Research Paper

Application of Panel Regression Model in Examining the Effect of Monetary Policy on Bank Profitability

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ABSTRACT

Profit is one of the most important factors influencing economic decision-making, the changes of which depend on various factors. Banks, as one of the most important business units, have a special reliance on the concept of profitability, and their performance is significantly influenced by macroeconomic conditions. Government economic policies are placed. Accordingly, the purpose of this article is to investigate the impact of monetary policy on the profitability of banks. For this purpose, the application of panel regression model has been used to study the effect of monetary policy on bank profitability during the period 2006-2018. The required data has been extracted and used through the website of the Central Bank and the Statistics Center of Iran. In this research, panel regression models in the form of GMM methods and panel grinder causality have been used to analyze data and critique hypotheses. Research findings show that expansionary monetary policy has a positive effect on the performance of banks. In a way, reducing the ratio of legal reserves improves the performance of banks. Bank lending and price inflation have a negative impact on banks' performance; Overdue claims and GDP also have a positive effect on banks' performance.

1 Introduction

Iran's economy has been suffering from the dominance of fiscal policies and financial repression for many years so this issue has become one of the structural challenges of the country's economy. Banks, as one of the most important parts of macroeconomics, play an important role in the mechanism of transferring the monetary policy to the real sector of the economy [23]. In recent decades, economic growth in developing countries has become very important. Economic growth requires the existence of financing systems to invest in various sectors of the economy. Financing systems can facilitate countries' economic growth by concentrating resources and limited funds for large investments. Banks play an important role in the growth and development of any economy [10]; On the other hand, Bank efficiency is essential in the establishment of healthy financial systems in countries [36]. Considering the prominent role of banks in financing systems and the significant impact of banks 'profitability on their

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activities, the study of factors affecting banks' profitability is of great importance. It is worth noting that the greater profitability of banks not only allows banks to generate funds to provide more credit but also makes it easier for bank policymakers to invest in risky environments [32]. As one of the types of economic policy, monetary policies are the process by which the Central Bank or the State monetary authority controls the supply of money or other monetary variables.

Monetary policies are divided into two types; 1 – Expansion monetary policy means policies that increase the supply of money in the economy, and 2 - Contractile monetary policy as policies that reduces the supply of money in the economy. Monetary policy is able to affect the balance sheet of banks in a variety of ways. The Contractile monetary policy reduces the value of the stock price and consequently reduces the amount of net wealth of firms as well as the amount of capital expenditure and the total output [19]. In the Iranian economy, most monetary policies are applied to the Central Bank through direct means of controlling bank profits and determining the credit ceiling as well as indirect means of legal deposit, bank contribution papers, and bank special deposits. Monetary policies through different channels affect the economy of the country, the most important of these channels are the interest rate channel, and the exchange rate channel the banking system in the Iranian economy remains one of the main pillars of finance for the whole country despite the advancements in financial markets. The main point is that depositors generally rely on bank deposits and tools available in the money market, such as bonds of participation and …. Firms ' production status is also dependent on how the bank pays [31]. One of the roles of the banking system and the belief of some, the most important role is controlling and directing the basic variables of macroeconomic variables through implementing monetary policies. In the Iranian economy, it is not widely used due to rules based on banking-based laws such as the interest rate of the exchange rate of open market operations. However, since the Central Bank has the same traditional functions as interest-based banks, it has to use other monetary tools to fulfill its duties that match its economic structure. The guidance of monetary policy in Iran and most developing countries instead focuses on offering more interest rates on the supply and demand of money and the monetary base. Also, a review of monetary policy and foreign exchange policies in the last decades suggests that the central bank has been used in many cases to guide the monetary policy of the rate of exchange. Since the banking system in the Iranian economy is the most important communication channel between supply and demand for monetary resources, thus, any deficiencies and inefficiency of its performance provide the grounds for disrupting the other sectors and generating various shocks.

Therefore, one of the most important challenges in the banking industry in any economy is the reaction that this industry will have against economic shocks, since in the case of various shocks; the profitability of banks is challenged and thus raises repercussions [6]. This paper also used a combined linear regression model. According to research, the factors affecting the profitability of banks are classified into two main groups: the first group includes criteria specific to the bank and the second group of criteria includes factors related to the structure of the industry and macroeconomic environment. In this paper, we intend to examine the effect of monetary policy, lending, and overdue claims on the profitability of banks. Also, the effect of business cycles, asset structure, income diversification, economic growth and inflation, amount of capital, financial structure, size, banking competition, and interest rates are examined by banks' profitability. Finally, we examine the relationship between asset quality and efficiency, and the profitability factors of banks [18]. The central banks in the countries are the main transitional policy of the monetary system and in some cases, the activities of the public sector, the private banks, and their decisions are made, on the other hand, with the process of privatization of the public sector, the private banks and their shares can be traded in the stock exchange, which resulted in more attention to the profitability and profitability of banks .therefore, this study aimed to investigate the relationship between monetary policy of central bank of banks and banks and the reason of choosing the importance

of the subject is the effect of environmental factors on profitability of the studied banks .it seems that the effect of environmental factors on the success or failure of a company or organization is more severe than management factors and therefore recognition of environmental factors and its risk for investors and other third parties and stakeholders are very important. Various studies have been done on the impact of monetary policies on the Iranian economy, but the difference between previous studies with the present paper is that the role of the intermediate banks in the mechanism of transfer of money in the economic fluctuation is neglected. this study, in terms of interface banks in the model, in addition to investigating the role of intermediate banks in the mechanism of transfer of money on the economic fluctuation of the main question of the study, the effect of monetary policy on bank profitability [27].

2 Literature Review

One of the most important developed countries is the existence of efficient markets and financial institutions that, while playing important role in the economies of these countries, are responsible for economic growth and development. In the course of economic growth, the importance of capital as an important factor of production is increasing day by day and this has caused the adoption of Policies in the direction of capital investment. Maintaining the balance in the macroeconomic arena in the wake of global economic developments and the rapid development of technologies in the present era has turned the changes in the banking system into an undeniable necessity. Changing business climate, changing business services, developing digital services, product development, paying attention to customer needs, and replacing the central customer instead of the central product are among the changes occurring in the banking system in the world. The evolution causes bank adaptation to changes and environmental factors and requirements of the banking industry. Such developments in developing countries such as Iran, where the ban is an important part of the financial system, the recent developments have been considered by monetary authorities as well as banking leaderships [1].

Abstract banks as one of the most important factors in economic development, the creation of capacity and power of countries, as well as the means of implementing monetary policies in the economic system are considered. The importance of the banking system is also considered in the creation of money, increased liquidity in the economy, investment in sectors and industries, the changes in prices of prices, employment as well as the value of money; therefore, the banking system will be able to transfer monetary policies with the greatest effectiveness to the economy, or the banks are important [37]. Economic crises in the world have well highlighted the role of financial systems and the importance of financial institutions in economic growth. Financial systems can make an economy more productive by concentrating limited resources and funds on large investments. Given the importance of the banking system, identifying the factors affecting the profitability of banks is of great importance. More profitability of banks not only allows banks to raise funds to provide more credit to the economy but also guarantees investment in risky environments for bank policymakers.

In addition, it has acceptable returns for shareholders [38]. The task of attracting and equipping the resources required for investment activities and projects is the responsibility of the financial system, so without a doubt, the financial system has an important role in increasing investment and, consequently, economic growth and development. Since in developing countries, the banking system practically plays the role of a financial system, therefore, the banking industry is one of the most important sectors of the economy of these countries. In developing countries such as Iran, in terms of capital market deficiencies, banks have a key role in equipping deposits for investment purposes, and in the economies of these

countries, banks can be considered the most important bridge between the supply and demand of monetary resources [29]. The direct and indirect roles and importance of banks in economic growth and development are very important. In fact, banks, as economic enterprises, seek to make a profit, which in turn can play an important role in the growth and development of the country. Banks' profitability is affected by internal and environmental variables. Internal factors are under the control of the bank's management and reflect the differences in the bank's management policies, resource allocation, asset portfolio management, and capital adequacy [9]. In developing countries such as Iran, financing systems are bank-based. This means that most of the funds needed to invest in various economic sectors are provided by the banking system. In a bank-centric system, banks and credit systems are one-size-fits-all and have taken over financial systems. Therefore, most of the financial markets are in the hands of the money market rather than the capital market [20]. The inter-banking market is one of the pillars of the money market in which banks and credit institutions to short-term financing and balance their liquidity status a bargain. The market has at least two important functions in financial markets; the first and foremost function of its function is to play an active and effective role in monetary policy implementation. Profit is the way it operates. The other function of the inter-banking market is to transfer cash to the desired form of financial institutions with surplus to firms with deficit [5].

By changing the real exchange rate, the competitiveness of the country's economy is reduced .in such a situation, the margin of the domestic producer's interest in the export market is reduced and the motivation for non-oil exports is low .in the case of the oil shock, oil prices by restricting oil exports as well as monetary policy are inefficient due to the domination of fiscal policy .that is, in this state budget, the state budget suffers a deficit. the government usually has two options to make up for its deficit; 1 - see domestic or international financial markets for borrowing, 2 - financing through the central bank of monetary policy (in a situation where the country's trade balance is negatively affected due to its negative oil revenue), a solution would be to change the nominal exchange rate to the proportion of supply and demand and to balance the trade balance again .in an oil economy which is an important part of the country's foreign currency revenues and its revenue, the positive and negative impacts of oil through the effect on the balance sheet of the central bank will affect the base volume of money severely and this is an important factor affecting the inflation rate [37]. The concept of profitability refers to the ability of a company to make a profit. Profitability is the end result of all the company's financial plans and decisions. Profitability variables, return on assets, and return on equity are often used to measure profitability [2].

Today, companies are trying to maximize the value of the company to attract investors, and increasing revenue and profit growth are one of the strategies that can be useful in this regard. Of all these variables, the best way to measure profitability or evaluate a company's performance is to calculate the rate of return on assets and the rate of return on equity. The rate of return on equity determines the relationship between the volume of equity of the company and profit. If a company increases its investments (from equity) but fails to increase its after-tax profit accordingly, the shareholder returns rate decreases. Therefore, increasing the investment volume of the company does not automatically improve its financial situation of the company [8].

Return on equity = profit margin $\times$ asset turnover$\times$ownership ratio

Return on equity is obtained through the ratio of net profit to the sum of equity. The goal of company management is to maximize the wealth of the company's shareholders. Therefore, the return on equity can be the best measure of the success or failure of the company's management in achieving this goal [26]. According to Antonio Trujillo-Ponce, the factors affecting a bank's profitability are classified into two main groups: The first group is the profitability criteria for each bank (internal factors) and is a

direct result of the management decisions of these banks. These criteria include asset structure, asset quality, capital, capital structure, efficiency, and size and income variability. The second group includes external factors, the profitability factors related to industry structure and macroeconomic environment, which include industry concentration, economic growth, inflation, and interest rates. A literature review indicates the examined internal and external factors affecting the profitability of banks, as well as studies on other factors affecting the profitability of banks. Klein & Weill [25] study Bank profitability and economic growth; Their findings show a positive impact of bank profitability on economic growth in both the short run and the long run. These findings are robust to controlling for the dynamics of banks' profits. Davis et al. [14] Have examined the effects of macroprudential policy on banks' profitability; Findings show that a number of policy measures have a negative impact on profitability, but these effects vary according to countries' economic development, bank type, and time period. Junttila & Nguyen [24] study the Impacts of sovereign risk premium on bank profitability: Evidence from the euro area; Findings show that the euro area banks have not suffered too much from the extremely low and negative interest rate era regarding their net interest margins. However, the overall profitability has lowered clearly during the sample period, and the sovereign risk premium has a robust negative effect on all the overall profitability measures, both with risk adjustment and without it, but it seems to have an increasing effect on the degree of wholesale funding and loan loss provisions.

Caby et al. [11] study the Impacts of climate change management on banks profitability using panel data of a sample of 137 banks from 36 emerging and developed countries during the period 2011–2019, using the Generalized Method of Moments. Damette & Kouki [13] study Political influence and banking performance: Evidence from African countries. Nikhil et al. [28] identified the impact of monetary policy tools on the performance of banks in India, and this could be an excellent suggestion to the regulators in framing favorable interest rates which would meet the macroeconomic objectives of the Indian economy. Shihadeh [33] used a sample of 271 banks in MENAP countries to examine the influence of financial inclusion on bank risk and bank performance, and based on the data analysis, financial inclusion had a negative relationship with banks' risks but a positive relationship with bank performance. In Asian countries, Van et al. [39] documented that a higher financial inclusion level had a positive effect on the stability of the bank sector as well as higher banks' revenues. At the same time, it had a negative effect on the banks' costs, but a positive effect on market share Johari et al. [23] Iran's economy has been suffering from the dominance of fiscal policies and financial repression for many years so this issue has become one of the structural challenges of the country's economy. Banks, as one of the most important parts of macroeconomics, play an important role in the mechanism of transferring the monetary policy to the real sector of the economy.

Monetary policy transmission operates through various channels: the lending channel, the balance sheet channel, and the capital channel. Examining how the role of banks in monetary policy transmission is affected by government fiscal repression policies provides useful information for monetary and financial policymakers and banking activists. In this study, we tried to investigate the effect of financial repression on monetary policy transmission through the lending channel of the country's banks. First, an indicator for the financial repression variable was defined using the PCA method, and then the relationship was estimated using the SVAR method and instantaneous response functions and using seasonal data for the period 1999- 2017. The results show that financial repression policies have a significant effect on bank lending and reduce banks' lending power. This issue, along with the negative real interest rate of bank facilities, causes a decrease in the profitability index and loss of banks. In Shihadeh and Liu [34], with a study sample of 189 countries (national level) and 701 banks, the authors evidenced the positive impact of financial inclusion on the bank's activities, which in turn led to higher returns.

They indicated that the number of branches had a positive relationship with ROA, ROE, and NI. More-over, Shihadeh et al. [33] examined the effect of financial inclusion on gross income and ROA of 13 commercial Jordanian banks using data from 2009 to 2014. Six financial inclusion variables were employed, namely SMEs' deposits and credits, ATMs, ATM services, new services, and credit cards (predictors of the variable). Based on the obtained results, the profitability of the banks was affected in a positive direction by the number of ATMs, number of ATMs' services, and SMEs' credits, but it was not affected by credit cards and new services as well as SMEs' deposits. Vijay Kumar [40]. In this study, the generalized method of the moments estimator is used to understand the relationship between monetary policy and the profitability of the banks in New Zealand. The finding of the study explains that an increase in short-term rates leads to an increase in the banks' profit. In addition, also an increase in long-term interest rates reduces the profitability of banks. The study used monetary policy variables, capital adequacy ratio, non-performing loan ratio, and cost-to-income ratio as the determinants of the profitability of banks in New Zealand.

The result says that only the capital adequacy ratio has a positive impact on the profitability of banks, whereas the non-performing loan ratio and cost-to-income ratio have a negative impact on the profitability of banks. Angeloni et al. [5] using seasonal data from 1980 - 1980 The existence of a banking risk channel in the transfer of monetary policy has been investigated for the country. In this study, the bank's risk of the two risks was on the site. They used non-original debts as an indicator of the risk of funds and from the private sector's debts as a proxy risk indicator. The results of the applied vector pattern indicated that the bank risk channel is on both sides of the balance sheet, the risk of funds and lending risk. The results show that the risk channel there is a bank in a strong monetary policy transfer mechanism for the USA. In a study, Chen et al. [12] investigated the existence of the Risk-taking channel of monetary policy in 29 countries during the period 2000 - 2012 with the help of panel data. The results showed that the risk of banks increases in the wake of the implementation of monetary policy and there is a risk-taking channel. Jiménez et al. [22] found in a study that after bank expansion, banks in Spain increase credit to borrowers with less credit value. And this risk-taking effect is different with the size and liquidity of banks. Jermann et al. [21], the financial sector plays a pivotal role in the image of the dynamic features of business cycles as well as the behavior of financial flows. In this model, the economy consists of two factors; households and firms.

Athanasoglou et al. [6] in a study entitled "Determinants of Bank Profitability" from 1985 to 2001, showed that the variables of capital, productivity growth, and cost management have a positive relationship with profitability. Loans, before interest rates fall, have a positive relationship with profitability and the variables of bank size and ownership do not have much effect on bank profitability. Kasmidos [26] in a study entitles "A determinant of the profitability of banks in Greece during the period of EU financial integration", examined the factors affecting the profits of 23 banks in Greece during the period 1990 to 2002, showing that capital quality factor has a positive and significant effect on bank profitability and in case of entering bank-specific variables, size factor has a similar effect and doubtful receivables, liquidity and cost-to-income ratio have a negative and significant effect on banks' profitability. Among macroeconomic variables, annual changes in GDP have a positive and significant effect and inflation have a negative and significant effect on bank profitability and all three variables of the financial market structure have a negative and significant effect on bank profitability. Goddard et al. [17] in an article using the dynamic composite data method examined the factors affecting the profitability of banks in Europe during the period 1992-1998. The results show that the profitability of banks in each period has a very high correlation with the previous period. Also, the ratio of capital to assets has a positive and significant relationship with the profitability of banks. While the effect of other variables is statistically significant. Renani et al. [32] examine how monetary policy affects economic sectors.

the results of this study indicate that using the Iranian economy data in the period, when the ratio of legal deposits is used both in the long run and in the long run, the exchange rate channel is the most effective channel in the transfer of the monetary policy to nominal GDP, but in the short run the role of housing price index in transferring the changes in monetary volume is more effective.

3 Research Questions and Hypotheses

1- Does monetary policy affect the profitability of banks? And this hypothesis must be tested: "Monetary policy affects the profitability of banks."

The main purpose of this study is to determine the impact of monetary policy, lending, and overdue claims on the profitability of banks. Economic analysts and economic and financial decision-makers and planners can benefit from the results of this research. Banks, as the main axis of financing the country's economy, should be able to survive with good performance and acceptable profitability, and the results of this research will contribute to this objective: providing a solution for the maintenance and survival of banks and their growth. Most experimental studies have only examined the factors affecting profitability. While this paper has investigated the effect of monetary policy, lending rates, and delinquent studies as well as business cycles on banks' profitability in the form of a generalized torque model of a dynamic data panel.

3.1 Research methodology

The required data has been extracted and used through the website of the Central Bank and the Statistics Center of Iran. The statistical sample was the provinces of the country in the period 2006 to 2018. In this paper, panel regression models in the form of GMM methods and panel grager causality have been used to analyze data and critique hypotheses. The main model can be specified as follows (according to formula number 1):

$$Y_{it} = f(R_{it}, C_{it}, D_{it}, INF_{it}) \tag{1}$$

Where Y_{it} indicates the profitability of Bank i in period t. R_{it} also indicates the ratio of legal reserves in period t. C_{it} indicates the lending rate of banks in the 1st province in period t. D_{it} indicates the number of overdue claims of banks in the i province in period t. INF_{it} indicates the rate of inflation in period t. In order to estimate the model, first consider its linear form (according to formula number 2):

$$Y_{it} = \beta_0 + \beta_1 R_{it} + \beta_2 C_{it} + \beta_3 D_{it} + \beta_4 INF_{it} + \varepsilon_{it} \tag{2}$$

In order to use the dynamic GMM approach, the above model is changed as follows by entering the value of the dependent variable (Y_{it-1}) in the model as follows (according to formula number 3):

$$Y_{it} = \alpha Y_{it-1} + \beta_1 R_{it} + \beta_2 C_{it} + \beta_3 D_{it} + \beta_4 INF_{it} + \varepsilon_{it} \tag{3}$$

In the theoretical and experimental literature, the GMM dynamic panel method is used to solve problems related to autocorrelation and heterogeneity. As an alternative method, we can use the stochastic effects model proposed by [12]. But endogenous problems for some explanatory variables still remain unresolved. This problem is the main reason for using the GMM system. The static panel method has problems in the field of serial correlation, variance heterogeneity, and outlook for some explanatory variables. The GMM system estimator makes it possible to solve problems related to serial correlation, variance heterogeneity, and outlook for some variables. These problems were solved by presenting the first-order difference estimator (GMM-DIF) and the GMM system estimator (GMM-SYS). The GMM-

SYS estimator is actually an alternative to the GMM first-order difference estimator. To estimate the dynamic model, the methodology used by [17] is used to apply a small sample correction to standard Blundell and Bond errors. In equations in which estimating the specific unobservable effects of each section (company or country) and the existence of a dependent variable interval between the explanatory variables is a major problem, we use the GMM generalized torque estimator based on dynamic panel models. To estimate the model by this method, it is necessary to first determine the instrumental variables used in the model.

The consistency of the GMM estimator depends on the validity of the serial non-correlation assumption of error statements and tools. This validity can be verified by two tests specified by Arlano and Bond. The first is the Sargan test (using the J-Stat statistic), a predetermined limit that tests the validity of instruments. The second is the M2 statistic, which tests for the existence of a second-order serial correlation in first-order differential error sentences. Failure to reject the null hypothesis in both tests provides evidence of the accuracy of the serial non-correlation hypothesis and the validity of the instruments. In other words, the GMM estimator is consistent if there is no second-order serial correlation in the error statements of the first-order differential equation. The Sargan test is a predetermined limit and is used to determine the type of correlation between tools and errors. For tools to be valid there must be no correlation between tools and error statements. The null hypothesis for this test is that the instruments are valid to the extent that they are not correlated with the errors in the first-order differential equation. Failure to reject the null hypothesis can provide evidence that the tools are appropriate. In other words, the GMM system model is compatible if there is no second-order serial correlation in the residual values (residues). If the GMM estimate is consistent and its tools are valid, the dynamic panel data model will also be valid.

4 Model Introduction and Analysis

In this section, using econometric analysis, we analyze the quantitative relationships between model variables. The econometric methodology requires the presence of a mathematical model that can express the relationship between variables in mathematical language, and secondly, appropriate statistical methods by which we can estimate the factors in that mathematical model. The outline of the method of doing the work will be shown in Fig. 1. According to the theoretical foundations, analysis of empirical studies, and research objectives, the following linear model has been selected to investigate the effect of monetary policy on the performance and profitability of banks. It should be noted that this model, after reviewing the existing models, has been the best possible model that can explain the relationship between variables in the form of theoretical frameworks with respect to econometric methods.

To specify the model, the profitability of banks in province i at time t is shown with Y_{it} and is considered as a function of factors and components affecting it, including monetary policy (according to formula number 4):

$$Y_{it} = f(C_{it}, R_{it}, D_{it}, P_{it}, GDP_{it}) \tag{4}$$

To specify the model in a predictable way, the relation can be written linearly as follows (according to formula number 5):

$$Y_{it} = \alpha + \beta_1 C_{it} + \beta_2 R_{it} + \beta_3 P_{it} + \beta_4 GDP_{it} + \beta_5 D_{it} + \varepsilon_{it} \tag{5}$$
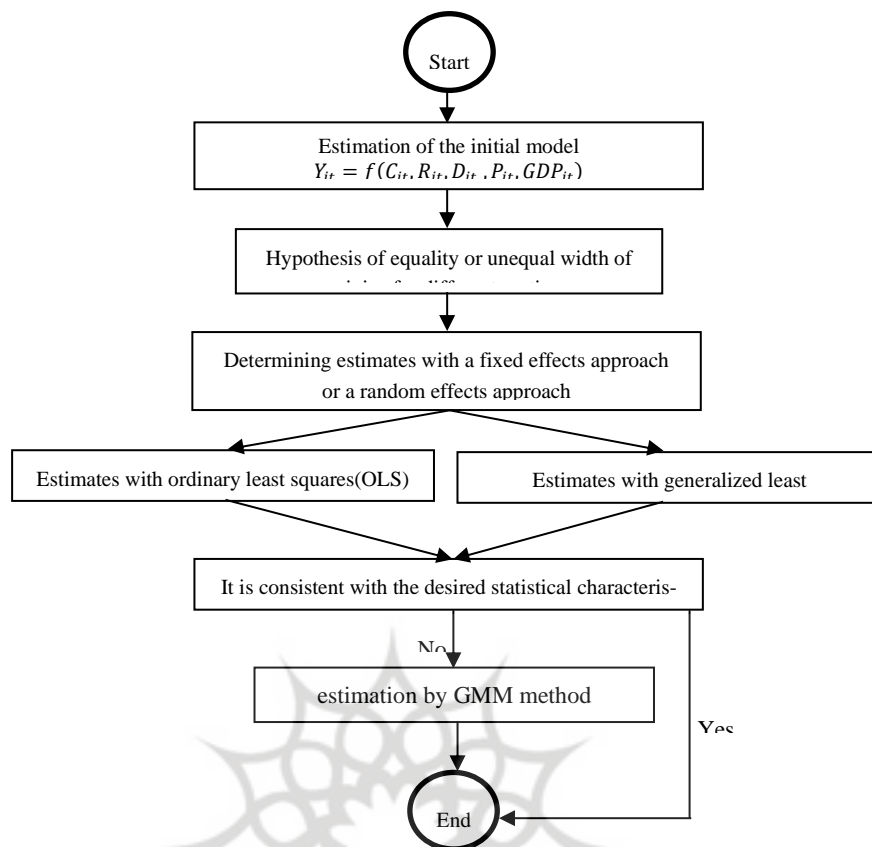
Fig. 1: The Research framework.

4.1 Model estimation

To estimate the model, first, the necessary statistical tests are performed to select the optimal model, then the desired model is estimated and finally statistical and economic analyzes are performed on it.

F-test: To determine the presence or absence of width from a separate origin for each section and province, the F-statistic is used as follows. Hypothesis zero states that the width of the origin is the same for different sections, and the OLS method and the pooling data can be used to estimate the model.

$H_0: \alpha0 = \alpha1 = \ldots = \alpha n = \alpha$
$H_1: \alpha i \neq \alpha j \ ; \ \forall i, j$

Table 1: F test results for the test of width equality of origins

F	$Prob$
22.35	0.00000

Comparison of computational F with table F (critical value) indicates that the probability of accepting the null hypothesis is 0.0000, which means that at the 99% confidence level, the null hypothesis is rejected and the width of the origin is not the same for different sections, thus random or fixed effects pattern should be used.

4.2 Hausman Test

After rejecting the hypothesis for the equality of origins for different sections, it must first be determined whether the model estimation is appropriate with the fixed effects approach or the random effects approach should be used. The Hausman test is used to determine this problem. In this test, the hypotheses are formulated as follows:

H_0: *Random Effect Approach is preffered.*

H_1: *Fixed Effect Approach is preffered.*

In EViews software, to perform the Hausman test, we must first estimate the model as a random effect. When we perform the Hausman test in EViews, another output is obtained, in the first line of which the statistic χ^2 (both) of the Hausman test appears that if the prob is less than one-tenth, the fixed effect model at level 90 Percentage is accepted upwards, but if it is greater than one-tenth, then the random effect model is accepted.

Table 2: Hausman test output

$Chi-Sq.\,Statistic$	$Chi-Sq.d.f$	$Prob.$
71.34	4	0.00000

From the Hausman test in this model, prob = 0.128 is obtained (Table 5); therefore, we conclude that the H_1 hypothesis is rejected and at the 90% and above confidence level we should use the random effects method to estimate the model. The software output results from the model estimation with the data panel method are obtained in the appendix of the article in full for each of the variables, which is a summary of the results of the model using the data panel method is given below:

Table 3: First output results of model estimation by data panel method - ordinary least squares (dependent variable of banks' performance, YIT)

Vaiable	Coefficients	T Statistics	Probability
C	0.0575	2.8946	0.0040
R_{IT}	- 0.2917	-2.1918	0.0290
C_{IT}	-2.44×10^{-9}	-14.1518	0.0000
D_{IT}	-0.0139	-0.1219	0.8973
P_{IT}	-0.00012	-2.4011	0.0169
Statistic F 22.36	Determination coefficient R^2 0.62	D-W 1.71	

Table 4: Results of the second output of model estimation by data panel method - generalized least squares (dependent variable of banks' performance, YIT)

Vaiable	Coefficients	T Statistics	Probability
C	0.0778	4.0388	0.0001
R_{IT}	- 0.5076	-3.9842	0.0001
C_{IT}	-1.96×10^{-9}	-12.0364	0.0000
D_{IT}	0.8320	21.9641	0.0000
P_{IT}	-0.00017	-3.6140	0.0003
Statistic F 150.12	Determination coefficient R^2 0.61	D-W 1.54	

As the results indicate, consistencies with the theory and the desired statistical properties for the coefficients have not been achieved. So, we go to the generalized torque method and re-estimate the results:

Table 5: Results of the third output of the model estimation by GMM method - generalized torques (dependent variable of banks' performance, YIT)

Variable	Coefficient	t Statistic	Probability
$Y_{IT}(-1)$	0.2474	4161	0.0000
R_{IT}	- 2.2083	-313	0.0000
C_{IT}	-2.07×10^{-9}	-3813	0.0000
D_{IT}	0.0952	394	0.0000
P_{IT}	-0.00016	-182	0.0000
$LGDP_{IT}$	0.0058	204	0.0000
AR(2) Wald (J)	Probability **0/3257** **0/2202**		
Source: Research Findings *. Significance at the level of 1% **. Significance at the 5% level ***. Significance at the 10% level			

Using the results of model estimation with the GMM system approach, we can say:

- Expansionary monetary policy (R_{IT}) has a positive effect on the performance of banks. Reducing the ratio of legal reserves improves the performance of banks;

- Bank lending (C_{IT}) has a negative impact on banks' performance;

- Price inflation (P_{IT}) has a negative impact on the performance of banks;

- Overdue claims (D_{IT}) and GDP ($LGDP_{IT}$) have a positive effect on banks' performance.
Then, the parent test was used to evaluate the simultaneous significance of the regulators. The null hypothesis of this test that all coefficients are zero is rejected by examining the p-value of this test at the level of significance of one percent and as a result the validity of the estimated coefficients and in fact the significance of the whole model is confirmed.
The Sargan test was also used to check the validity of the tools, which is the same as the J-Statistic test, and for the tools to be valid, there must be no correlation between the tools and the error statements. By examining the p-value of this test, the results indicate the validity of the estimation assumptions (independence of regulators, including perturbations), ie the instrumental variables used in this model are appropriate, and thus the validity of the results for interpretation is confirmed.

5 Model coefficients interpretation
Based on the results, the general diagram of the effect of independent variables on bank performance can be shown in Fig. 2. We now examine the estimation results using both statistical and economic criteria. Statistical criteria: Statistical criteria provide an econometric model. In particular, we seek to test whether there is statistical evidence for the use of independent variables. These tests examine the significance of coefficients and are usually performed in applied work. We also statistically test the importance of all independent variables, which is a common test in which we test the overall importance of regression (significance of total regression). In addition to the significance tests, it is useful to know how close the estimation line is to the scattered observations used for the estimation. This is an indicator of the good fit of the estimation line and is usually called the coefficient of determination or R^2. As can be seen, based on the value of the t-statistic, for all the effects of the research variables, it was statistically significant in the sense that the research hypotheses were not rejected. The coefficient of determination as well as the value of the F statistic indicates a relatively strong positive relationship between

the independent variables and the dependent variable. Also, the value of the Watson Durbin statistic indicates the lack of autocorrelation in the model.
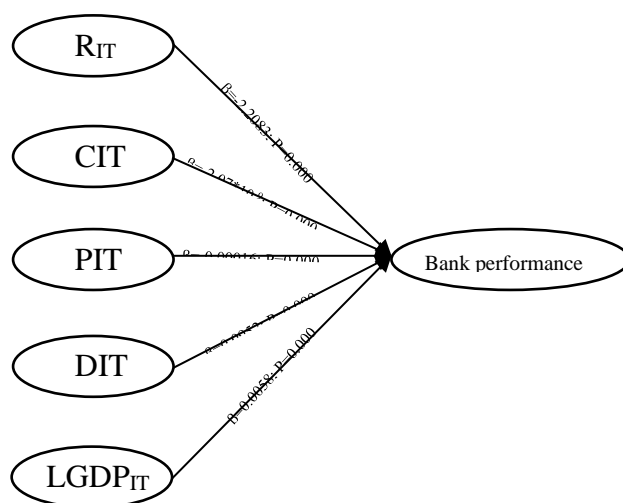

Fig. 2: Final results of the effect of independent variables

Economic criterion: This criterion is simple but strong for evaluation; it pays attention to the sign and size of factors (coefficients). It should be noted that the sign and the size of the coefficients are consistent with economic theory.

Investigate the research hypotheses can be stated as follows:

- As described, expansionary monetary policy has a positive effect on the performance of banks. Reducing the ratio of legal reserves improves the performance of banks;
- Bank lending has a negative impact on banks' performance;
- Price inflation has a negative impact on the performance of banks;
- Overdue claims and GDP have a negative impact on the performance of banks.

6 Conclusion, policy suggestions, and recommendations

The banking industry the economy, especially in the Iranian economy, plays a key role in terms of the shortcomings of the capital market so it is highly important to develop a monetary strategy tailored to the economic climate in countries like Iran exposed to different shocks. It should not be considered that the fluctuation of macroeconomic variables affects the way the banking system operates, and one of the most important challenges of the banking industry in any economy is the reaction that the industry will have against economic shocks. This is so important that in recent years, the banking industry in many developed economies has not tolerated resistance to economic shocks, and given the role played by banks in the monetary transfer mechanism, they spread the shocks to other parts of the economy, and the macroeconomic economy trapped the country. The results from the estimation of the model can be summarized as follows.

We have used two variables related to monetary policy: short-term interest rate (cash rate) and long-term interest rate (10 - year bond – rates). The previous literature has mixed findings on the relationship between the short-term interest rate and bank profitability. Some researchers argue that an increase in short-term interest rate increases bank profitability because most banks borrow on short - term basis and lend on a long-term basis which helps them to improve lending margins and profitability On the other hand, some researchers suggest that banks perform better in low-interest rate environments. When

the interest rates are low, banks focus on consultancy services and trading activities to generate non-interest income such as fees and commissions. In addition to monetary policy variables, there are some other factors that have a significant effect on the profitability of banks in Iran. Capital adequacy ratio, non-performing loan ratio, and cost-to-income ratio are also important determinants of bank profitability in Iran. The capital adequacy ratio has a positive impact on bank profitability when profitability is measured with ROA, but the coefficient is insignificant in the case of ROE. On the contrary, non-performing loans have a negative impact on bank profitability when we use ROE as a profitability measure, and the coefficient of the non-performing loan ratio is insignificant in the case of ROA. The cost to income ratio has a negative effect on the profitability of banks, irrespective of the profitability measure. These findings are largely consistent with previous studies; however, they resolve some uncertainty with respect to whether banks would benefit from pursuing an aggressive or conservative lending policy. In terms of inflation and GDP growth, in line with the previous literature, we found a positive impact of both variables on the profitability of banks.

Despite the continuous reduction in the interest rate, Iran has not been able to achieve the desired level of inflation. The results show that falling interest rates have a significant impact on the performance of banks. The findings from the study inform policymakers about the impact of monetary policy on bank profitability and assist them in making important decisions related to changes in monetary policy instruments. Banks are an integral part of the economy and their profitability is important for economic growth. Previous research suggests a positive effect of bank profitability on economic growth. This paper discussed the application of the panel regression model in the study of the impact of monetary policy on the profitability of banks. Thus, the information from 30 provinces of the country for 13 years was estimated with the help of the generalized torque method and model coefficients. Also, the relationship between independent variables and the profitability of banks was investigated. According to the results, the implementation of expansionary monetary policy improves the performance and profitability of banks. However, bank lending and price inflation have a negative effect on banks' performance. According to the results of this paper, control variables such as the number of overdue claims and GDP also had a positive effect on the performance of banks. Therefore, it is suggested that banks pay attention to other methods of allocating resources instead of lending as much as possible to improve their performance and minimize overdue claims by adopting appropriate measures. Also at the macro level, considering the negative effects of expansionary monetary policy and liquidity growth help to improve the performance of banks in the banking system, with the controlled implementation of expansionary monetary policy.

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