

The Integration of Fintech and Banks: A Balancing Act Between Risk and Opportunity

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Abstracts: Financial technology is a widely discussed issue in industrialized countries, although it is relatively new in underdeveloped ones. With the emergence of financial technology (fintech), the banking sector has undergone significant changes. This paper investigates the impact of fintech, both inside and outside the industry (startups), on the profitability of the banking sector. Using a panel of eighteen Egyptian banks over the period 2017 -2021, the study employs a panel fixed effect, a generalized method of the moment and robust least squares models to examine the relationship between fintech and bank profitability. Our findings reveal a significant relationship between fintech and bank profitability, suggesting that the adoption of fintech inside the banking sector has a negative effect on bank profitability, while the adoption of fintech outside the banking sector has a positive and significant effect on bank profitability. These findings have significant implications for policymakers and industry stakeholders as they navigate the evolving financial landscape.

Keywords: Fintech; Bank Performance; GMM Model; Robust Least Squares.

1. INTRODUCTION

Financial technology is a common topic in developed countries, but it is new in developing countries. FinTech is expected to shape the future of the financial system with innovations like ATMs, RegTech, blockchain, crowd funding, digital currencies, robo-advising, mobile banking, digital wallets, and other financial applications.

On the other hand, the banking sector is seen as one of the most important parts of any economy, especially the Egyptian economy. Each bank's strategic risks can have a huge effect on the whole banking industry and the economy in general. Despite the fact that fintech firms pose a danger to a part of banks' market share and, consequently, their profitability, banks still play an important role in the economy. They provide financial intermediation and a channel for funds by turning deposits into investments that make money.

Therefore, the banking sector is considered to be one of the most important sources of funding, and its stability is crucial and essential for any financial system. In order for the financial system to be effective, there are several characteristics that must be achieved. First, the banking sector must maintain its market share. Second, it must work on customer loyalty and attract new customers. Third, it must become more profitable. Finally, it must enhance the quality of services offered to clients.

As a result, banks have been among the pioneers in using information technology as most financial activities are backed by information technology, consequently banks are investing a lot in technology to improve the efficiency of the financial innovation system.

Nowadays, banks offer a number of services through electronic channels, such as ATMs, electronic funds transfer, online banking platforms, electronic stock trading, electronic wallets, and mobile banking. These services cause a reduction in the cost and time required to complete the services. As a result, the bank would attract more customers and have a bigger market share.

At the same time, FinTech startups are customer-centric and can therefore offer the same financial services as banks in a less complicated and expensive way. As a result, they will be considered as a threat to the banks' market share.

To the best of the authors' knowledge, all previous studies are concerned with only one type of Fintech indices which is aggregate FinTech. While this study is the first to disaggregate fintech services measurements into two groups: fintech services within banks (such as ATMs, tokens, point of sale, debit and credit cards, bank-wallet and mobile), and startups in the field of financial technology services - outside the banking sector (such as: Kickstarter, CrowdBank, GoFundMe, and Paymob). The main objective of this paper is to investigate the impact of each group of fintech separately on the profitability of the banking sector. The study employs dynamic generalized method of moments model. Using panel data of 18 Egyptian commercial banks over the period from 2017 to 2021.

The rest of this study consists of 7 sections following the introduction. Section 2 include the literature review. Section 3 highlight the fintech different types and illustrating the advantage and disadvantage of each type. Section 4 shows the role of the Egyptian government to support the FinTech Sector. Section 5 illustrate data sources, and descriptions, principal component analysis, as well as the model description. Section 6 summarizes the main results of the models. Section 7 includes the robustness check of the results. Finally, section 8 presents study conclusions.

2. LITERATURE REVIEW

Many different studies have been concerned with banking performance measurement (Abaidoo & Anyigba, 2020; A.U.F. Ahmad & Hassan, 2007; N. Ahmad et al., 2020; Alam, 2003; Apătăchioae, 2015; Bacidore et al., 1997; Bhatia et al. al., 2018; Delis & Papanikolaou, 2009; Dietrich & Wanzenried, 2014; Hughes & Mester, 2013; Hussain et al., 2002; Kalhoefer & Salem, 2008; Menicucci & Paolucci, 2016; Munir & Baird, 2019; Murcia et al. al., 2018; Naifar, 2010; Otley, 1999; Xu et al., 2019). However, those previous studies used various measurements to evaluate financial and non-financial performance.

There have been a number of studies that have been conducted to investigate the relationship between the development of financial technology and the effect of this development on the profitability of financial institutions. However, the outcomes of the studies varied depending on the samples that were used in the research. As a result, the literature can be divided into two categories based on the findings of the study.

The first group of studies has indicated that the use of financial technology services has a beneficial effect on the profitability of banks such as (Al-Omouh et al., 2020; Boumoud et al., 2020; Cheng & Qu, 2020; Gaudio et al., 2020; Kempoi, 2018; Navaretti et al., 2017; Panetta, 2018; Shahabi, 2019; Thi et al., 2020; Vasiljeva & Lukanova, 2016; Wang & Sui, 2020; Wonglimpiyarat, 2017; Zinakova, 2020). They realize that financial technology services give the banking sector a good advantage in providing financial service at a lower cost. In addition, fintech startups represents a motivation for banks to innovate and develop traditional services using digital technology.

While with respect to the second group, it is found that the impact of the adoption of financial technology services on banking profitability is negative such as (Akhisar et al., 2015; Azirou, 2021; Gozman & Willcocks, 2018; Guechi, 2020; Hossein, 2013; Khrawish & Al-Sa'di, 2011; Romanova & Kudinska, 2016; Sheng, 2020; Thakor, 2020; Vives, 2017) According to these studies, the use of financial technology is detrimental to the profitability of banks since it represents a powerful rival that offers services at cheaper costs, easier procedures, and faster service delivery, so it is in competition with banks for market share. Additionally, banks that adopt the same pattern in providing financial technology must incur a high cost to change their style, as well as a robust infrastructure to secure their transactions and to accommodate the bank's large customer base, which puts pressure on the bank's profitability.

3. FINTECH ADVANTAGE AND DISADVANTAGE

FinTech is a merger between two fields, finance and information technology and it refers to financial technology services. Fintech is a new concept which had more than one approach to define.

There are many approaches to define fintech. According to the first approach, fintech is considered to be a group of businesses instead of a phenomenon. For example, Fergus Gordon & Maltas (2019) define FinTech companies as those that "provide technologies for banking and corporate finance, capital markets, financial data analytics, payments, and personal financial management." Furthermore, Wesley-james (2015) defines FinTech firms as those that "provide solutions for banking and corporate finance, capital markets, financial data analytics, payments, and personal financial management."

According to the second approach, fintech is a technological service, Jünger & Mietzner (2020) They used the Fintech term "to refer to the services of various high-tech startups that feature innovative business and digital platform models". Moreover, LEE & Teo (2015) use the Fintech term as the "innovation of financial services which delivered through technologies". Furthermore, according Sangwan (2019), "FinTech refers to the application of computers and related digital technologies in financial services and is substantially redefining the work of financial entities".

Other perspectives focus on describing fintech as an industry or a sector, such as Schueffel (2017), who defines the FinTech industry as "a new financial industry that applies technology to improve financial activities." On the other hand, Vasiljeva & Lukanova (2016) define fintech as "a sector that concentrates on arranging financial services for private individuals and businesses with the goal of offering customer-centric solutions in the most efficient and cost-effective manner possible, utilizing innovation and technology to do this".

Moreover, Navaretti et al., (2017) classify FinTech according to the type of business, such as FinTech payment companies and FinTech lending companies. However, Magnuson (2018) argues that fintech has brought fundamental changes across all aspects, "from the way that banking works, to the way that capital is raised, even to the very form of money itself".

Fintech is defined differently by different researchers, however the evidence we have so far can be used to construct a basic definition. It is a new market that combines finance and technology to replace the old financial system with one based on technology. Financial firms and new entrepreneurs use software like artificial intelligence, blockchain, cloud computing, big data, machine learning, and the internet of things to provide better financial services.

Nowadays, different financial institutions offer a wide range of different financial technology services. These services can be divided into ten distinct types, as summarized in table 1.

Table (1): Types of FinTech

FinTech	Factors	Advantage	Example
RegTech	<ul style="list-style-type: none"> • tradition's high cost • speedier transactions 	<ul style="list-style-type: none"> • simplifying development, maintenance, and support costs • optimizing operations • improving audits procedures • lowering operational risks • real-time analytics and data 	<ul style="list-style-type: none"> • Verified • Neqabty • Quantexa • 360factor • Comply Advantage
Blockchain and cryptocurrencies	<ul style="list-style-type: none"> • The need to decentralized payment systems 	<ul style="list-style-type: none"> • resistive to fraud • cheaper safer money transfer 	<ul style="list-style-type: none"> • Bitcoin • Ethereum • Dogecoin
Insurance	<ul style="list-style-type: none"> • Technology-enabled retail financial services innovation. 	<ul style="list-style-type: none"> • Helping firms predict claims. • Analyze consumer behavior 	<ul style="list-style-type: none"> • Carsurance • Collective health • Insurance CRM software.
Investment advising	<ul style="list-style-type: none"> • Financial advice behavioral biases. • Trend-chasing 	<ul style="list-style-type: none"> • Diversity, better returns, lesser volatility. • Cost and time effective. • Transparency 	<ul style="list-style-type: none"> • Thndr • Drive wealth

Crowdfunding	<ul style="list-style-type: none"> • Funding creative ideas 	<ul style="list-style-type: none"> • Allow small entrepreneur and startups to compete with big companies 	<ul style="list-style-type: none"> • Kickstarter • GoFundMe • JustGiving • Funding Circle • CrowdBank
Lending	<ul style="list-style-type: none"> • Complexed regulations • Expensive rates 	<ul style="list-style-type: none"> • Easier • Faster • Rules clearer. 	<ul style="list-style-type: none"> • VALU • Money fellows • Happy money
Personal Finance	<ul style="list-style-type: none"> • Money-saving • Financial advice 	<ul style="list-style-type: none"> • Provide reliable financial advice. 	<ul style="list-style-type: none"> • Haweshly • Khazna • Noqood
Price Comparison	<ul style="list-style-type: none"> • Crowded market with different costs 	<ul style="list-style-type: none"> • Prices • Features • Store availability • Ratings • Reviews 	<ul style="list-style-type: none"> • Safqa • Kanbkam
Digital payment	<ul style="list-style-type: none"> • Costly bank fees 	<ul style="list-style-type: none"> • Simple • Easy • Fast • Safe 	<ul style="list-style-type: none"> • Jumia pay • Paymob • Fawry
Automated Teller Machines	<ul style="list-style-type: none"> • Customer growth • Service challenges 	<ul style="list-style-type: none"> • Cost effective • Efficient • Secure 	<ul style="list-style-type: none"> • Commercial Banks ATMS

Source: (Abraham & Schmukler, 2019, p. 2,3; Agarwal, 2020, p. 11; Alterkawi & Bittar, 2019, p. 23; Cai, 2018, p. 17,965; CCAF; World Bank; World Economic Forum, 2020, p. 107; Fenu et al., 2018, p. 27; Guechi, 2020; Navaretti et al., 2017; Rabbani et al., 2020, p. 72; Thakor, 2020)

4. CBE FINTECH AND INNOVATION STRATEGY

The Central Bank of Egypt (CBE) recognizes the importance of FinTech to the modernization of Egypt's financial industry in accordance with the country's National Vision for 2030. CBE identifies that embracing innovation is essential for altering Egypt's banking scene and boosting financial inclusion because the banking sector is still a promising market -as it shown in Figure 1. Only 32.8% of the population has a financial institution account and only about half of the population buys things online or is considered to be an internet user. On the other hand, the total amount of digital payments in Egypt in 2021 is only 8.63 million Egyptian pounds. As a result, Egypt has the chance to become a leader in the MENA and Africa financial services sectors. To do this, CBE make a plan for Egypt's FinTech sector to grow.(CBE, 2021)

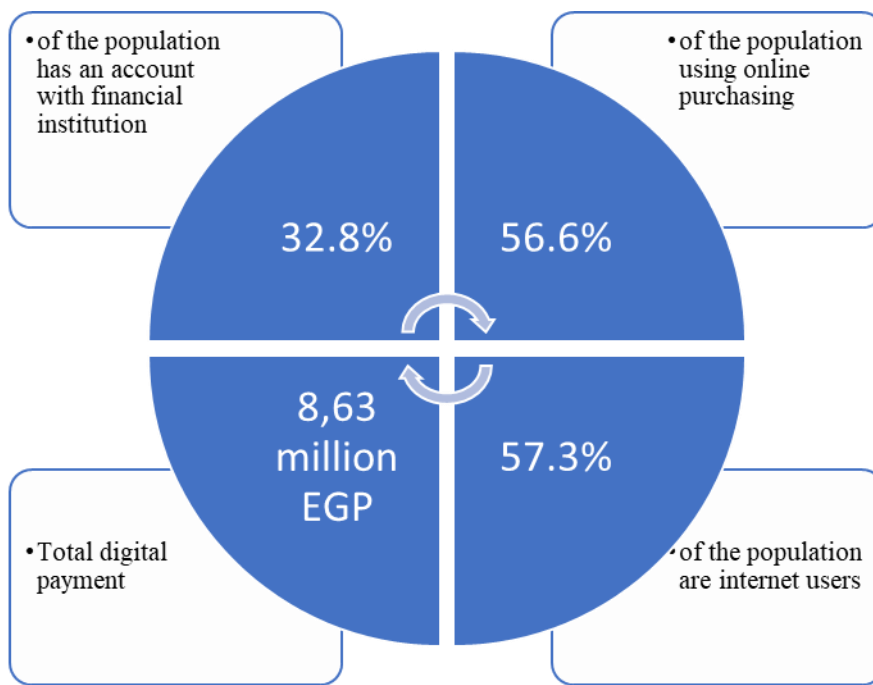


Figure (1): Egyptian Ecosystem

Source (Datareportal.com, 2021)

The Egyptian ecosystem assessment include an analysis of global benchmarks for the effect of FinTech and lessons learned from eight countries. (Mexico, Brazil, UK, Kenya, India, China, Philippines and Singapore). Countries with similar characteristics to Egypt and mature markets that want to be FinTech hubs are both on a large scale. Based on an analysis of the different ecosystems, the FinTech ecosystem framework is made up of five pillars.

First, the demand for fintech in Egypt is driven by individual customers, corporates, and financial institutions. According to the World Bank, Egypt may lead the regional financial technology hub since Egypt has a 26% of the population of the Middle East and North Africa region. Large number of financial institutions and distinguished strategic location. Although 27% have poor financial literacy, and 67% of Egyptians do not have bank accounts. Therefore, in order to promote fintech adoption, trust in digital financial services must be restored and digital preparation must be addressed.(Findexable, 2019; Klapper et al., 2015)

Second, Funding, the central bank of Egypt supported FinTech sector by EGP1 billion in 2019. In addition, CBE is also using the recommendations to influence venture capital funds' investing strategies and draw market attention to key FinTech areas.(CBE, 2019)

Thirdly, regulation has been improved through e-KYC, digital lending and spending, and mobile wallet payment requirements. Nonetheless, FinTech regulatory issues must be handled. The lack of a FinTech licensing system and clear suggestions for a standard and suitable regulatory regime among major authorities are the biggest hurdles. Thus, (CBE) created a FinTech and Innovation Unit within the bank to address regulatory and governance challenges, enable regulatory updates, and publish leadership thoughts.

Fourth, Egypt has a talent pool of several million students and a lot of resources that help FinTech companies. To prepare Egyptian youngsters for the future, technology-business curricula must be developed. It is common to work with universities, businesses, and other places to train people for new technology jobs. Moreover, new firms need more professional services. Thus, a FinTech hub will provide FinTech entrepreneurs with the tools they need to grow their businesses.

Finally, there is not enough regulation of FinTech. The CBE, Financial Regulatory Authority, National Telecommunications Regulatory Authority, and Money Laundering Combating Unit regulate FinTech solutions. In sum, FinTech lacks a leader. Thus, the FinTech Hub will promote the industry locally and globally as the market's flagbearer.

Egyptian FinTech companies offer a diverse variety of services and products, as well as a variety of business models, which increased significantly from 15 startups in 2017 to 112 startups in 2021, with a 647% growth rate. MSME's are becoming more aware of how important financial technology is, especially after the COVID-19 pandemic, which has sped up the use of e-payments and the creation of local FinTech solutions. (CBE, 2021)

Egypt wants to be "a globally recognized FinTech hotspot in the Arab world and Africa, home to next-generation financial services, talent development, and innovation growth". Due to the CBE strategy, the Egyptian FinTech market ranks second in MENA in terms of agreements (23% of MENA deals) and funding (21% of MENA funding). Additionally, FinTech investment ranks 3rd in Africa. (CBE, 2019)

In February 2020, the CBE launched "FinYology: FinTech for Youth" alongside the Egyptian Banking Institute and other colleges and banks as part of its FinTech talent development strategy pillar. The program educates students about FinTech and digital solutions and finds new talent. On the other hand, over the previous five years, Egyptian FinTech and FinTech businesses have received over \$250 million as funding. (CBE, 2022)

5. DATA METHODOLOGY

5.1. Data Sources

This study uses panel data of 18 Egyptian commercial banks (see: Appendix 1), over the period from 2017 to 2021. The study primarily considered the availability and dependability of data while determining which banks and time periods to include.

The profitability ratios (return on assets and return on equity) have been calculated using equation (1) used by Berk & DeMarzo (2020) and equation (2) employed by Ben Bouheni et al. (2016). These equations are calculated by analyzing the financial statements of each bank in the sample under consideration. The financial statements are collected from the announced annual reports of the banks, shown in appendix 1.

$$ROA = \frac{\text{Earnings Available to Common Stockholders}}{\text{Total Assets}} \quad (1) \text{(Berk \& DeMarzo, 2020)(Berk \& DeMarzo, 2020)(Berk \& DeMarzo, 2020)(Berk \& DeMarzo, 2020)(Berk \& DeMarzo, 2020)(Berk \& DeMarzo, 2020)(Berk \& DeMarzo, 2020)(Berk \& DeMarzo, 2020)(Berk \& DeMarzo, 2020)(Berk \& DeMarzo, 2020)(Berk \& DeMarzo, 2020)(Berk \& DeMarzo, 2020)(Berk \& DeMarzo, 2020)(Berk \& DeMarzo, 2020)(Berk \& DeMarzo, 2020)(Berk \& DeMarzo, 2020)}$$

$$ROE = \frac{\text{Earnings Available to Common Stockholders}}{\text{Common Stock Equity}} \quad (2)$$

Fintech outside the banking sector has been estimated using the change in investment in the fintech market which is considered as an indication of market expansion of this data has been collected from CBE report (Central Bank of Egypt, 2021).

The fintech inside the banking sector has been estimated by principal component analysis. It includes seven components which are the number of ATMs; number of credit cards; number of debit cards; number of prepaid cards; number of points of sale; number of money wallet accounts; and the average money wallet transactions. The seven-component data have been collected from CBE Financial Stability Report (different issues).

5.2. Principle Component Analysis

Before turning to the econometric analysis, a FinTech inside the banking sector index has to be calculated using the principal component analysis (PCA) method. Principal component analysis (PCA) is a statistical method that involves turning a group of variables that might be correlated into a number of values of variables that are uncorrelated in a straight line. The main goal of an analysis that uses principal components is to summarize the information content in large data tables by means of a smaller set that can be more easily visualized and analyzed, new linear combinations of factors are made. The result of PCA is a new set of variables called PCs that are not related to each other and are in a certain order. (Jolliffe & Cadima, 2016, p. 2; Lid & Planning, 1993, p. 330)

The study uses principal component analysis of financial technology services provided by banks, as shown in equation (3). The FinTech inside the banking sector index include the number of ATMs, number of credit cards, number of debit cards, number of prepaid cards, number of points of sale, number of money wallet accounts and the average money wallet transactions.

$$FTIN_{it} = \alpha_1 DC_{it} + \alpha_2 PC_{it} + \alpha_3 CC_{it} + \alpha_4 ATM_{it} + \alpha_5 MWA_{it} + \alpha_6 AMWT_{it} + \alpha_7 POS_{it} \tag{3}$$

Where

$FTIN_{it}$ is the index of fintech inside the banking sector.

DC_{it} is the number of Debit cards.

PC_{it} is the number of prepaid cards.

CC_{it} is the number of credit cards.

ATM_{it} is the number of ATMs.

MWA_{it} is the number of money wallet accounts.

$AMWT_{it}$ is the average money wallet transactions.

POS_{it} is the number of point-of-sale machines.

Table (2): Principal Component Analysis Results

Principle Component Number	Eigen value	Proportion	Cumulative proportion
1	5.692331	0.8132	0.8132
2	1.164641	0.1664	0.9796

Output of E-views Package

It can be concluded from table (2) that two components will be used in calculating fintech index. It is noticed that PC1 and PC2 had an eigen value greater than one. In addition, they have a cumulative proportion of 98%. The two components PC1 and PC2 are shown in equations (4) and (5).

$$PC1 = 0.36 DC_{it} + 0.41 PC_{it} - 0.15 CC_{it} + 0.42 ATM_{it} + 0.41 MWA_{it} + 0.41 AMWT_{it} + 0.41 POS_{it} + e_{it} \quad (4)$$

$$PC2 = 0.43 DC_{it} + 0.86 CC_{it} - 0.1 ATM_{it} - 0.19 MWA_{it} + 0.1 AMWT_{it} + 0.14 POS_{it} + e_{it} \quad (5)$$

$$FTIN_{it} = 0.79 DC_{it} + 0.42 PC_{it} + 0.71 CC_{it} + 0.32 ATM_{it} + 0.22 MWA_{it} + 0.51 AMWT_{it} + 0.54 POS_{it} \quad (6)$$

Fintech index will be calculated by substituting using actual data in equation (6). It can be noticed that the seven factors affect Fintech positively and the debit cards has the highest impact on fintech followed by credit cards.

5.3. Methodology

This study examines the impact of financial technology services inside and outside the banking sector on the performance of a number of Egyptian commercial banks using the dynamic generalized method of moment (Dynamic GMM).

Banking performance can be measured using different indicators, such as return on assets (ROA) and return on equity (ROE). The study will use two different models, the first with the return on assets as a dependent variable as shown in equation (7) and the second with the return on equity as a dependent variable illustrated by equation (8). Both models have the same main explanatory variables, which are the fintech adopted by the banking sector, which is measured by an FTIN index estimated in equation (6), in addition to the adoption of fintech outside the banking sector, which is measured by the change in investment in fintech startups.

$$Roa_{it} = Roa_{i(t-1)} + \alpha FTIN_{it} + \beta FTOUT_t + e_{it} \quad (7)$$

$$Roe_{it} = Roe_{i(t-1)} + \alpha FTIN_{it} + \beta FTOUT_t + e_{it} \quad (8)$$

Where

Roa_{it} is return on assets of bank i in year t

Roe_{it} is return on equity of bank i in year t

$FTIN_{it}$ is the index of fintech inside the bank I in the year t

$FTOUT_t$ is the change in investment in fintech startups in the year t

e_{it} is the error term.

6. ESTIMATION RESULTS AND DISCUSSION

This study's main objective is to determine the impact of fintech on bank performance using a panel data econometric approach. One of the numerous advantages of applying panel data is the ability to adjust time series for individual heterogeneity. Other advantages include more informativeness, higher variability, fewer instances of cross-variable collinearity, more degrees of freedom, and increased effectiveness. (Yunitaningtyas et al., 2019)

In the first step, equations (7) and (8) can be estimated using fixed and/or random effects models. Prior to estimating the model, it is crucial to decide whether a fixed, or random effect model is more appropriate. A Hausman test is required as a result. To ascertain if the error term is uncorrelated with unobserved effects, the Hausman test is performed. The error term is thought to be unrelated to the non-observable effects under the null hypothesis. (Mulamba, 2009) Accepting the null hypothesis implies that the random-effects model is more adequate for the data.(Fattah, 2017). It can be concluded from the Hausman test that the fixed effect is more suitable for both equations (7) and (8). The results of estimating equations (7) and (8) using the fixed effect model have been illustrated in Table (3).

Table (3): Panel data estimates using Fixed Effect Model

	ROA		ROE	
	Fixed model	Prob	Fixed effect	Prob
<i>ROA (-1)</i>	0.074792	0.6286		
<i>ROE (-1)</i>	-		-0.209808	0.4959
<i>FTIN</i>	-0.042675	0.0001	-0.369159	0.0036
<i>FTOUT</i>	0.010163	0.0018	0.090176	0.0087
<i>Constant</i>	3.827065	0.000	35.50302	0.0013
<i>R-squared</i>	0.908856		0.755474	

However, when confronted with endogeneity difficulties, these models may provide biased conclusions. Following that, the identical specification for a first-difference analysis will be applied to avoid the endogeneity issue. This indicates that a generalized approach of moments can be utilized.

Table (4): Panel data estimates using GMM model.

	ROA		ROE	
	Coefficient	prob	Coefficient	Prob
ROA (-1)	-0.0425	0.0848		
ROE (-1)			0.2614	0.2072
FTIN	-0.6815	0.0004	-0.332	0.0019
FTOUT	0.0175	0.0015	0.0963	0.0028
J-STATISTIC	2.733		4.6127	
PROB(J-STATISTIC)	0.4346		0.2024	
AR (1)	0.477		0.477	
AR (2)	0.336		0.339	

The results in table (4) indicate that the lag value of return on equity has a statistically insignificant relationship with the bank's present return on equity. All coefficients of the variables included in the models are statistically significant.

While with respect to the one-year-lagged return on assets, it is found that it has a negative and significant effect on ROA. This is because investing in assets in the previous year give the bank the profit needed before the assets depreciated. Relying on the same assets without making new investments in the current year may hurt the return on assets of the current year, but it is important to remember that it has a very small effect on the return on assets by 0.04, as reflected by the slope of the lag dependent variable.

The results also indicate that there is a strong negative relationship between the adoption of FinTech inside the banking sector and the profitability of the bank. Moreover, there is a positive relationship between the adoption of fintech outside the banking sector and the return on assets and return on equity of the banks.

According to the result in table (4), it can be noticed that GMM use the right set of instrumental variables selected for the models according to the value of Prob (J-Statistic). After moving on to the econometric analysis, the study must consider the possibility of serial correlation among variables. Therefore, to make sure there is no serial correlation, the Arellano-Bond serial correlation test needed to be run. Arellano and Bond developed a serial correlation test set to figure out if the estimator that uses lags as instruments and assumes that errors are random would stop working if the errors were actually serially correlated. Table (5) shows that there is no problem with the residues in the Arellano-Bond test for first-order autocorrelation. (Bond, 1991)

7. ROBUSTNESS CHECK

To check the robustness of the results of the GMM, the robust least squares (RLS) model will be applied in addition to the GMM model. Even when there is an outlier effect, the RLS model provides unbiased analysis. The main objective of the robust least squares is to minimize outliers in both regressand and regressors. (Khalid et al., 2018)

Table (5): Results of the Robust Least square model

	ROA		ROE	
	Coefficients	Prob	Coefficients	Prob
<i>ROA (-1)</i>	0.797623	0.0000	-	-
<i>ROE (-1)</i>	-	-	0.822171	0.0000
<i>FTIN</i>	-0.031690	0.0000	-0.190978	0.0007
<i>FTOUT</i>	0.011714	0.0000	0.077075	0.0001
<i>Constant</i>	1.562889	0.0000	9.364179	0.0010
<i>R-squared</i>	0.539535		0.607352	
<i>Prob(Rn-squared stat.)</i>	0.0000		0.0000	

Results of the robust least square models illustrated in Table (5) demonstrate the constancy of the relationship between variables under consideration. The sign of all coefficients in the RLS model is consistent with that of the GMM model except for the lagged value of the ROA. According to the robust least square results, all variables have statistically significant impact.

CONCLUSION

The main objective of this study is to investigate the linkage between banking performance and FinTech adoption. A fixed effect, a generalized method of moments and robust least squares models have been used in the regression analysis.

The regression indicates that the financial technology services provided by the banking sector have a negative impact on its profitability while the financial technology provided outside the banking sector has a positive impact on bank profitability, which is the opposite of the predictable results.

The main reasons behind these results are the fact that Egyptian banks need a strong infrastructure to implement financial technology at the level of their wide customer base, which costs time and money in a large size in the short term. Moreover, the transition to the digital form while maintaining the satisfaction of the bank's customers in the traditional form at the same time which puts pressure on the bank's budget. In addition, banks face many obstacles represented by the regulations imposed by the Central Bank. Finally, because banks place a small profit margin on the financial technology services they provide, it is part of the CBE's strategy to encourage customers to use financial technology services and also to compete with start-up companies that provide the same type of services at a lower cost.

As for the spread of FinTech start-ups in the Egyptian market, the model has been estimated that they have a positive impact on the profitability of banks. This is because the size of FinTech start-ups in Egypt is relatively small, and they cannot serve a broad base of customers with broad services without the use of partnerships with Egyptian banks. That led to an overlap in services between the Egyptian banking system and fintech startups. On another words, FinTech startups are considered another window for Egyptian banks to apply their own financial technology to a new segment of customers at a lower cost and with simpler regulations.

At the end, this study can help the banking sector get the most out of fintech. The study's results show that the banking sector must use fintech, but through two different channels. The first is the bank's own research and development department, and the solution will have long-term benefits. Even though the second channel is through other financial technology companies, it can still benefit in the short term from their fast growth. Consequently, they can choose between the two options so as not to put too much pressure on the bank's budget.

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