



The impact of macroeconomic variables on bank facilities in Iran

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Abstract

Considering the importance of banking system facilities that can lead to profitability, scrutinizing effective patterns and variables and observing the legal requirements of capital and even maintaining a surplus of capital over what the regulator has determined is possible. Able to enable the banking system to perform well in times of crisis and in times of economic crisis and crisis. The role of macroeconomic variables is also important so that a structural review of the factors can have a significant impact on the lending facilities of the country's banking system. To this end, the present study seeks to investigate the impact of macroeconomic variables on banking system concessions by using the ARDL from 2004-1 to 2016-4. The results of the model estimation show that in long-term, the active population has a positive and significant impact on the depositing rate by the banking system. However, consumer price index, interest rate and Gini coefficient as an indicator of income distribution have a negative and significant relationship with the lending facility of the banking system.

Keywords: bank facilities, active population, interest rate, consumer price index, ARDL method, Iran

1. Introduction

Adequate capital is a prerequisite for maintaining the security of the banking system, and each bank and credit institution must always maintain a reasonable balance between legal capital and the capital used to ensure the stability of its operations and consider the possible risks. The main function of this ratio is to protect the bank against unexpected losses as well as to protect depositors and creditors. Due to the protection, this ratio provides against losses, maintaining and maintaining sufficient and appropriate capital against the existing risks is the primary source of public confidence in each bank in particular and the banking system in general. In the banking system, the most important characteristic of a bank capital is its permanence and the ability to fulfill obligations to depositors and other creditors. In addition, given the nature of the bank's ownership structure, the characteristics of those owners who can directly influence the orientation of the strategies of the bank, policies and risk management policies are also to be considered. The ownership structure of each bank should be so that it maintains the integrity of its capital and acquires more capital in the conditions it needs (Mehrara *et al.*, 2016) ^[15].

The economic environment has a significant impact on the financial status of companies and financial institutions, and the importance of this issue has been repeatedly mentioned in the literature of financial economics. Ball and Brown's (1968) study showed that the reported profits of firms are largely influenced by changing economic conditions. Existing statistics also show that the financial system, banking institutions, and advanced stock markets are located in countries that are economically well positioned, which confirms the impact of companies on the state of the economy (Abasiyan *et al.* 2008) ^[1].

In today's world, however, communication, commodities, information, and technology have expanded and improved more than ever. Manufacturers and exporters of goods have had a better

opportunity than ever to compete in these international markets and thereby expand their scope. The most traditional way to enter these markets, i.e., export of goods, has led to greater and wider development, more revenue, and constant awareness of the latest technological and scientific developments than ever before (Alijani *et al.* 2010) ^[3]. Increasing export potential increases domestic production, employment and the value-added in various fields (agriculture, industry, mining, etc.), improving production quality and creating competitive fields, with the possibility of providing better and better products and balancing the payments in countries. The role of the banking system is also important here. If the facilities provided in different sectors of the economy are properly managed, growth and development can be achieved in these sectors; but if banks fail to provide their facilities fairly and equitably to the needs of the sectors, this will lead to imbalances that could impede economic growth and development in countries.

Banks, however, are highly vulnerable due to their characteristics and must have sufficient capital to cover the risk of their activities. On the other hand, banks need to be aware of the damages and shocks caused by economic activity and monetary policy so that these damages are not passed on to depositors and any potential losses are attracted by capital. This will preserve public confidence in the bank. For this reason, capital is very important in banking institutions and is one of the most important criteria for measuring the health of the banking system (Mehrara *et al.*, 2016) ^[15].

Therefore, paying special attention to the factors affecting the banking facilities concessions may be crucial. For this purpose, the present study attempts to investigate the impact of macroeconomic variables on the banking facilities granted in Iran by using self-explanatory method with extended lags in the period of 2004-1 to 2016-4.

2. Theoretical foundations and research history

Macroeconomic variables refer to economy-related factors on regional or national level that can encompass a wide range of societies (Mackna, 2016) ^[13]. Factors such as economic productivity, unemployment, inflation, savings, and investment are key indicators of economic performance, which are closely monitored by governments, corporations, and consumers (Juna, 2014). Developing countries, including Iran, have a high degree of instability of macroeconomic variables. In these countries, exchange rates, stock prices, and other major macroeconomic variables are more volatile than advanced and industrial economies, which in turn create an uncertain environment for investors and thus prevent investors from investing. Make an easy and confident decision about future investment. Therefore, in order to increase their investment and thus achieve sustainable economic growth, paying attention to markets and financial systems, as one of the main sectors of financing and influencing their optimal performance, is of particular importance (Mohammadi *et al.* 2014) ^[16]. The development of the financial sector can play an effective role in boosting investment and economic growth. Within the framework of endogenous growth theory, the development of the financial sector through more efficient allocation of capital, efficient conversion of savings into investment, as well as lowering the interest rate, can affect the real sector of the economy. Now, if the economy with a proper approach can increase the dynamics of the banking system, this issue will be reflected in different sectors and thus can lead to the development of different sectors (Kenza, 2016) ^[11]. In a market-based economic system, the primary task of monetary and credit institutions is to collect wandering deposits, allocate credit and maintain borrowers' financial discipline, facilitate the flow of payments, provide intermediary information, reduce risk, and facilitate integrated supervision as well as It is a pillar for monetary policy implementation. On the other hand, in an efficient banking system, the central bank also considers the control of low inflation and its stability in different economic conditions as the main objective of monetary policy. To achieve these goals, the central bank cannot directly stabilize the inflation and health of the banking system by using instruments at its disposal (such as interest rates, legal reserve ratios, etc.), but the monetary policy institution needs to evaluate different channels of influence. Monetary policy focuses on the major macroeconomic variables in the real, financial and currency sectors, this process is called the monetary transmission mechanism. Monetary policy through different channels such as interest rate channels, exchange rates, price channel of other assets, substitution channel, wealth channel, credit channel, balance sheet channel, and bank lending channel affect different economic sectors, depending on the subject of the article, the lending channel. The banking system is being scrutinized. In the bank lending channel, it is assumed that bank loans are the main source of financing for small and medium-sized firms, while large firms can access credit markets directly through the issuance of stocks and bonds. If the SMEs need more than their domestic funds, they should go to bank sources, of course, to access bank resources (bank loans) at the price and amount of available credit, as well as It depends on the credit supply policy. The process of monetary policy effecting through bank lending channel mechanism is that tightening monetary policy through monetary instruments (such as raising legal reserve rates,

reducing central bank direct credit to banks, or reducing bank credit ceilings), reduces deposits. Banking and consequently bank credits. Reducing your bank credit reduces your investment and therefore your productivity loss. The impact of monetary policy through the bank lending channel has been of particular interest in studies such as Bernanke and Blinder (1992), Bernanke and Mishkin (1993), Mishkin (1955), Bernanke and Gertler (1955) and Taylor (1955) (Negintaji and Omidikia, 2013). Since business cycles are defined as recurring patterns of economic crisis and economic growth, the length of these cycles is usually irregular. Initial analyzes of the business cycle were based on the belief that each stage of the economy had a peak and a decline in the economy. One economic boom, the next economic downturn, and that downturn create the next boom, and the economy will be forever trapped in a self-sustaining cycle (Mehrra *et al.*, 2016) ^[15]. Banks are forced to attract deposits from the public and provide facilities for earning a living and continuing to operate. One of the required attributes to succeed in this is maintaining a proper and adequate capital base. Lack of capital will eventually lead to considerable difficulties for the bank in a competitive environment. Therefore, the necessity of this research is to investigate whether monetary effectiveness is a regulated system of confrontation of economic variables that relates monetary change to the real sector of the economy. Identifying the ways that monetary policy is able to influence bank lending by changing the availability of insured deposits can be an important point to consider (Negintaji and Omidikia, 2013). Indeed, if the underlying impact of these shocks as one of the influential features of the banking system facilities of Iran changes over time with monetary and fiscal policy changes, it can be accepted that the existence of a traditional bank lending channel for Iran would be confirmed. On the other hand, if the impact of shocks on bank capital surplus capital as one of the influential features of the banking system facilities of Iran changes over time with monetary policy changes, it can be accepted that the existence of bank capital channel for Iran would be confirmed (Hedayati, 2008) ^[8].

The role of capital and investment in real production and economic growth has always attracted the attention of many economic studies. Notably, these studies, especially those that took place after the economic crisis of 2008, focus on the impact of credit and credit shocks on economic growth (Stringberg, 2017) ^[23]. Historical experience has always shown the effects of capital market and credit disruptions on economic activity and inflation. Studies focused on this topic have often used a wide range of techniques to assess and estimate the effect of credit shocks. For example, Halvorsen and Jacobsen (2009), Busch *et al.* (2010), Helbling *et al.* (2010), and Tamasi and Vilagi (2011) use structural VAR patterns, such as Trons *et al.* (2009) and Becker and Ivashina (2010). Regression panel models and finally Gilchrist and Zakrajshek (2011) have used general equilibrium models (DSGE). All of these studies have used variables such as values of credit, prices, and net worth of assets as financial indicators to identify structural shocks to credit supply. The results of all these studies indicate the impact of negative credit shocks on real output decline (Gharshi, 2016) ^[7].

Elbadry (2018) ^[6] studied the relationship between bank financial stability and risk management in 12 banks of Saudi 2011 to 2014. The results show a significant negative effect of capital adequacy ratio on credit risk. Also, leverage effect on credit risk has a

significant and positive effect. In addition, the results indicate a significant and negative impact of regulations, leverage, loan to deposit ratio and bank size on liquidity risk. Finally, the results show a positive and significant effect of capital adequacy, regulations, leverage and asset utilization ratio on operational risk and indicate a negative and significant effect of loan-to-deposit ratio on operational risk.

ValiPour and Vahed (2017) ^[24] examined the risk management and prediction of key variables affecting bank risk and lending facilities. The results show that there is a positive and significant relationship between GDP, oil income, exchange rate, and bank trust ratio. However, the effects of liquidity and inflation on banks' adequacy are negative and significant, which means they reduce the quality of banks' capital.

Dadashian (2017) ^[4] examines the role of economic variables on the lending facilities of private banks in Iran. To estimate the model from the data of Modern Economy Banks, Parsian, Pasargad, Karafarin, Saman, Saderat, Mellat, Tejarat, Ansar and Sarmayeh during the period of 2007 to 2014 and to estimate the required model from the combined data method (Panel-Data) Used. According to the estimation of the research model, it can be stated that the inflation rate has a positive and significant impact, the value-added of different economic sectors has a positive and significant impact (of course the value-added of the industrial sector is accepted at the 5% confidence level), the price index Housing has a positive and significant effect on the volume of lending facilities selected by the research banks. In addition, the impact of short-term deposits to total deposits ratio and long-term deposits-to-total deposits ratio has a positive and significant effect on the volume of lending facilities of selected banks. As a result, it can generally be said that, with the exception of the inflation rate, other research hypotheses are confirmed.

Din Mohammadi *et al.* (2017) ^[5] examined the impact of business cycles on the mix of resources and uses of public and private banks in Iran over a period of 2005 to 2013. The results show that the type of bank ownership does not affect the combination of bank resources and uses. There is a positive and significant relationship between the inflation rate and the share of long-term deposits over the period of 2005 to 2013, but this relationship is not significant for the share of short-term and short-term deposits. The relationship between the inflation rate and the banks' lending facility is also not significant. The results also show that most of the changes in the share of short-term deposits are explained by the internal factors of banks and the majority of changes in the share of visual, long-term deposits and facilities granted by banks are explained by factors outside banks.

Lotfi and Amini (2016) ^[12], in a study, analyzed the effects of macroeconomic variables on credit risk at 52 Mellat Bank branches from 2007 to 2012 using the panel-data method. According to the results of the study, variables affecting nominal interest rate, facility growth rate and GDP growth rate have a positive and significant effect on credit risk while inflation rate has a negative effect on credit risk.

Karimi (2016) ^[10] investigated the effect of macroeconomic variables and specific banking characteristics on non-performing demand in the Iranian banking system. The purpose of this study was to determine the effect of macroeconomic variables and specific banking characteristics on non-current demand in the Iranian banking system over the period of 2005 to 2013. Hence, the variables affecting non-trade demand are initially divided into

two groups of macro variables and specific banking variables. Macroeconomic variables include economic growth rate, exchange rate fluctuations, and the rate of real return on the informal market from the actual profit rate on the formal market. Specific banking variables include bank size, quality of management and capital adequacy ratio. The model estimation results show that the variables of economic growth rate have a negative impact and the variables of real rate of return in the informal market have a positive effect on the official market rate and exchange rate volatility has a positive effect on the dependent variable. Investigating the impact of specific banking variables has also shown that the variables deposit-to-cost ratio, which represents the quality of management or performance, and the ratio of share of facilities that represent the size of the bank, all have a significant negative impact on non-performing claims.

Mehrara *et al.* (2016) ^[15] investigated the role of economic fluctuations on banks' lending facility through the Bank's Supplemental Capital Channel. In this study, the effect of real and nominal shocks on bank lending behavior in selected banks of the country was tested using generalized torque method for the period 2006 to 2014. The results show the positive effect of nominal surplus shocks on the growth of bank lending facilities and the negative effect of real shocks on surplus capital on the growth of banking facilities in Iran. According to the results, the existence of capital surplus leads to positive impact of nominal shocks on the provision of facilities but in the face of real capital shocks, it cannot reduce the supply of banking facilities. In other words, in monetary contraction regimes Capital has a negative effect on banking facilities and limits the bank's lending power. However, in expanded monetary regimes this threat is less.

Ongri (2014) ^[18] examined the impact of macroeconomic variables on the financial performance of Kenyan non-bank financial institutions from 2004 to 2013. The results of this study show that return on assets of non-bank financial institutions has a significant positive relationship with growth rate, seasonal exchange rate, and seasonal GDP and inflation rate.

Negintaji and Omidikia (2013) examines the impact of banks' facilities on the variables of investment, employment, and value-added in agriculture. The study period was 1972 to 1989 and three-stage least squares (SLS) method was used to estimate the equations. The results show that the effect of current and capital credits on the value-added, investment and employment of the agricultural sector is positive and significant.

Were *et al.* (2012) ^[14], in their paper, examined the impact of access to bank credit on the economic performance of key sectors of Kenya's economy using panel-data and generalized torque method over the period 2000-2010. The results show that credit has a significant positive impact on the GDP of the economic sectors, including agriculture.

Shahchera and Mirhashemi (2011) ^[22] investigated the effects of monetary policy shocks on banking system facilities during the period 2001-2009 by theoretically explaining and designing a model using generalized moments estimation method. In this regard, the results of the study indicate that the variables of capital and liquidity and size have a significant effect on lending to the Iranian banking network and on the other hand, these effects are exacerbated by the contractionary monetary policy. In fact, the existence of a traditional bank lending channel and bank capital channel for the Iranian banking network was confirmed. Although its impact has been modest.

Ahmad (2011) [2], in his study, analyzed the impact of credit on the agricultural production of Pakistan during the period of 1974-2008. The results using the ARDL method show that credits play a significant role in the agricultural sector and credits have always been necessary for farmers to purchase the productive factors. He also concluded that production increased through the provision of three factors including tractors, wells, and grains (credits were the main source of purchase for these factors).

Tayebi *et al.* (2010) [21] in their paper, examined the effects of the allocation of the country's banking facilities to the agricultural, industry and service sectors and measured their employment trend over the period 1972-1995. The results show that by allocating banking facilities to the sectors of industry and mining, agriculture and services, the agricultural sector has the highest annual average job creation and the service sector has the lowest annual average job creation.

3. Research methodology

3.1 Auto Regressive Distributed Lag Method

This method was developed by Pesaran and Shin- Pesaran *et al.* (1996). This method has advantages over the Parasitic-Granger cointegration method, including the small sample size estimates obtained by this method. On the one hand, the partial distribution of the least squares estimators is abnormal, so the hypothesis test using ordinary statistics is invalid. In addition, the Engel-Granger method is based on the default of a co-integration vector, and under conditions where there is more than one co-vector, this method will result in inefficiency. Despite these limitations in the use of the Engel-Granger method, other methods such as self-explanatory methods with extended intervals can be used to overcome these limitations.

In general, methods such as Engel-Granger in studies dealing with small samples (low number of observations) are not valid because of the short-term dynamic reactions between variables, since they are not valid. Their estimates are not without bias and therefore, the hypothesis test using ordinary test statistics such as t will not be valid. For this reason, the use of models that have short-term dynamics and lead to more accurate estimation of the coefficients of the model is considered. An ARDL pattern (p, q1, q2, ..., qk) is briefly shown in the following figure (Lotfi and Ahmadzadeh, 2005).

$$\alpha(L, \rho)Y_t = \alpha_0 + \sum_{i=1}^k \beta_i(L, q_i)X_{it} + \delta W_t + \mu_t \tag{1}$$

Where, the constant value “yt” is the dependent variable, and L is the interrupt operator, so that $L^j Y_t = Y_{t-j}$, W_t , is the vector of non-random variables, such as the width of the origin, the trend variable, the variables Virtual or exogenous variables with fixed intervals. P is the number of interrupts used for the dependent variable and q_i is the number of interrupts used for the independent variable (X_{it}). Also in the pattern above:

$$\alpha(L, P) = 1 - \alpha_1 L - \alpha_2 L^2 - \dots - \alpha_2 L^P \tag{2}$$

$$\beta_i(L, q_i) = 1 - \beta_{i1} L - \beta_{i2} L^2 - \dots - \beta_{iq} L^q \quad i = 1, 2, \dots, k \tag{3}$$

The number of optimal intervals for each of the explanatory variables can be determined using one of the AIC, SBC and HQC criteria. In long-term

$$X_{it} = X_{it-1} = \dots = X_{it-q}, Y_t = Y_{t-1} = \dots = Y_{t-p},$$

Where, X_{it-q} represents the q interval of variable i. Thus, the long-term equation for the ARDL model is expressed as the following:

$$Y_t = \alpha + \sum_{i=1}^k \theta_i x_i + \gamma W_t + v_t \tag{4}$$

Where:

$$\alpha = \frac{\alpha_0}{\alpha(1, \rho)} \tag{5}$$

$$\gamma = \frac{\delta}{\alpha(1, \rho)} \tag{6}$$

$$\theta_i = \frac{\beta_i(1, q)}{\alpha(1, \rho)} = \frac{\sum_{j=1}^q \beta_{ij}}{\alpha(1, \rho)} \tag{7}$$

$$v_i = \frac{u_i}{\alpha(1, \rho)} \tag{8}$$

The ARDL model estimation consists of two steps for estimating long-term coefficients. The same dynamic model is used to calculate the long-term coefficients of the model. The long-term coefficient for the variables x is obtained from:

$$i = 1, 2, \dots, k \quad \theta_i = \frac{\hat{\beta}_i(1, q_i)}{1 - \hat{\alpha}(1, \rho)} = \frac{\hat{\beta}_{i0} + \hat{\beta}_{i1} + \dots + \hat{\beta}_{iq}}{1 - \hat{\alpha}_1 - \dots - \hat{\alpha}_p} \tag{9}$$

Now there are two ways to check that the long-term relationship obtained by this method is not false: In the first method, the following hypothesis is tested:

$$H_0 = \sum_{i=1}^p \alpha_i - 1 \geq 0 \tag{10}$$

$$H_1 = \sum_{i=1}^p \alpha_i - 1 < 0$$

The null hypothesis implies that there is no cointegration or long-term relationship, since the condition that the short-term dynamic relationship tends to be long-term equilibrium is that the sum of the coefficients is less than one. To perform the test, one must divide the sum of the coefficients by the dependent variable lag and the sum of the standard deviations of the coefficients.

$$\frac{\sum_{i=1}^p \hat{\alpha}_{i-1}}{\sum_{i=1}^p S_{\hat{\alpha}_i}} \quad (11)$$

If the absolute value of t is greater than the absolute value of the critical values provided by Banerjee, Dolado, and Master, the null hypothesis is rejected and the existence of a long-run relationship is accepted.

In another approach proposed by Pesaran *et al.* (1996), the existence of a long-term relationship between the variables under investigation is tested by computing the F statistic to test the significance of the levels with the variables' lag in the error correction form. The important point is that the distribution of F is nonstandard. Pesaran calculated the appropriate critical values corresponding to the number of regressors and whether the model included the width of origin and trend. They presented two sets of critical values, one on the assumption that all variables are stable, and the other on the assumption that they are all unstable (with justified difference once). If F is computationally outside this limit, a definitive decision is made without knowing whether the variables are either I(0) or I(1). If F is computed above the upper limit, the null hypothesis that there is no long-term relationship is rejected, and if it falls below the lower limit, the null hypothesis is accepted, if F is computed between the two, the inferred results are uncertain and depend on whether the variables are I(0) or I(1). Under these conditions, we have to perform single root tests (Pesaran, 1995) [19].

3.2 Error Correction Method (ECM)

Coexistence among a set of economic variables provides the statistical basis for using error correction models. The main reason for the popularity of these patterns is that they relate short-term fluctuations of variables to long-term equilibrium values. These models are in fact a type of partial adjustment models in which by measuring the permanent residuals from a long-run relationship, the effective forces in the short run and the velocity approaching the long-term equilibrium are measured (Tashkini, 2005) [20].

3.3 Data and study model

The present study is based on the Dadashian (2017) [4], Lotfi and Amini (2016) [12] and Ongri (2014) [18] model based on theoretical and theoretical studies:

$$LOAN_t = F(EMP_t, CPI_t, INTER_t, R_t, GINI_t) \quad (12)$$

which is defined as the following:

$$LLOAN_t = \hat{\alpha}_0 + \hat{\alpha}_1 LEMP_t + \hat{\alpha}_2 LCPI_t + \hat{\alpha}_3 LINTER_t + \hat{\alpha}_4 LR_t + \hat{\alpha}_5 LGINI_t + \varepsilon_t \quad (13)$$

Where:

$LLOAN_t$: represents the logarithm of the amount of facilities granted by commercial banks in t time

$LEMP_t$: represents the logarithm of the active population in t time

$LCPI_t$: represents the index of consumer price in t time

$LINTER_t$: represents the one-year deposit interest rate in t time

LR_t : represents the interest rates on services provided to the service sector in t time

$GINI_t$: represents the Gini coefficient in t time

After extraction, the model is then tested statically using the ARDL method. This is a causal-analytical study and the library method is used to collect the required data and information. The required data have been collected seasonally from the Central Bank of Iran time series databases and Statistics Center of Iran for the period of 2004 to 2005. The software used in this study is Eviews and Microfit.

4. Model estimation and results analysis

4.1 Stationarity test

In the present study, the generalized Dickey-Fuller root unit test (ADF) was used to evaluate the reliability of the variables. This test is one of the most important single root tests in time series data. In this test, the null hypothesis is that there is a single root (unstable). Based on this test, the null hypothesis that there is a single root (unstable) is rejected if the ADF statistic is greater than the critical value. The results of this test are summarized in Table (1).

Table 1: The results of Stationary of the variables

Variables	t statistic	Probability	Stationarity
Loan	-0.6273	-0.8551	unstable
Dloan	-9.6180	0.0000	stable
Emp	-1.5626	0.4941	unstable
Demp	-7.3163	0.0000	stable
Cpi	-0.2057	0.9304	unstable
Dcpi	-8.4715	0.0000	stable
Interest	-1.5611	0.4949	unstable
D interest	-9.9312	0.0000	stable
R	-7.5796	0.0000	stable
Gini	-6.98411	0.0000	stable

Reference: Research findings

As can be seen from the generalized Dickey-Fuller test, the results show that all the variables are at an imminent level and all variables are mana with a difference. Consequently, the reliability of the variables is proved by a one-time difference.

4.2 Short-term results analysis

Based on the Schwartz-Bayesian criterion, the maximum model lag is 1. The reason for using this criterion is that the Schwartz-Bayesian criterion saves time and thus has a greater degree of freedom. The results of the short-term pattern are presented in Table (2).

Table 2: Short-term model estimation results

Variable	Ratio	Standard deviation	t statistic	Probability
Loan(-1)	0.73748	0.078233	9.4266	0.000
EMP	0.026230	0.008833	2.9694	0.005
CPI	-0.0028	0.0051676	-0.55462	0.582
Interest	0.22884	0.11266	2.0313	0.053
R	-0.23112	0.13229	-1.6865	0.105
R(-1)	-0.28070	0.14466	-1.9403	0.064
GINI	-3.5951	22.5133	-0.15969	0.874
R ² =0.8581, R ² Bar= 0.8455, DW=1.79, F=169.9326 [0.000]				

Reference: Study findings

The findings in Table (2) show the results of the model estimation in the short run. The model results show that a 1% increase in the lending facilities of the banking system in the past period results in a 0.73% increase in the lending facilities in the current period. The one percent increase in the active population results in a 0.02 percent increase in the amount of banking facilities granted. Or one-unit increase in the consumer price index, the amount of banking facility concessions decreases by 0.002 units. Increasing one unit in the deposit interest rate results in a 0.22-unit increase in the lending facility of the banking system. The relationship between the interest rate and the amount of credit facilities granted by the banking system is reverse. The interest rate on the banking system decreases by 0.23 as the unit rate increases. Finally, the relationship between the income distribution index (Gini coefficient) and the amount of banking facilities granted is also negative. With one-unit increase in the Gini coefficient, the banking facility's lending rate drops to 3.5 units. The coefficient of determination estimated by the model is 0.85. This suggests that model variables were able to account for 85% of the dependent variable changes. It also does not appear in the autocorrelation model, and Durbin Watson 1.79 confirms this fact.

4.3 The results of cognitive tests

After estimating the model over a short-term, it is necessary to examine the classical assumptions in this regard. Cognitive tests of classical assumptions were examined, the results of which are presented in Table 3.

Table 3: Classic assumptions cognitive tests results

Test name	F statistic	Probability
Serial autocorrelation	0.21554	0.925
Functional form	0.17903	0.674
Variance heterogeneity	0.79781	0.993

Reference: findings of the study

The results of Table (3) show that there is a significant level of classical assumptions at 5% significance level, and therefore, it can be concluded that there is no serial correlation in the model, the model assumption is correct and the variance heterogeneity is not even seen in the model.

4.4 Long-term results analysis

At the beginning of this section, we examine the validity of a long-term relationship. For this purpose, we need to test the following hypothesis.

$$H_0 = \sum_{i=1}^p B_i - 1 \geq 0 \tag{14}$$

$$H_1 = \sum_{i=1}^p B_i - 1 < 0$$

The result is a test statistic of type “t”, which can be compared with the critical quantities provided by Banerjee, Dolado, and Master for the test. Therefore, one can test the existence or absence of a long-term relationship as follows:

$$\frac{\sum_{i=1}^p \widehat{\beta}_i - 1}{\sum_{i=1}^p \delta \widehat{\beta}_i} = \frac{0.73748 - 1}{0.078233} = -3/3556$$

The computed statistics in this example are obtained at -3 / 3556 and since they are in absolute magnitude higher than the critical value of Banerjee, Dolado and Master (-3/28), therefore the null hypothesis that there is no long-run relationship in favor of the opposite hypothesis. (Long-term relationship) we reject. Therefore, there is a long-term relationship between these variables. Thus, Table 4 shows the results of long-term model estimation.

Table 4: long-term model estimation results

Variable	Ratio	Standard deviation	T statistic	Prob
EMP	1.1972	0.45227	2.6470	0.014
CPI	-0.51717	0.28797	-1.7959	0.085
Interest	0.36427	0.10604	3.4352	0.002
R	-0.91661	0.47761	-1.9192	0.067
GINII	-0.48744	0.20281	-2.4034	0.024

Reference: findings of the study

As we can see in Table (4), the coefficient for the active population variable is 1.19. That is, for a one percent change in the size of the active population, the change in the rate of granting banking facilities would be 1.19 percent. Thus, as can be seen, with the increase of the active population, the demand for facilities from the banking system increases, so the level of concessional facilities increases. The presence of an active population increases the spirit of work and activity, which in turn leads to production. Here, different sectors may need to utilize and utilize the banking system's facilities in terms of financing. Therefore, it can be very helpful as a result of properly guiding the resources of the banking system. Credit and facilities are an important part of any bank's operations and are economically important. Banks, through their credit operations, enable the transfer of resources from those who are directly willing or able to participate in economic activities to those in need of financial resources and facilitate Economic activities increase investment, production, and employment. In other words, banks with the help of their credit and financial policies can provide the conditions for economic growth and development, or vice versa, by not lending, causing stagnation and recession in the country. The surplus demand for bank loans to supply in the country, due to the low interest rate on inflation rates, has led to credits being rationed, and the government has extended credits in terms of its ownership of the banking system through rationing rules. It is divided between different economic sectors. The credits allocated to different economic sectors are in line with the government's macroeconomic goals of economic growth, obviously, if these credits are used optimally they will lead to added value growth. Otherwise, the granting of banking facilities will deviate from its main course and lead to a lack of optimal allocation of economic resources.

The negative coefficient of the consumer price index is negative, indicating the inverse relationship between the inflation rate and the level of concessions granted by the banking system. That is, the higher the consumer price index in the country, the lower the amount of concessional facilities on average, which can be traced to the demand for credit facilities. As inflation and prices rise in the country, the conditions for different sectors and the supply of raw materials and production of products for sale become tougher, as will institutions, companies, factories, and firms.

Manufacturers will not be able to find the right market for goods and services as before, and may even close their manufacturing plants. In this case, without the demand for banking facilities, the amount of facility lending will also be hampered and thus reduced.

Another variable considered in the model is the deposit interest rate. The estimated coefficient for this variable is 0.36. This indicates that there is a positive and significant relationship between the interest rate on the deposit and the amount of banking facilities granted. So it can be said that the higher the deposit rate, the more demand for the facility can increase. Bank interest rates have been an influential component of the Iranian economy in the last decade, as it must serve the interests of depositors, borrowers and bankers alike. Given that, the banking system is responsible for 90% of the country's economy, various sectors and sectors of the economy are also expected to be diversified and the banking system must *meet all* their needs.

The estimated coefficient for the interest rate variable is -0.91. That is, for a unit of interest rate change, the change in the lending rate of the banking system would be -0.91. Thus, as can be seen, the interest rate on the banking system decreases as the interest rate rises, thus reducing the amount of lending facilities. Lowering the interest rate on banks' loans actually reduces investment costs, and these lower costs are incentives to increase investment from bank lending resources. In addition, lowering the interest rate of banks' lending facility reduces the interest rate on other financial markets, including money and capital markets, and thus reduces the cost of using capital and consumer goods. Due to the changes in the function of total production of the economy due to the increase in the volume of capital stock and the use of more labor force, the total output of the economy reaches a higher level which means that the shift in total production means transfer of the total supply of the economy to a higher level of production. Is. This reflects economic growth coupled with a general decline in the price of goods and services produced. Therefore, one might expect that as interest rates fall, demand for the bank's banking system increases.

The estimated coefficient for the variable of income distribution is negative and is -0.48. This indicates that with a 1-unit increase in the Gini coefficient, the rate of concessional facilities decreases to 0.48 points. The greater the income inequality in societies, the lower the motivation for more education, more money, and entrepreneurship. For many developing countries, widespread poverty and low-income share of the poor have received particular attention. As the internationalization of economic relations has increased, the uncertainties arising from these relationships have also increased, and some evidence suggests that income differences in recent decades have fueled economists' interest in the topic of income distribution, its variations, and influencing factors. It has exacerbated it. In general, poverty occurs in a society when individuals do not have a certain level of well-being that is considered reasonable by the criteria of that society. Thus, in a developing country, poverty may mean deprivation of the facilities that are simply necessary for life, while for a developed country it may mean the relative

deprivation of the conditions and facilities of a particular life in that country. Our country, Iran, is also not immune from poverty and according to the available statistics and information; a large part of the population is in poverty. So paying special attention to the optimal distribution of income can even help the banking system in providing better facilities.

4.5 Error Correction Model analysis

The error correction model shows that in each period, a few percent of the dependent variable imbalance is adjusted for the long-term relationship. In this estimation, the coefficient of -0.62822 is obtained which is statistically significant and its negative indicates that any imbalance in the pattern moves in the long-term towards equilibrium and each year Almost one in 0.62 of the imbalances is resolved, and it can be said that it takes approximately less than 2 years to correct the short-term equilibrium error and return the model to the long-term equilibrium. The results of the ECM test are presented in Table 5.

Table 5: Results of estimating the error correction model

Variable	Ratio	Standard deviation	t statistic	Probability
dEMP	0/7520	0/3802	1/9779	0.059
dCPI	-0/8074	0/0822	-9/8209	0.000
D Interest	0/2288	0/1126	2/0313	0.053
dR	2/2311	1/3229	1/6865	0.104
dGINI	-0/3249	0/1518	-2/1402	0.042
ECM(-1)	-0/6282	0/1893	-3/3187	0.003
$R^2= 0.71636$ $R^2\text{Bar} = -0.65321$ $DW= 1.9637$				

Reference: findings of the study

4.6 The analysis of the structural stability of the estimated model

Structural failure tests investigate the stability of the coefficients; whether the parameters estimated at different periods are sufficiently robust and stable or not. Some phenomena may cause structural changes in the economy, such as war, oil shocks, and so on. These are issues that may make fundamental changes in the quantitative relationships between economic variables, and according to Lucas's criterion, the estimated parameters of the econometric model may change with policy change. This problem can be investigated by structural failure tests.

4.6.1 Cusum cumulative sum test

The cumulative sum test is based on the cumulative sum of the disturbing sentences. The graph of this test shows the cumulative sum of disruptions in time in the range of critical lines. If the cumulative sum of disrupted sentences leaves the area between the critical lines, it indicates structural instability.

Diagram (1) shows the test result of the cumulative sum of disturbing sentences. As can be seen, the line from the cumulative sum of disturbed sentences is within the range of the critical lines and has not been omitted, so the estimated parameters are stable and there is no structural failure in the model.

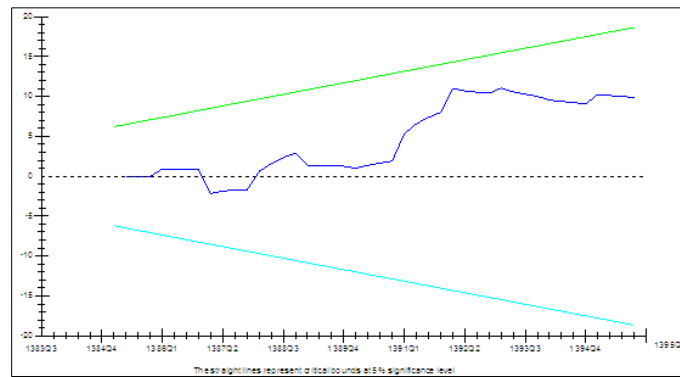


Fig 1: results of the CUSUM test

4.6.2 Cusum of Squares cumulative square test

The sum test of the cumulative squared of the distorting sentences is based on the cumulative sum of squares of the distorted recursive sentences. Its diagram shows the cumulative sum of squares of the return disturbance plus two critical lines. If the cumulative sum of the recursive residuals squared lies outside the boundaries of the two critical lines, the reason is structural instability.

Diagram (2) shows the result of the cumulative squared test of the recursive residual sentences. As can be seen from the diagram of the sum of squared residuals within the boundary of the critical lines, the estimated model has structural stability and no structural failure has occurred.

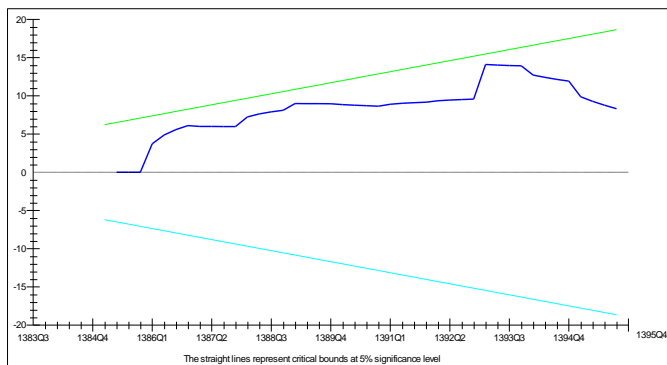


Fig 2: CUSUM of Squares cumulative square test results

5. Conclusion

As an important pillar of financial backing, capital allows banks to be able to continue to streamline and make profits when faced with macroeconomic problems. Banks that have surplus capital (the difference between the bank's legal capital and the capital used against potential risks) are more likely to respond to economic fluctuations in their banking policies. The banking system is of great importance today in the economy. Fiscal policies are effective in dealing with shocks in business cycles. However, monetary policy can react quickly to these shocks. Therefore, having an effective and efficient monetary policy is very important in combating business cycles and demonstrates the importance of monetary policy. The role of macroeconomic variables is also important here, and it is imperative to consider their changes to the functioning of the banking system. The present study, considering the importance and role of the banking system in the country, has investigated the effect of

macroeconomic variables on the amount of lending facilities in the Iranian banking system. In this study, a self-explanatory model with extended interruptions (ARDL) was used. The research data have been collected seasonally from 2004 to 2016 and estimated using Eviews and Microfit software. Based on the results, it can be said that in the long-term the active population has a positive and significant impact on the deposit rate by the banking system. However, consumer price index, interest rate and Gini coefficient as an indicator of income distribution have a negative and significant relationship with the lending facility of the banking system.

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