the role of FinTech conversion, this research employs panel data of ten banks that are listed in Egyptian Stock Exchange over the period from 2018 to 2022. In addition, bank index (EGX Bank Index) has been used to analyze the impact of a bank's FinTech level and its performance using the Structural Equation Model Analysis. The study reveals several significant findings. First, a significant relationship between financial technology (Neo Bank, Trs Acc, Dig Pay, and Wom Fin) and bank's stock return (EGX Bank Index). Second, a positive significant relationship between financial technology (Neo Bank, and Trs Acc) and bank's stock return (EGX Bank Index). Third, a negative significant relationship between financial technology (Dig Pay, and Wom Fin) and bank's stock return (EGX Bank Index).

The study contributes new empirical evidence to enrich the understanding of the relationship between FinTech and bank performance. It confirms the significant role of FinTech in bank performance, establishing both positive and negative relationships. Building on these findings, further research can deeply categorize and investigate the relationship between specific segments of Fintech and banks to provide clearer insights into their relationship. Additionally, in terms of practical contributions, the study demonstrates the capability of using (Neo Bank,

DigPay, TrsAcc, and WomFin) to measure FinTech variables. It also applies SEM method to estimate the relationship FinTech and bank stock return. These approaches can be utilized for further research in other markets to strengthen the relationship between FintTech search and bank stock returns.

Evidently, the adoption of FinTech innovations in the banking sector has improved the performance of banks measured by EGX Bank Index. Investing in FinTech infrastructure does not only allow banks to expand their customer bases, but also reduce credit risks and save operational costs. Therefore, banks should bring together various resources that facilitate digital technology and financial innovations. Regulators in Egypt should devote more efforts to foster digital transformation in the banking sector by encouraging an agile regulatory framework.

6. RESEARCH RECOMMENDATIONS

The researcher develops the following recommendations based on the findings and conclusion which may improve financial technology in Egypt and make greater use of it. First, transferring ATMs to work without cards through the "long-range communication" technology, which allows customers to withdraw cash from their balances using digital wallets or the bank's application by bringing the phone closer to the ATM screen to withdraw cash without the need to enter a card or password to verify the identity of the customers. Second, investment in Artificial Intelligence: The most influential trend is a technology where AI-based on distributed and shared data set as it is used for dynamic and psychological customer segmentation. The combination of predictive and cognitive capabilities is a trend that includes technology partners as we have noted in the cases of

Watson from IBM and Alpha Go from Google. Early movers who collaborate with tech companies will change into a system. Adopting another generation of quantum computing.

7. RESEARCH LIMITATIONS and FUTURE STUDIES

In this study, the research in an Arabian country has restricted the data availability as well as the time constraint of 5 years. In future, a longer period of study of banks' performance could make more accurate conclusions.

A variety of regions could also be used to assess and compare banks' performance in Egypt. An in-depth study could concentrate on the channels through which FinTech affects bank performance and how they can adapt different regional strategies to improve performance. Different dimensions of FinTech such as information technology and cyber security technology could be assessed and analyzed.

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تأثير التكنولوجيا المالية على الأداء المالي للبنوك: القطاع المالي في مصر

الملخص:

الهدف: أصبحت التكنولوجيا المالية الآن ضرورية لكل شركة لتسهيل وتبسيط المعاملات التجارية. ونظراً للنقاش العالمي المستمر بشأن العلاقة بين التكنولوجيا المالية والبنوك، بما في ذلك البلدان النامية، فإن الغرض من هذه الدراسة هو فحص كفاءة البنوك في مصر بعد انتشار التكنولوجيا المالية. تبحث هذه الدراسة في تأثير ابتكارات التكنولوجيا المالية على مستوى البنوك على أداء البنوك في مصر.

النتائج: أحد النتائج الرئيسية لهذه الدراسة هو وجود تغيير إيجابي متزامن وسببية بين التكنولوجيا المالية و وعوائد البنوك.

التداعيات البحثية: تساهم هذه الدراسة في الأدبيات المتعلقة بحالة تبني خدمات التكنولوجيا المالية في مصر وتأثيرها على كفاءة البنوك. تسلط هذه الدراسة الضوء على العلاقة المعقدة بين التكنولوجيا المالية والبنوك، وتقدم رؤى تساهم في فهم هذا التفاعل الديناميكي في سياق المشهد الناشئ للتكنولوجيا المالية في مصر.

الأصالة/القيمة: تحتاج البنوك المصرية إلى إيجاد طرق أكثر ابتكارًا لتسريع تحويل المجتمع المصري إلى مجتمع غير نقدي. وينبغي لصناع السياسات والمستثمرين الاهتمام بتسهيل ابتكارات التكنولوجيا المالية الجارية في مصر لخلق الفرص وبناء قطاع مالي أكثر شمولاً وكفاءة.

الكلمات المفتاحية: التكنولوجيا المالية. الأداء المالي للبنوك. مصر.