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Can financial inclusion increase the profitability of selected Iranian banks?

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ABSTRACT

Banks play a vital role in the economy of countries and are like its main arteries. Banks, as economic firms, seek to maximize profits. Therefore, it is necessary to identify the factors affecting their profits. According to various studies, several factors can affect the profitability of banks. One of the most important of these factors is financial inclusion. Therefore, in this study, the effects of financial inclusion on the profitability of selected banks listed in the Tehran Stock Exchange during the period 2010 to 2023 have been studied. The quantile panel regression method has been used to estimate the model.

The results of the model estimation showed that the components of financial inclusion have a positive effect on the profitability of the studied banks. The high level of these variables indicates that more people have bank accounts, make deposits in banks, and receive facilities. Therefore, banks have sufficient funds to grant loans and invest in profitable opportunities, and this has a positive effect on the profitability of banks. The cost-to-income ratio and the amount of non-performing loans also have a negative and significant effect on bank profitability and reduce it. The effect of capital adequacy on bank profitability is positive but not statistically significant. In addition, GDP growth and inflation also have a positive and significant effect on the profitability of the studied banks.

Keywords: Financial inclusion, Profitability, Iran, Panel Quantile Regression, Bank

1. Introduction

The importance of the banking system in creating money and increasing liquidity, financing economic activities, investment in various sectors and industries, changes in the general level of prices, and creating employment is undeniable. Banks, as economic enterprises, are considered the main artery of economic activities and have a more prominent role in financing economic activities. Therefore, it is expected that banks will always seek profitability and it is important to examine and evaluate their performance and factors affecting profitability (Ezzati et al., 2016). Higher profitability of banks not only allows banks to create funds to grant more credits but also makes it easier for bank policymakers to invest in high-risk environments. Several factors can affect the profitability of the banking system. One of the most important of these factors is the issue of financial inclusion. Financial inclusion refers to the access to and active use of financial products and services within the framework of a formal financial system by all groups in society. This concept encompasses a wide range of financial services, including payments, deposit accounts, credit, insurance, pension funds, and securities markets. Wider access to financial services allows individuals and firms to take advantage of business opportunities, invest in education, save for retirement, or hedge risks (World Bank Financial Inclusion Division, 2018). In the context of financial inclusion, it can be stated that the expansion of bank branches, increasing people's access to banking services, and increasing the number of people with deposit accounts in the banking system, increase the ability of banks to provide loans and credit and earn profits from it. This increase in profits is further increased when banking services are provided to customers through information and communication technology (ICT) tools such as the Internet, mobile phones, ATMs, etc. In this case, the bank's cost of providing these services is also reduced and the bank's profitability is enhanced. However, achieving financial inclusion is not always easy and may face challenges. For example, individuals' access to new bank accounts does not always translate into regular use. In fact, it is important to note that there is a fundamental distinction between using financial services and accessing them. Some individuals or firms may have access to these services but not use them. Others may have indirect access, for example by using other people's bank accounts (World Bank Financial Inclusion Division, 2018).

Some members of society may also be unable to access financial and banking services due to discrimination, lack of information, failure to enforce contracts, poor information environment, inappropriate financial products, price restrictions due to market failure, ill-informed regulations, or political and personal interpretations of regulations. In other words, a portion of the population of any country may be outside the financial system for various reasons and cannot benefit from its benefits. In these cases, financial inclusion can overcome these types of problems by facilitating individuals' access to the formal financial system. At the macroeconomic level, financial inclusion can also contribute to greater stability of the banking system and be effective in their profitability. There is ample evidence of these effects, especially in developing Asian countries. Reduced reliance on external financial resources as a result of higher savings and reduced withdrawal rates in times of stress due to an increase in the number of deposit accounts are among the effects of improving financial inclusion. This reduces outstanding debts and, consequently, reduces systemic risks (Nkoa and Song, 2020). Along with the positive effects of financial inclusion, it should be noted that in some cases, accelerating and rushing to achieve a higher level of financial inclusion is not necessarily better. In other words, when credit grows rapidly, increasing financial inclusion may cause undesirable conditions. Because not all financial services are suitable for everyone and there is a risk of overuse, especially in terms of credit. Increasing credit without sufficient attention to financial sustainability may turn into a crisis. The 2008 crisis in the United States and the 2010 crisis in the microfinance sector in India are two examples that show that expanding financial inclusion, without considering some considerations and financial standards, can lead to increased systemic risk and ultimately financial instability and the occurrence of a crisis. This will increase the credit risk of banks and will have a negative impact on the profitability of banks. Therefore, the increase in credit risk, which is caused by granting loans and credit without a plan and without supervision, faces banks with a financial crisis(Rahimzadeh et al ,2023).

Therefore, it is observed that in addition to the positive effects of financial inclusion on economic

growth and bank profitability, in some cases it is possible that increasing financial inclusion leads to an increase in banks' credit risk and a decrease in their profitability (Rahimzadeh et al ,2023).

In other words, the question that arises is what effect financial inclusion and its various components can have on bank profitability in Iran? Also, the research hypotheses are as follow

Hypothesis 1: Financial inclusion access criteria have a positive and significant effect on the profitability of selected banks in Iran.

Hypothesis 2: Financial inclusion usage criteria have a positive and significant effect on the profitability of selected banks in Iran.

2. Theoretical Framework

2.1. Financial inclusion and bank profitability

The issue of financial inclusion as an important socio-economic issue has been on the policy agenda of many governments and international institutions. This concept has been studied mainly in the dimensions of access, use and quality (barriers) of financial services. In the context of access to financial services, proximity, availability and convenience are considered. In the context of use, financial capability and ability, actual use (including the amount and frequency of use, regularity and rules) is considered, and in the context of quality of financial services, adaptation to customer needs and sustainable and responsible provision of these services are considered(Figure 1).

Figure 1. Different Dimensions of Financial Inclusion

Access	Availability of and access to financial services(eg, access points such as ATMs or branches)
Usage	Usage of financial services (eg, type of accounts, transaction amounts, outstanding balance)
Other Dimension	Strength of consumer protection ,presence of credit barriers, awareness and understanding of financial products,etc.

Source: Nkoa and Song, 2020

As mentioned, one of the factors affecting the profitability of the banking system is the concept of financial inclusion (Kumar et al., 2020). Among the research conducted on financial inclusion, only a few studies have examined the impact of financial inclusion on bank profitability. According to the results of these studies, a profitable banking sector is essential for economic development (Atanasoglu et al., 2008) and financial stability (Klein and Weil, 2017). Banks also strengthen economic growth by financing productive projects (Levin and Zervos, 1998). In other words, it can be said that although variables such as bank capital, non-performing loans, bank size, liquidity, cost management and bank efficiency affect profitability, the effect of financial inclusion on bank profitability has been ignored in these studies. As mentioned, only a few studies have focused on the relationship between financial inclusion and bank profitability. Also, different researchers have used different measures of financial inclusion. For example, Kondo (2010) used the number of ATMs index and suggested that the number of ATMs does not affect bank profitability in Japan. Holden and Albanani (2004) also showed a positive relationship between the number of ATMs and bank profitability in the United Kingdom. Shihadeh and Liu (2019) examined the impact of financial inclusion on bank risk and performance in 189 countries, using the number of branches as a measure of financial inclusion. Their results showed that an increase in the number of branches leads to an increase in bank profitability. Shihadeh et al. (2019) examined the relationship between financial inclusion and bank performance in Jordan and found that the number of ATMs and the number of credit cards increased bank profits. Therefore, in general, the factors affecting bank profitability can be summarized as follows:

3. Literature Review

Foreign Sources

Mashamba and Chikutuma (2023) used the moments GMM estimator and panel data of 11 commercial banks during the period 2011-2020 to investigate the determinants of bank profitability in Zimbabwe. They found that bank-specific factors, such as non-interest income, liquidity, cost efficiency, capital adequacy and bank stability, have a positive and significant effect on bank profitability, while the industry factor, bank concentration, has a negative and significant effect. Also, macroeconomic factors, such as gross domestic product (GDP) and inflation, do not have a significant effect on bank profitability.

Keka et al. (2023) used seasonal data from 2010 to 2020 and panel data method and studied the determinants of bank profitability in Kosovo and Albania. This study focuses on several determinants of bank profitability, including number of employees, loan interest rate, non-performing loans and total facilities paid. The dependent variables also include return on assets (ROA) and return on equity (ROE). According to the findings of the study, loan interest rates, total facilities, and non-performing loans significantly affect the profitability of the studied banks.

Kumar et al. (2021) studied the impact of financial inclusion on bank profitability using a sample of 122 Japanese banks from 2004 to 2018. They found that financial inclusion is important even in a developed economy. According to the results of the study, reducing the number of branches reduces the profitability of Japanese banks, although the number of deposit accounts and automated teller machines (ATMs) does not affect bank profitability. Among the bank-specific variables, cost management, credit risk management, and bank size are the main drivers of profitability.

Shihadeh (2021) in an article titled "Financial Inclusion and Bank Performance: Evidence from Palestine" examined the relationship between financial inclusion indicators and bank performance in Palestine. The population and sample of the study included all 15 banks operating in Palestine and the study period was 2006 to 2016. To interpret the variables, this study used the volume of loans to SMEs (utilization), bank penetration, number of ATMs and branches (access), and online banking. In addition, this study uses operating profit, total income, and ROE as indicators of bank performance and dependent variable. The results of the study showed that bank penetration tools, branches, and ATMs can increase bank performance. Despite the decrease in lending to SMEs, this factor can positively improve the performance of banks in Palestine. Overall, financial inclusion helps banks improve their performance and increase their income.

Hong Wo (2020) examined the relationship between financial inclusion and financial market stability using a dataset of 3071 banks in the Asian region during the period 2008 to 2017. This paper uses the generalized moments (GMM) approach. The findings of this paper show that a high level of financial inclusion (access to banking facilities) contributes significantly and positively to the stability of the banking sector and leads to greater resilience of banks. Hence, financial inclusion can help banks increase their income, reduce costs and increase their market share.

Isaka Jaja et al. (2020) in an article titled "Financial Inclusion and Bank Profitability in South Africa" examines the impact of financial inclusion on bank profitability in South Africa. In this article, data from 1990 to 2017 and the GMM method are used to calculate the parameters. The results show that there is a positive relationship between the Financial Inclusion Index (FINDEX) and bank profitability in the studied countries. In other words, financial inclusion has been an important driver of bank profitability in South Africa.

Domestic Sources

Shahreza et al(2024) evaluate the impact of intellectual capital, components of financial capital, banking industry indicators and macroeconomic indicators as internal and external factors on the return on assets and return on equity of commercial banks listed on the Tehran Stock Exchange. For the period 2015 to 2020, multivariate regression analysis method has been used. The results show that intellectual capital and interest rates have a positive effect and assets quality, cost management and stock market development have a negative effect on return on assets of banks, and intellectual capital, ownership concentration and interest rates have a positive effect and asset quality, cost management, capital adequacy, stock market development and GDP growth rate, have a negative effect on return on equity of banks.

Erfani and Heydari(2023) to examine the effective indicators on liquidity management, a composite index that represents the level of bank liquidity management was calculated and introduced. Then, using the annual data of 16 banks in the period (2006-2021), the effect of liquidity management on banks' profitability was investigated using the generalized moments method (GMM), two-stage Arellano-Bond. The results show that liquidity management has the most positive effect on the profitability of banks, so that in private and semi-state banks, the intensity of this effect is greater than in state banks.

Khademi et al. (2019) in an article titled "Investigating the effects of specific banking and

macroeconomic variables on bank profitability (comparison of neoclassical and post-Keynesian schools)" using the panel data autoregressive regression model, identified the effects of specific and macroeconomic variables on the profitability of Iranian banks in the framework of the assumptions of the neoclassical and post-Keynesian model. The statistical sample consists of 10 banks and financial institutions (public and private) in the period from 2001 to 2018. The results show that economic growth has a positive and significant effect on the profitability of the banking system. There is also a significant relationship between bank arrears and granted facilities. The Granger causality test confirms the existence of a positive one-way relationship between the granted facilities of the studied banks and the amount of savings. The effects of specific banking and macroeconomic variables on bank profitability were confirmed from the perspective of the post-Keynesian school.

Pourmehr et al. (2018) used quarterly data from 2006 to 2016 to examine the impact of macroeconomic variables and management quality on the profitability of private banks and bank performance (including return on assets, return on equity, and net interest margin). For this purpose, the influencing components were divided into external and internal components; so that indicators related to management quality, asset quality, capital adequacy, and liquidity were included as internal components, and indicators of inflation rate, deposit interest rate, real GDP growth, and capital market development were included as external components affecting bank profitability. The results of the research model estimation indicate that the liquidity coverage ratio and the ratio of non-current receivables to total facilities as intra-bank variables have a negative effect, and real GDP growth as an external variable has a positive effect on profitability components.

Mehrabanpour(2017) empirically analyses the factors determining the profitability of 15 banks for the period of 1384 – 1393. The results of examining hypothesis using panel analyses and Eviews software and the return on equity (ROE) as the profitability measure, indicate that there is a positive relationship between the profitability factors and the asset structure, revenue diversification, economic growth and inflation. In addition, capitalization, capital structure, size, industry concentration and interest rate have a negative effect on bank profitability.

Based on the studies presented in the literature, none of the studies have examined the impact of financial inclusion and its components on the profitability of banks in Iran. In addition, In studies conducted abroad, the dependence between sections, banks, and countries has not been considered before estimating the model. In comparison to the aforementioned studies, in the present study, while testing the existence of dependence between sections, the research model is estimated using the quantile panel method, which is robust compared to common estimation methods such as ordinary least squares, especially when there are outliers or when the dependent variable does not have a normal distribution. These two cases, can be considered as research innovations.

4. Methodology

In this study, the dependent variable of the model is the profitability of the selected banks. Therefore, return on assets (ROA) has been used to measure the profitability of banks (PROF) (Atanasoglu et al., 2008; Mirzaei et al., 2013; Shihadeh and Liu, 2019). The rate of return on assets is calculated by dividing pre-tax profit by total assets. The financial inclusion variable is also included as an independent variable in the model, and to measure it, the number of bank accounts of individuals with commercial banks per 1,000 people over 18 years of age (FINAC) is used as an indicator for the use of financial services, the number of ATMs per 1,000 people over 18 years of age (FINATM) and commercial bank branches per 1,000 people over 18 years of age (FINBRANCH) are used for access to financial services. In addition, a number of bank-specific characteristics and macroeconomic variables are also considered as control variables in the model.

- Cost-to-income ratio (COST): The cost-to-income ratio is often used as a measure to measure the operational efficiency of a bank. A number of studies have used the cost-to-income ratio as a determinant of bank profitability. Most of these studies show that the cost-income ratio has a negative impact on bank profitability (Atanasoglu et al., 2008 and Dietricht and Wanzenried, 2011).
- Capital adequacy ratio (ADEQ): The capital adequacy ratio is often used as a measure of credit risk management. Although research has shown that the

capital adequacy ratio affects bank profitability, the direction of this relationship is unclear. Atanasoglu et al. (2008) reported a positive impact of capital adequacy on bank profitability (ROA), but Dietricht and Wanzenried (2011) found that capital adequacy has a negative impact on bank profitability (ROE).

- Non-performing loan ratio (NPLR): The non-performing loan ratio is also often used as a measure of credit risk management, with the assumption that banks with high non-performing loans have poorer credit risk management and therefore lower profitability than their peers. Atanasoglu et al. (2008), Dietricht and Wanzenried (2014) and Tan et al. (2017) all found that the non-performing loan ratio reduces bank profitability.
- Bank size (SIZE): Bank size is measured using the natural logarithm of the bank's total assets. There are mixed findings on the effect of bank size on bank profitability. Smirlock (1985) suggested that bank size has a positive effect on their profitability, Tan and Floros (2012a) found this effect to be negative, and Shahzad et al. (2013) stated that bank size has no effect on their profitability.
- Loan-to-deposit ratio (LDR): The loan-to-deposit ratio is often used to measure liquidity. Here too, there are mixed views on the impact of this ratio on banking sector profitability. Tan and Floros (2012) argued that banks with higher liquidity have lower profitability, while Heffernan and Fu (2010) concluded that banks with higher liquidity have higher profitability.
- Inflation Rate (INF): Most studies show that banks perform better during inflationary periods. For example, Atanasoglu et al. (2008) and Tan (2016) found a positive relationship between inflation rate and bank profitability. However, Mirzaei et al. (2013) show that banks perform worse during inflationary periods.
- Gross Domestic Product (GDP) Growth: The literature shows that business growth and demand for loans increase during boom periods. Hence, both Atanasoglu et al. (2008) and Mirzaei et al. (2013) found that GDP growth increases the profitability of the banking sector.
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Reserch Findings

Based on the studies presented in the literature and the study by Shihadeh (2021), the research model can be presented as follows.

$$Prof_{it} = \beta_0 + \beta_1 FINAC_{it} + \beta_2 FINATM_{it} + \beta_3 FINBRANCH_{it} + \beta_4 COST_{it} + \beta_5 CAR_{it} + \beta_6 NPLR_{it} + \beta_7 SIZE_{it} + \beta_8 LDR_{it} + \beta_9 INF_{it} + \beta_{10} GDPG_{it} + u_{it}$$

To estimate the model, data of selected listed banks in the Tehran Stock Exchange between 2010 and 2023 were used using the Rahavard Novin software, the financial statements of the banks and their published information on the codal website. The banks studied are Bank Mellat, Saderat, Tejarat, Parsian, Post Bank, Sina, Sarmayeh, Shahr, Iran Zamin, Pasargad, Ansar, Karafarin, Eghtesad Novin, Saman, Ayandeh and Gardeshghari.

Descriptive findings

Descriptive statistics of the variables included in the model were obtained using the Eviews software and are presented as follows:

Based on the results of the Jarque-Berra test statistic, it can be concluded that the variables have a normal distribution. Because at a significance level of 5%, the null hypothesis of the test that the distribution of the variables is normal cannot be rejected.

Table1: Descriptive statistics

Variable	Mean	Median	Mode	Max	Min	J-B Statistics
Return on assets ROA	16.8	17.9	17.2	22.4	13.2	3.1 (0.15)*
Number of bank accounts with commercial banks (per 1000 adults)	536	545	538	610	505	2.8 (0.18)*
Number of ATMs (per 100,000 adults)	47	49	46	85	32	3.4 (0.13)*
Number of bank branches (per 100,000 adults)	53	55	59	68	44	3.15 (0.15)*
Non-performing loan ratio	12.5	12.6	13.8	15.8	11.2	2.5

Variable	Mean	Median	Mode	Max	Min	J-B Statistics
						(0.21) *
Cost-to-income ratio	2.6	2.7	2.84	3.8	1.8	3.25 (0.14) *
Capital adequacy ratio	18.6	16.9	17.4	27.3	9.2	3.6 (0.12) *
Bank size	3.63	3.89	3.75	5.2	1.7	2.18 (0.24) *
Loan-to-deposit ratio	2.85	49.4	49.4	49.4	49.4	2.28 (0.23) *
Gross domestic product (1000000$)	401.6	405.8	411.5	644.3	289.6	3.3 (0.14) *
Inflation rate	32.6	30.8	33.5	48.6	21.3	3.4 (0.13) *

Source: Research calculations
*:Indicator of normal distribution of the variable at a significance level of 5%.

4.2. Inferential findings

In panel data econometrics, it is generally assumed that the data used are cross-sectionally independent. This assumption, like other assumptions, may not hold, so the first step in panel data econometrics before performing any test is to detect cross-sectional dependence or independence. This is because the dependence between sections can be due to factors such as external effects, regional and economic connections, interdependence of uncalculated residuals, and unusual unobserved factors between different sections. Several tests have been proposed for this purpose in econometrics, including Friedman (1937), Breusch and Pagan (1980), and the CD test of Pesaran (2004). Pesaran (2004) presented a test to detect cross-sectional dependence or independence for balanced and unbalanced panels. This test can be applied to balanced and unbalanced panel data and has desirable properties in small samples. The null and alternative hypotheses of this test are defined as follows:

$$H^1: b^{ij} = b^{ij} = E(\pi^{it}\lambda^{it}) \neq 0 \quad \text{For some } i \neq j$$
$$H^0: b^{ij} = b^{ij} = E(\pi^{it}\lambda^{it}) = 0 \quad \text{For all } i \neq j$$

For balanced panels, the CD test statistic can be calculated as follows:

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}\right)$$

where $\hat{\rho}_{ij}$ Pearson's pairwise correlation coefficients are the residuals. If the calculated CD statistic is greater than the critical value of the standard normal distribution at a certain significance level, then the null hypothesis is rejected and cross-sectional dependence is concluded(Table 2).

According to the results and at a significance level of 5 percent, the null hypothesis of the absence of cross-sectional dependence between the studied banks is not rejected. In the second step, to avoid spurious regression estimation, the Augmented Fisher Dickey-Fuller unit root test is performed. Based on the results of this test, all variables in the model are stationary at the level of variables(Table3). In other words, the variables in the model do not have a unit root. Therefore, the proposed model can be estimated and its results analyzed without worrying about the spuriousness of the estimated regression

Table 2: Results of the cross-sectional dependence test

Model	Value of the calculated CD statistic	Result
Absence of cross-sectional dependence	1.15	Model 1

Source: Research calculations

Table3: unit root test result

Variable	Level	Prob	result
Return on assets ROA	62.8	0.00*	I(0)
Number of bank accounts with commercial banks (per 1000 adults) FINAC	55.6	0.00*	I(0)

Variable	Level	Prob	result
Number of ATMs (per 100,000 adults) FINATM	42.8	0.04*	I(0)
Number of bank branches (per 100,000 adults) FINBRANCH	44.2	0.03*	I(0)
Non-performing loan ratio NPLR	52.6	0.00*	I(0)
Cost-to-income ratio COST	55.7	0.00*	I(0)
Capital adequacy ratio CAR	48.3	0.02*	I(0)
Bank size SIZE	60.5	0.00*	I(0)
Loan-to-deposit ratio LDR	49.4	0.01*	I(0)
Gross domestic product GDP	41.2	0.05*	I(0)
Inflation rate INF	48.6	0.02*	I(0)

Source: Research calculations

*: Indicates that the variables are stationary at the level

Table 4: Estimation Results

τ	0.1	0.3	0.5	0.7	0.9
C	0.14 (1.31)	0.124 (1.22)	0.115 (1.43)	0.12 (1.13)	0.125 (1.26)
Number of bank accounts with commercial banks (per 1000 adults) FINAC	0.35 (2.05)*	0.36 (2.12)*	0.33 (2.3)*	0.32 (2.1)*	0.36 (2.2)*
Number of ATMs (per 100,000 adults) FINATM	0.18 (2.25)*	0.19 (2.3)*	0.17 (2.1)*	0.165 (2.3)*	0.176 (2.2)*
Number of bank branches (per 100,000 adults) FINBRANCH	0.20 (2.62)*	0.21 (2.7)*	0.23 (2.27)*	0.20 (2.3)*	0.198 (2.5)*
Non-performing loan ratio NPLR	-0.12 (2.4)*	-0.115 (2.3)*	-0.11 (2.1)*	-0.13 (2.4)*	-0.125 (2.2)*
Cost-to-income ratio COST	-0.15 (2.25)*	-0.15 (2.25)*	-0.15 (2.25)*	-0.15 (2.25)*	-0.15 (2.25)*
Capital adequacy ratio CAR	0.11 (1.43)	0.12 (1.5)	0.11 (1.3)	0.125 (1.1)	0.113 (1.2)
Bank size SIZE	0.14 (2.5)*	0.145 (2.2)*	0.136 (2.3)*	0.128 (2.5)*	0.135 (2.2)*
Loan-to-deposit ratio LDR	0.18 (2.5)*	0.17 (2.3)*	0.168 (2.1)*	0.182 (2.2)*	0.187 (2.1)*
Gross domestic product GDP	0.35 (2.35)*	0.34 (2.3)*	0.33 (2.4)*	0.32 (2.4)*	0.35 (2.2)*
Inflation rate INF	0.132 (2.15)*	0.125 (2.2)*	0.127 (2.1)*	0.136 (2.1)*	0.132 (2.0)*
R^2	0.72	0.73	0.715	0.74	0.738
quantile slope equality test	5.25 (0.00)©	5.13 (0.00)©	5.38 (0.00)©	5.26 (0.00)©	5.42 (0.00)©
symmetric quantiles test	4.32 (0.00)©	4.29 (0.00)©	4.38 (0.00)©	4.63 (0.00)©	4.58 (0.00)©

Source: Research calculations

*: The numbers in parentheses are the t-statistic values and indicate that the coefficients are significant at the 5% significance level

Based on the estimation results(Table 4), At a significance level of 5 percent, the effect of financial inclusion components such as the number of bank accounts, the number of ATMs, and the number of bank branches on the profitability of the studied banks was positive and significant. This means that increasing the level of financial inclusion components can have a positive effect on the profitability of banks. For example, a high number of bank accounts often means more interaction between individuals and the bank. This allows banks to attract more deposits and subsequently provide more loans to their customers. Hence, banks earn income by granting loans and can increase their profits. Also, a high number of bank branches, due to network effects, convinces people to be a customer of a bank with more branches for greater

convenience and because of the availability of a bank branch. Hence, a bank with more branches often has more customers and its financial interactions will also be greater. This can certainly increase the amount of credit creation and loan disbursement by banks and have a positive impact on their profitability. The increase in the number of bank branches and the number of ATMs also increases the penetration rate of financial and banking services and by facilitating people's access to banking services, it can attract many customers to the bank and therefore increase the income and profitability of the bank due to a phenomenon called network effects. Because the greater the number of ATMs and bank branches in an area, the more likely people are to choose that bank due to the ease of using the services of that bank.

According to the estimated results, the cost-income ratio has a negative and significant effect on the profitability of the bank and reduces it.The high cost of a bank compared to its income reduces the funds available to the bank for lending and limits the bank's ability to earn income and increase profitability.

At a significance level of 5 percent, the effect of capital adequacy on the profitability of banks is positive but not statistically significant. Capital adequacy is one of the important indicators for banks and credit institutions that is used to assess their financial condition. Capital adequacy shows how resistant the bank is to possible financial risks. Therefore, a high ratio can indicate the financial health of the bank under study. In other words, a bank with a favorable capital adequacy is financially healthy and is likely to have higher profitability.

The ratio of non-performing loans is another variable that has a negative effect on the profitability of banks. Because a high ratio increases the volume of overdue bank loans, which increases the credit risk of banks. On the other hand, the high level of this ratio reduces the amount of funds available to the bank for granting loans and credit, making investments or carrying out any profitable activity, thereby negatively affecting the profitability of banks.

In confirmation of the studies conducted in the research background, the growth of GDP with the increase in the income level of individuals and the increase in the volume of economic activities has increased the amount of interactions of individuals, including deposits, obtaining loans and credit, etc., and has thus had a positive impact on the profitability of banks.

The effect of inflation on the profitability of banks is also positive and is statistically significant at a significance level of 5 percent. Because high inflation, in addition to increasing the costs of banks, has increased the income from economic activities and investment of banks, especially in fixed assets and financial assets, and thus has increased the profitability of banks.

In the estimated regression, the coefficient of determination varies between 0.715 and 0.74. In addition, based on the quantile slope equality test results, the null hypothesis (the slope coefficients are equal among the quantiles) can be rejected at a significance level of 5 percent. In other words, the slope coefficients between the quantiles are not equal. Also, based on the symmetric quantiles test results, at a significance level of 5 percent, the null hypothesis (coefficients are symmetrical in the quantile regression) is rejected. Because the Prob of this test is smaller than 0.05.

5. Discussion and Conclusion

Due to the role of banks in the country's economy, bank profitability and determining the factors affecting it have always been important. One of the factors that can affect bank profitability is financial inclusion. In other words, expanding bank branches, increasing people's access to banking services, and increasing the number of people with deposit accounts in the banking system increase the ability of banks to grant loans and credit and earn profits from it. Therefore, in this study, the effects of financial inclusion on the profitability of selected banks active in the Tehran Stock Exchange during the period 2010 to 2023 have been studied. The research findings showed that the components of financial inclusion have a positive effect on the profitability of the studied banks.The cost-to-income ratio and the amount of non-performing loans also have a negative and significant effect on bank profitability and reduce it. These results confirm the findings of the study by Pourmehr (2018) and Mehrabanpoor (2017). The effect of capital adequacy on bank profitability is positive but not statistically significant. These results are contrary to the findings of the study by Pourmehr (2018) and Shahreza et al. (2024). In addition, GDP growth and inflation also have a positive and significant effect on the

profitability of the studied banks. These results are consistent with the findings of Mehrabanpoor's study (2017) but are opposite to the findings of Shahreza et al. (2024).

The main reason for the positive impact of financial inclusion and its components on bank profitability is that, a high number of bank accounts often means more interaction between individuals and the bank. This allows banks to attract more deposits and subsequently provide more loans to their customers. Also, a high number of bank branches, convinces people to be a customer of a bank with more branches for greater convenience and because of the availability of a bank branch. The increase in the number of ATMs also increases the penetration rate of financial and banking services and by facilitating people's access to banking services, it can attract many customers to the bank and therefore increase the income and profitability of the bank due to a phenomenon called network effects. All of these can have a positive impact on bank profitability.

the cost-income ratio has a negative effect on the profitability of the bank.The high cost of a bank compared to its income reduces the funds available to the bank for lending and limits the bank's ability to earn income and increase profitability. The ratio of non-performing loans has a negative effect on the profitability of banks. Because a high ratio increases the volume of overdue bank loans, which increases the credit risk of banks. therefore the ratio of non-performing loans negatively affecting the profitability of banks.

The effects of GDP growth and inflation on the banks profitability was positive. Because high economic growth and inflation boost economic activities in the country, which increases the volume of financial transactions between individuals. In addition, individuals face increased income due to economic growth, and their financial and banking interactions also increase. This allows banks to attract more deposits and provide more loans and credits. Therefore, it is likely that banks' profitability will increase due to economic growth and inflation.

However, based on the results of the study and considering the positive impact of financial inclusion on bank profitability, the following suggestions are presented.

- Due to the positive impact of the number of ATMs on the profitability of banks, the number of ATMs should be increased in order to provide individuals with better access to financial services and distributed as evenly as possible
- Given the positive impact of the number of accounts opened by individuals on the profitability of banks, opening individual accounts should be facilitated as much as possible. Currently, individuals can also open accounts online and verify their identity online. This procedure should be implemented and standardized for all banks.
- Due to the negative impact of the cost-to-income ratio on bank profitability, efforts should be made to reduce the said ratio as much as possible. For this purpose, information and communication technology tools such as opening an online account, using mobile banking and internet banking can be used.

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