The impact of Financial Inclusion on Bank Profitability and Economic Growth: Evidence from Egypt

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الملخص

تهدف هذه الدراسة الى دراسة أثر الشمول المالى على القطاع المصرفى ومن ثم النمو الإقتصادى فى مصر فى الفترة من ٢٠١٤ حتى ٢٠١٩ من خلال استخدام ماكينات الصراف الآلى لكل ١٠٠٠ فرد، القروض لكل ١٠٠٠ فرد، وعدد البنوك التجارية لكل ١٠٠٠ فرد كمقاييس للشمول المالى واستخدم العائد على حقوق المساهمين، العائد على الأصول كمقاييس لربحيه البنوك واستخدام الناتج المحلى الاجمالى كمقياس للنمو الاقتصادى.

واعتمدت الباحثتان على تحليل كمى إحصائى باستخدام برنامج **Stata** لتحليل متغيرات تم اشتقاقها من البنك الدولى والبنك المركزى المصرى وصندوق النقد الدولي. وانتهت الدراسة إلى أن استخدام ماكينات الصراف الآلى لكل ١٠٠٠ فرد، القروض لكل ١٠٠٠ فرد ذات دلالة معنوية ايجابية فى النموذجين الاول والثانى فيما يتعلق بالعائد على حقوق المساهمين، العائد على الأصول بينما عدد البنوك التجارية لكل ١٠٠٠ فرد ذات دلالة معنوية سلبيه على ربحية البنوك. كما توصلت الدراسة الى ان جميع مقاييس الشمول المالى المستخدمة ذات دلالة معنوية ايجابية على الناتج المحلى الاجمالى .

الكلمات المفتاحية : الشمول المالى ، ربحية البنوك ، النمو الاقتصادى، العائد على حقوق المساهمين، العائد على الأصول، الناتج المحلى الاجمالى.

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Abstract

This study examines the impact of financial inclusion on banks` profitability measured by ATMs numbers per 1000 adults, loans per 1000 adults, number of commercial banks per 1000 adults, and the economic growth in Egypt depending on GDP. The researchers depend on a quantitative approach that uses the variables that affect the bank's profitability and economic growth. The data for this study were manually obtained from the Central Bank of Egypt's (CBE) annual reports, the World Development Indicators (WDI), and the International Monetary Fund (IMF) yearly reports. The banking industry in Egypt was included in the study's population. The analysis covers the years 2014 to 2019.

The findings support that Loan accounts and ATMs numbers are statistically significant in model 1&2 regarding the profitability measures (ROA and ROE), implying that these variables have an impact on bank profitability in Egypt. On the other hand, branch numbers negatively affect bank profitability. While model 3 comes as a result of models 1 and 2 to show the significance of the relation between economic growth and bank profitability.

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1. Introduction

Banks are considered one of the essential financial intermediates in any financial system as they affect the small investors, small and medium-sized (SMEs), and the overall economy that will affect economic growth (Barth, et al., 2000). As banks are recognized as a base for economic development, they should develop with the development of the ICT sector and raise the size of the financial inclusion in the economy.

To enhance financial inclusion, the monetary authority- the central bank in Egypt- has to encourage the financial institutions and banks to adopt it for all individuals and increase the individuals access to financial services electronically.

Financial inclusion is one of the crucial policies adopted nowadays to use the best of the ICT sector in the banking and financial sector that will benefit the economy as a whole. The central bank of Egypt tried to adopt many initiatives to enhance the financial inclusion in Egypt, ending with the choice of the World Bank (WB) Egypt with Mexico and China as model countries in financial inclusion (Alex Bank, 2017). Thus, this paper will tackle the relation between financial inclusion, economic growth, and profitability in Egypt since 2016, as it was the first time the Egyptian government began to give attention to the concept of financial inclusion.

Many studies examined financial inclusion and the different practices of different governments and banks in that context. However, the relationship between bank profitability, financial inclusion, and economic growth in developing countries, especially Egypt, was not tested.

There will be four sections to this paper as the second section will present the literature review and hypotheses development about financial inclusion, economic growth, and profitability. The third section will include the research data and methods. Section four will introduce the results and discussion. Finally, the conclusion section will be offered.

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2. Literature review and hypotheses development:

There isn't a definition of financial inclusion that is widely accepted as some researchers linked the presentation of financial services to individuals or certain groups as low-income groups and how they are involved in the banking sector (Chakravarty & Pal, 2013). The low-income group's involvement aims to engage the excluded ones in the banking sector in the sense of their savings, payments, and internet banking (Lenka & Sharma, 2017). Therefore, this part will be divided into three parts. The first one will tackle the relation between the economic growth and financial inclusion, while the second part will examine financial inclusion and bank profitability. The third one will discuss the linkage between economic growth, financial inclusion, and bank profitability.

2.1 Economic growth and financial inclusion

In late 2000, the financial inclusion concept arose in many studies on the scope of economic growth (Nacceur & Ghazouani, 2007) found an indirect relationship between financial inclusion and economic growth in the MENA region.

(Nada, 2020) concluded that there is a long-run relationship between financial inclusion and advancement in Egypt's economy, society, and environment. The number of ATMs, average household loans, average household deposits per capita, and the number of commercial bank branches per 100,000 people were investigated as four predictor factors for financial inclusion. These independent variables have an impact on financial inclusion. Ecological, social, and economic sustainability all go hand in hand. From 2004 to 2017, to test the variables, a multiple regression model was employed. Results have demonstrated a strong link between Egypt's financial integration and long-term growth. Given that just 33% of the adults in Egypt have direct access to organized financial services, there is significant potential to improve society as a whole.

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(Sayed, Abbas & Touny, 2020) examines how financial inclusion affects Egypt's GDP growth and heavily relies on financial inclusion indices. The researchers employed secondary data to explore the relationship between the GDP and many independent variables. The authors used multiple regression models to examine the data, and the model produced statistically significant results. The findings show that the first-quantile risk for banks is related chiefly to bank penetration. The opening of additional branches will diminish the danger that local banks face. The national financial inclusion index is also strongly correlated with bank risk in the second and third quantiles. According to these findings, the risk to banks will decrease in the region due to enhanced financial inclusion. Based on these conclusions, higher bank penetration will boost bank efficiency and lower risk with the added advantage of risk reduction.

Sethi, D., & Acharya, D. (2018) evaluate the dynamic influence of financial inclusion on economic growth for many developed and emerging nations. To investigate how financial inclusion and economic growth are related, Several cross panel data models are used in this study, including regressions with country fixed effects, random effects, temporally fixed effects, panel cointegration, and panel causality tests. A panel causality test is used to determine the direction of causation. In contrast, a panel cointegration test is used to assess the long-term link between financial inclusion and economic growth. Information for the years on financial inclusion 2004–2010 is obtained from Sarma (2012). According to empirical research, financial inclusion and economic growth are positively correlated over the long term in 31 nations. In addition, the panel causality test demonstrates that financial inclusion and economic growth are causally related in both directions. Thus, the study affirms that financial inclusion is one of the primary forces behind economic growth.

Okoye et al. (2017) the Ordinary Least Squares method is used to examine the effects of financial inclusion on economic growth and development in Nigeria between 1986 and 2015. Indicators of financial deepening, loans to

rural regions, branch networks, and the loan-to-deposit ratio were utilized in the study to gauge financial inclusion. Indicators of financial deepening in the study were the ratios of the total money supply to GDP and private sector credit to GDP. As a substitute for economic expansion, GDP growth over time was employed, while per capita income was used as a gauge of poverty and, consequently, a development metric. The paper demonstrates that providing credit to the private sector has not considerably aided the economic expansion in Nigeria, and financial inclusion has aided in reducing poverty in Nigeria by providing credit to rural areas.

2.2 Profitability and financial inclusion:

(Almaleeh, 2020) analyses how financial inclusion relates to liquidity and profitability in Egypt. The researcher utilized a multiple regression model to determine how much the independent variable (Financial inclusion) affected the dependents (liquidity and profitability). The research was conducted on Egyptian banks from September 2012 to September 2018. The findings indicate that variations in financial inclusion measures can account for 53% of the variation in Egyptian banks' profitability and that financial inclusion has a considerable effect on various measures of banks' liquidity.

Shihadeh et al. (2018) This study uses annual data from 13 commercial banks between 2009 and 2014 to examine the relationship between financial inclusion (FI) and bank performance in the Jordanian economy. The performance of these institutions is assessed by their national income and Jordanian banks` return on assets (ROA). Researchers depended on six distinct FI measurements to ensure the validity of their findings. They consist of new services, credit for SMEs, deposits for SMEs, the number of ATMs and ATM services, the number of credit cards, and the number of ATMs. Although the results of the analysis varied when the FI variables' effects were analyzed separately, Gross revenue and ROA metrics revealed that financial inclusion had a significant influence on performance. Thus, FI contributes to increased bank efficiency.

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Issaka et al. (2022) examined the banks` profitability in Sub-Saharan Africa (SSA) concerning financial inclusion. Using data from 1990 to 2017, the system generalized method of moments (GMM) was employed in the paper dynamic pooling estimator to calculate the parameters. The findings indicate a positive association between Sub-Saharan Africa's banks' profitability and the financial inclusion index (FINDEX). This shows that Sub-Saharan Africa's banks' profitability is significantly influenced by financial inclusion.

Shihadeh, F., & Liu, B. (2019) investigate whether financial inclusion affects the efficiency and risk of banks. The study examined how banks' performance and risk related to increasing financial inclusion. The analysis used information for 189 nations and 701 institutions from the BankScope, World Bank, and financial development databases. The study's empirical methodology was employed to support its research premise. The research offers evidence of expanding financial inclusion, with branches acting as the primary method of banking penetration, along with other financial inclusion indicators that have been found throughout the world, which could aid banks iterating higher returns and reducing risks.

This information not only pushes banks to invest in additional branching and penetration but also helps the global objective to increase financial inclusion. As a result, policymakers can utilize these insights to inform the development of their plans for growing the branch networks. Governments can also play a significant role in creating the policies and rules that will increase banking penetration and help more disadvantaged individuals. This study provides evidence from around the globe demonstrating the beneficial effects of greater financial inclusion on both bank operations and the lives of the less fortunate. This study also addresses the subject of financial inclusion, providing a new line of investigation for future research.

Some individuals were avoiding any transactions with banks as they were afraid of "Reba" so banks began to engage Islamic banking with financial inclusion. (Saeed, 2002) found that the best way to engage the poor is through "zakat", "sadakat" and "waqf hassan"

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2.3 Profitability, economic growth, and financial inclusion.

There isn't much research on the connection between profitability, economic expansion, and financial inclusion. In examining that relation, Kumar V., et al. (2021) illustrate that financial inclusion promotes economic growth and reduces poverty is supported by prior research. However, it is yet unclear if financial inclusion increases bank profitability. We look into this using 122 Japanese banks as a sample from 2004 to 2018. We discover that financial inclusion is crucial even in developed economies; branch closures hurt Japanese banks' profitability, while the number of loan accounts and ATMs has little bearing on bank profitability. The main forces behind profitability among bank-specific factors are cost control, credit risk management, and bank size. Compared to (Sharma, 2006), High economic growth increases banks' profitability by reaching many investors and users using low-cost techniques such as financial inclusion.

To the best of the authors' knowledge, no literature was found that studies the relationship between profitability, economic growth, and financial inclusion, especially in Egypt. Therefore, this study will try to fill that gap.

To this end, most of the literature revealed that banks' profitability and economic growth are enhanced by financial inclusion, with a slight impact on developed markets. Therefore, the following hypotheses have been adopted:

Hypothesis 1a: The profitability of banks and the number of ATMs have a positive relationship.
Hypothesis 1b: banks' profitability and the number of loan accounts have a positive relationship.
Hypothesis 1c: banks' profitability and the number of branches have a positive link.
Hypothesis 2a: Economic growth and financial inclusion have a positive relationship.

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3. Data and methods

3.1. Data

Data used in this study were manually obtained from the Central Bank of Egypt's (CBE) annual reports, the World Development Indicators (WDI), and the International Monetary Fund (IMF) yearly reports. The banking industry in Egypt was included in the study's population. The analysis covers 2014 to 2019 when Egypt became a member of the AFI. Panel data of six observations were utilized.

The crucial impact of FI on bank profitability and economic growth has been hypothesized, which is based on previous studies, which originate a vital influence for the variables measured. Our research on banks' profitability looks at the impact of financial factors on bank profitability and economic growth.

3.2. Dependent and independent variables

3.2.1. Dependent variables

3.2.1.1 Bank profitability.

Consistent with the literature (Almaleeh, 2020; Shihadeh & Liu, 2019; Issaka et al., 2022), the percentages of return on assets (ROA) and return on equity (ROE) were used as a measure of profitability.

3.2.1.2 Economic growth

Regarding economic growth, this study depended on the data available from the international monetary fund (IMF) and World development indicators (WDI) from 2014 to 2019. These variables will be provided on an annual basis. Most of the literature used different variables such as credit to GDP (Bruhn & Love, 2014), Broad money to GDP and deposits to GDP (Okoye, et al., 2017), and GDP per capita (Olaniyi, 2015).

3.2.2. Independent variables

3.2.2.1. Financial inclusion variables.

Los Cabos hosted the G20 Summit In 2012, and the following FI metrics were determined in 2012: (1) financial services accessibility (number of branches, ATMs, and accounts); (2) financial services consumption (adult and SMEs deposits, loans, and savings); and (3) product and service quality in terms of costs of accounts, and financial knowledge. Numerous parameters are utilized to measure each category. This research adopted a novel approach by analyzing FI from the supply side, similar to (Shihadeh, et al., 2018). Indicators of financial services access and use were employed in this strategy. The third parameter, the quality of product and service delivery, was omitted since it is impossible to quantify owing to a lack of data.

As F. H. Shihadeh, et al. (2018) studied, the determinants for financial services consumption by using the world bank financial indicators on an annual basis, including the number of ATMs per 100,000 individuals, the number of loan accounts within commercial banks per 1,000 adults, and the number of commercial bank branches per 100,000 adults (WDI).

3.4. Model specification

These variables were modeled in the study to assess the effect of variables of the predictors on the outcomes:
We estimated the following models:

$$ROA_{it} = \beta0 + \beta1FIN\ LOAN_t + \beta2FIN\ ATM_t + \beta3FIN\ BRANCH_t + u_{it} \quad (1)$$

$$ROE_{it} = \beta0 + \beta1FIN\ LOAN_t + \beta2FIN\ ATM_t + \beta3FIN\ BRANCH_t + u_{it} \quad (2)$$

$$GDP_{it} = \beta0 + \beta1FIN\ LOAN_t + \beta2FIN\ ATM_t + \beta3FIN\ BRANCH_t + u_{it} \quad (3)$$

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The bank is indicated by the subscript *I*, while the period is indicated by the subscript t. β0: indicates that the intercept is constant. The bank's profitability is measured by the dependent variables: ROE and ROA. The independent variables FIN ATM, FIN LOAN, and FIN BRANCH refer to the country's financial inclusion, and the error term is uit. To practically investigate financial inclusion's impact on bank profitability and economic growth where bank profitability is concerned, equations (1) to (3) are applied (ROA and ROE), and economic growth (GDPcap). The effect of the predictors on the result was tested using ordinary least square (OLS) regression. The regression was run using STATA software to evaluate the study hypothesis.

Table 1 Definition, notation, and Measure.

Variables	Notion	Measures
Independent Variables *variables of Financial inclusion* the total number of loan accounts Numbers of ATMs the total number of bank branches	FIN-LOAN FIN-ATM FIN-BRANCH	loan accounts per 1000 adults with commercial banks ATMs number per 100,000 adults commercial bank branches number per 100,000 adults
Dependent Variables Return on assets Return on equity Economic growth GDP per capita	ROA ROE GDPcap	Profit before tax / Total assets (%) Profit before tax / Total equity (%) GDP per capita

3.5 methods

This paper will adopt OLS regression to estimate the relation between economic growth and bank profitability in Egypt. Therefore, it will begin by testing the unit root test to investigate if the data are stationary. It will test the correlation according to Johansen's cointegration test and end with OLS regression.

The authors used OLS regression (Short, 1979; Staikouras & wood, 2004) and found that the data related to bank profitability and economic growth give good results through the linear equations.

4. Results and Discussion

The descriptive statistics, all-variable correlation coefficients, and the outcome of OLS regression will all be covered in this section.

4.1 Descriptive statistics

Table 2 presents descriptive data regarding each variable, such as mean, standard deviation, and lowest and highest values. Because the majority of studies use ROA and ROE as dependent variables, whereas ATM, branches and loans, and GDP per capita are variables of financial inclusion. The profitability of Egyptian banks varies, with ROAs ranging from 1.4 to 2% and ROEs ranging from 21.5 to 30.9 percent.

Over the period (2014-2019), the number of Egyptian loans has a mean of 107.83, with a standard deviation of 7.55. The number of ATMs in the data has mean of 16.3245, with a standard deviation of 3.0720. The average number of branches in the data is 5.07, with a standard deviation of 0.78587. Regarding GDP per capita, mean is 35460.23 and a standard deviation of 11577.29.

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Table 2 descriptive statistics results

	Mean	Median	Maximum	Minimum	Std. Dev.	N
ROA	1.633333	1.55	2	1.4	0.225093	6
FIN_BRANCH	5.07	4.81	6.64	4.56	0.785875	6
FIN_ATM	16.3245	16.698	20.07	12.061	3.072067	6
FIN_LOAN	107.8383	105.885	116.91	100.09	7.555772	6
GDPCAP	35460.23	32333.46	53017.25	23555.52	11577.29	6
ROE	24.18333	23.4	30.9	21.5	3.486785	6
INFLATION_RATE	14.83333	12.185	23.53	10.1	5.864959	6

Source: authors' calculations

4.2 Johnsen's cointegratin:

The matrix of correlation coefficients among the variables in the ROA, ROE model is shown in Table 3. The matrix depicts the relationship between each variable and the others. Table 3's correlation matrix reveals that FI has a positive coefficient for all variables except ROE and infl. According to the correlation matrix, the variables have a significant positive link with the FI.

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Table 3: the correlation results

t-Statistic	ROA	FIN_Bch	FIN_ATM	FIN_LOAN	GDPCAP	ROE	INFL
ROA	1						
FIN_Bch	0.303005	1					
FIN_ATM	0.040376*	0.740372	1				
FIN_LOAN	0.160674	0.712007	0.840634	1			
GDPCAP	0.001205***	0.860668	0.920193	0.897188	1		
ROE	-0.21066	-0.21692	-0.67262	-0.37189	-0.33541	1	
INF	-0.56564	0.056388	0.584639	0.285355	0.467865	-0.40371	1

Source: authors' calculations

Table 3 shows a high positive relation between GDP per capita and ROA at 1%, while there is a weak negative relation between ROA and ROE at 10%. Also, there is a positive relation between ROA and ATM.

4.3: OLS results:

To cope with unobserved heterogeneity between banks and simultaneous causality, the research employs OLS (ordinary least square regression technique) in analyzing the relationship between bank profitability and adopted different effects, whether fixed or random ones have had many techniques. The fixed-effect method is used to solve estimated problems regarding the unobserved heterogeneity among firms. It is most effective in case the unobserved heterogeneity is stable throughout time for a single business (Tan, & Walsh, 2010). Unlike the fixed-effects model, the random-effects model analyzes changes in the error term over individual enterprises and periods and reduces variation within the sample by partially pooling the data.

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Table 4. OLS Estimation Results, Models 1 and 2.

Variable	ROE	ROA
FIN_BCH	-1.1937*	0.455281
FIN_ATM	-2.76979**	0.048953
FIN_LOAN	-0.11933*	0.037448
GDP	0.000715***	-6.05E-05
C	62.96827**	-3.36866
Adjusted R^2	0.998885	-0.465

Source: authors' calculations

The results of the examining of model 1 and 2 show that there is no relation or significant relation between ROA and profitability. In contrast, the results show that ROE is significant with most variables at different levels. GDP per capita is solid and significant, with ROE- as an indicator for bank profitability at 1%. Also, the number of ATMs is strong and significant, with ROE at 5%, as shown in table 4.

Therefore, the researchers estimated the relation between ROE as a bank profitability indicator and GDP per capita calculated in model 3, which shows that all variables are strong and significant at 5% and 1%, except the number of branches is insignificant, as shown in table 5.

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Table 5 (Model 3 results)

Variable	Coefficient
ROE	1757.655***
FIN_BRANCH	-394.641
FIN_ATM	5134.288***
INFLATION_RATE	-223.906**
C	-85538.3***
Adjusted R^2	0.999993

Source: authors' calculations

Discussion

This study intended to evaluate the impact of financial inclusion on bank profitability as assessed by the number of loans, commercial banks, and ATMs per 1000 adults and in Egypt's economic development as measured by GDP per capita.

Moving on to the regression analysis, this study produced three models. Two of the models looked at how the independent variables related to financial inclusion affected profitability using two different proxies; the other model looked at economic growth using the following proxies; Loan accounts and ATMs numbers are statistically significant in both of the models regarding the measures of profitability (ROA and ROE), implying that these variables have an impact on bank profitability in Egypt.

As a result, we accept Hypothesis 1a: "bank profitability is positively related to the number of loan accounts," and Hypothesis 1b: "The number of ATMs

and bank profitability has a positive link." An increase in the number of loan accounts (FIN LOAN) implies an improvement in bank profitability. The additional income may be offset by increasing transaction costs and overheads from more loan accounts, among other things.

Many studies, including those (ALmaleeh, 2020; Shihadeh et al. (2018); Issaka et al. (2022)), have connected the expansion of ATM networks to greater bank profitability. In places where operating a branch is difficult, expanding the number of ATMs and their services could be seen as opening up additional avenues for serving customers. If these other channels are accessible, customers might be more inclined to acquire bank accounts and use bank services. Furthermore, the expansion of ATM networks enables clients to use banking services whenever they want and at a lesser cost, luring them to do so more frequently. By improving banks' ability to sell their products, generate more revenue, and provide credit to customers, The percentages of profitability are related to the low number of bank branches in Egypt.

According to bank of Alex report in 2017, over 33 percent of the population had bank accounts in the early stages of financial inclusion. one interpretation of these statistics is that Egypt has a high rate of financial exclusion. Egypt's economy is also founded mainly on cash transactions, meaning that most financial activities include cash exchanges. Given this, it is still too soon to make any explicit judgments about how financial inclusion would impact the viability and liquidity of Egyptian banks.

The findings show that branch numbers do not affect bank profitability in Egypt. Thus, Hypothesis 1c isn't accepted: Bank profitability and the number of branches have a positive link. Our findings are consistent with Shihadeh and Liu (2019). They argue that expanding the number of branches increases the number of clients, which leads to an increase in deposits and loan portfolios and risk diversification.

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According to Boot and Schmeits (2000), financial inclusion helps banks diversify and decrease risk. Harimaya and Kondo (2016) found that any increase in the number of branches will affect the costs that will lead to inefficiency in the costs, which leads to cost efficiency. As a consequence, our findings may suggest that opening new branches in financially disadvantaged communities or regions might help banks boost profitability and diversify risk.

5. Conclusion.

The Egyptian economy is experiencing rapid development in all sectors and increased economic activities besides the government's great concern with technology and artificial intelligence. All of these developments increase the demand for financial services. Therefore, this study examined the effect of financial inclusion on profitability and economic growth in Egypt.

The results showed that loan accounts, inflation rate, and ATMs numbers are statistically significant in both models regarding the profitability measures (ROA), implying that this variable has an insignificant positive impact on bank profitability in Egypt. However, the findings show that branch numbers positively and substantially affect bank profitability in Egypt.

A significant result of that study is the positive relationship between economic variables used and the financial relationship as the increase in GDP will increase the profitability of banks as investors and the users of the financial sector will have more confidence in the banking sector will end with economic growth and the increase in the standard of livings in Egypt. Finally, the bank profitability will foster Egyptian economic growth as they were positively related.

After analyzing the results, four key recommendations can be given to policymakers to promote financial inclusion in Egypt and, subsequently sustainable development: The following steps will strengthen business structures: 1) create and improve the legal and regulatory framework to make

it easier for lower-income populations living in remote areas to access
services; 2) lower transaction costs and increase the simplicity of payment
methods; 3) Allow financial and non-financial companies to employ financial
technology alternatives; 4) Increase the number of financial literacy services
offered by financial institutions or other intermediaries. Lower transaction
costs and ease of payment channels.

To ensure the best and most efficient resource use, monetary authorities
should speed up their efforts to boost financial inclusion through improving
credit delivery and utilization to the private sector.

For future studies, linking financial inclusion with bank profitability to
alleviating poverty in Egypt is extremely important- especially between urban
and rural areas after the developments made by the Egyptian government to
promote technology in all fields. In addition, applying these data in the Arab
or MENA region is an obvious example of developing countries.

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