The Effects of Macroeconomic Variables on the Determination of Bank Credit Rate of Usury- Free- Banking in Iran

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ABSTRACT

The study has used auto regressive distributed lag method to estimate the effects of independent variables on the dependent variable. According to findings, the impact inflation rate on bank credit rate is positive in short - run, so that the impact of this variable has been effective on bank credit rate after 1 year delay on dependent variable. The reel per capita gross domestic product (GDP) alters the banking credit rates toward the positive direction. The short - run impact of legal reserve rate on bank credit rates is positive. The effects of inflation rate, GDP, and legal reserve rate variables are positive on the bank credit rate. Thus, the Fisher hypothesis is confirmed in Iranian context. Error correction coefficient links the speed of the short-run variable fluctuations to the long-run equilibrium amount i.e., the short-run imbalances of dependent variable decreases 19% annually and moves to the long-run equilibrium.

Keywords: Macroeconomic Variables, Bank Credit Rate, Usury- Free- Banking
JEL Classifications: E51, E58, E52

1. INTRODUCTION

The financial policies of banks can provide the means of economic growth or conversely they can create economic recession in different countries. They can provide the means of development in the country by granting credits to different businesses, industries and production spheres. Moreover, banks by granting credits provoke and develop exports, enlarge gross domestic product (GDPs), increase the industrial and agricultural developments, develop domestic and foreign marketing, transportation as well as by providing facilities for importing goods they motivate investors to invest in the banks (Saeedi, 2009). Therefore, they have a significant role in investing small capitals and setting up production and consumption, so that the successful implementation of this policy will more contribute on economic development.

Conversely, preventing crediting leads to recession and stoppage of economic development. Granting is an important part of any bank operation. Banks provide the possibility of transferring financial resources to the individuals who are in need of funds from those

who are unwilling or unable to participate in economic activities, therefore, it facilitates the economic operations, investments and productions. On the other hand, the banks are at risk by granting. So their mismanagement leads to losses and bankruptcy. Financial competition among banks reduces interest rate leading to crediting openly to the high risk credits in which deposits will be the financial sources. Thus, interest margin and credit risks will be increased by reducing the focus rate on crediting. If banks would be independent in specifying bank credit ratings, they would have had an important role in inflation and recession. Besides, the role of the banks in economy is due to the existence of interest rate which plays a significant role in capitalism in determining the national income. In capitalism, interest rate is the cost which is paid for money and worthy documents. Furthermore, as we know, interest rate is the important factor in investing. Therefore, there is a law on usury-free-banking, in Iran, passed in 1362 which pertains that it is illegal to have interest rate on bank credits. So in economic operations in order to provide credit to the active individuals, interest rate can be replaced by bank credit rate. Considering the facts stated earlier, two important facts as usury-free-banking

and the doctrine of the interest rate by the Central Bank in Iran should be emphasized. Accordingly, Kamijani and Bahrami (2008) support the foregrounded idea that "bank credit rate is a doctrine and its importance on specifying monetary policies regarding Iranian economic condition by Central Bank on the one hand, and reducing the interest rate controversy, should be both considered." Thus, the present study considers the impact of macroeconomic variables such as inflation rate as an indication of the economy development, the unemployment rate as an indicator of recession, GDP as a variable of economy capacity, and legal reserve rate as a side variable on bank credit rate. Accordingly, the followings are the research hypothesis:

- The rate of inflation has a positive effect on the bank credit rate (Fisher hypothesis).
- The unemployment rate has a negative impact on the bank credit rate.
- GDP has a positive impact on the bank credit rate.

Thus, time series data, which are related to research variables in the periods of 1360–1393, having gathered from Central Bank of the Islamic Republic of Iran site, they have been analyzed. Hence, auto regressive distributed lag (ARDL), due to the aforementioned purposes and the advantages of, has been applied.

2. THEORETICAL BASIS OF THE RESEARCH

Surveys have shown that in many countries in a long- run, there is a positive relationship between nominal credit rate and inflation rate as far as the amount of nominal credit rate is a reflection of the inflation fluctuations. The existence of a positive relationship between the nominal credit rate and expected inflation is Irving Fisher's hypothesis and in economic literature, it is known as Fisher effect.

Fisher has proposed the expectations who believed that the full prediction assumption and matching the expectations in a short - run is idealistic, however, the realistic assumption is that the predictions should be considered as dilatory and the expectations as matching in the long-run. He believed that it takes nearly 30 years to adapt economy with the new inflation rate, though he points out that the development of economy and in the new world the daily prediction and matching the expectations is done completely and more quickly compared to the past, therefore, it will be equal with the actual inflation rate in the long - run. Thus, he hypothesizes that in the long - run a unit increase in inflation rate leads to the increase of nominal credit rate and the real credit rate will be constant:

$i = r + \beta r, \beta = 1$

As a result, it can be stated that Irving Fisher's hypothesis known as Fisher's Effect is being accepted by most of the theorists and policymakers in recent years and it has been validated in the most of the countries.

Furthermore, based on definition of the economic literature, business cycles are a type of regular fluctuation existed in the macroeconomic activities. It means that any observed fluctuation in economy does not reflect the business cycles. It can be accidental as wars, strikes, revolutions or it can be seasonal. A distinction between seasonal and cyclical fluctuations is that the seasonal fluctuations (such as an increase of the demand of many goods in the new year) occurs in a certain period of time, whereas business cycles cannot be predicted at a regular time intervals. Four stages of business cycles can be briefly stated as expansion and recovery, prosperity, recession, through or depression.

Moreover, cause and effect relationship between the credit and inflation rate in economy can be considered on the basis of the demand-side policies as contractionary or expansionary monetary policies and supply-side policies including an increased price of each of the production institutions such as labor, capital and land.

On the demand-side economy, if monetary policies are contractionary, it increases bank credit rate which constant spirit rate increases the credit rate of deposit appropriately. In the economy, by increasing bank credit rate and the cost of goods and services the expenses increases as well. However, the inflation derived from the cost, by reducing the amount of investments and reducing demands in the economy leads to the reduction of the general level of prices in economy. Thus, performing a monetary policy in examining the cause and effect relationship between credit and inflation rate, changes in the credit rate is the cause and changes in the general level of prices will be the effect. While performing contractionary monetary policies, it increases the government expenses and decreases the tax in total demand in the economy side leading to an increase of the price of the general level. Increasing the price of the general level then increases the credit rate. Therefore, if monetary policy is performed, changes in the price of the general level will lead to the changes in the credit rate.

Accordingly, based on macroeconomic literature, if the level of prices increases, the first impacted variable from that of increased level of prices is the real money balances. In other words, by increasing the level of prices, the real supply of money will be decreased. On the basis of Keynes' analysis, reducing the supply of cash (more than the demand of money in a society) leads to some problems in the economy. Besides, according to Walrasian equilibrium, in order to establish a balance in an economy, an extra demand for money leads to the oversupply of worthy documents and decreases the its prices and raises the market interest rates. Therefore, it is theoretically expected that an increase in price rates leads to the increase in credit rates. Hence, there is a positive relationship from inflation rate towards the nominal interest rate. In other words, an increase in the inflation rate can increase the interest rate in an economy, but the way of the impact of interest rate on inflation is possible through increasing the interest rate which leads to the increase of the production costs and the level of prices ending in inflation rate. On the other hand, economic theories implies that an increase in the inflation rate, increases the interest rate. Clark (1895) has studied the effects of inflation rate on the nominal interest rate and believes that the real interest rate is constant. Accordingly, he believes that the based on the inflation rate nominal interest rate should be changed.

Considering the interest rate, there is a negative relationship between unemployment and interest rate. During recession and unemployment, the government (Central Bank) acts according to the reduction of interest rate (bank credit rates) as expansionary monetary policy along with other policies. Thus, there is a negative impact of unemployment on the interest rate (bank credit rate).

Therefore, according to the stated literature, it can be said that the inflation rate has a positive effect on the nominal interest rate. However, the relationship between nominal and real interest till Fisher's time was not correct analytically. But Abounoori *et al* (2013), using other researchers' studies, explained the theory of inflation and interest constantly (Abounoori et al., 2013).

3. LITERATURE REVIEW

In order to investigate the literature of the studies about the bank credit rates, granted credits and the relationship of interest rate along with the macroeconomic variables, it has been tried to have a review on both domestic and foreign studies. In this section, at first, the domestic studies will be reviewed, then we will have a review on foreign studies.

Based on Salami and Bahmani's studies, determining fixed interest rate for bank credits by the Credit Council leads to the diversion of the banks from the real participation in the investment projects on the expected income and their risks which ends in the reduction of the efficiency of Islamic Banking. In addition, "reducing the relative interest rate of the credits for risky investments leads to the extra demand of the credits. Crediting to these demands will lead to the violation of depositors' rights (2001)."

Besides, Mehregan et al. (2006) using panel data studied the cause and effect relationship between interest and inflation rates and have founded that there is one - sided cause and effect relationship from interest rate towards the inflation rate. In other words, the experts' perspective of Islamic Economy, especially in Iran, has been confirmed (2006).

Saeedi (2009) studied the role of assignment and non-assignment credits of specialized banks in Golestan Province and showed that the role of the non-assignment effects of specialized banks in economic growth was more than assignment credits. In general, according to the used research models, the role of specialized banks through granting credits in economic growth and the value ratio is positive and according to the expected theories. Therefore, bank credits can perform a significant role in investment and production growth.

Nazarian and Hashemi (2009) studied the effective factors on the interest rate of Governmental Banks. The results of the studied model shows that the interest rate differences in Governmental Banks (with the exception of Post Bank) in a period of 2002–2007, has a reduction of 6.16% to 5.36 in an average. Moreover, they have used Herfindahl Hirschman centralization index in 2002 in order to consider the effects of the private banks on the banking system and their effects on the interest rate differences. The results shows that in Iran's banking system, Governmental Banks are more active in absorbing investments, granting credits, and etc., but this current structure is changing and moving towards the reduction of monopoly in banking.

According to the results of the study of Tayyebi et al. (2010), due to the allocation of the bank credits to industry and mining, agriculture and services, the agriculture sector has provided the highest average annual agricultural jobs and the service sector has provided the lowest average. However, the results indicate that there is a fluctuation in the banking system performance in relation to job creation in economic sectors particularly in services, as this type of credits in the stated period led to the reduction of jobs.

In their studies, Nazarian and Safarpour (2011), using ARDL method have concluded that in the long–run, the differences of the bank credit rates with market interest rates, unorganized money market and country risk have had a significantly low effects on the ratio of outstanding claims.

In another research, Jefresh et al. (2012) studied the effects of the reducing bank credit rates on the inflation index during 1996–2007. The research results imply that the relationship between bank credit rates and inflation index in the long – run is meaningful and reducing bank credit rates leads to the reduction of inflation rate, while in the short – run, this relationship is somewhat meaningless and reducing bank interest credit rates has a little effect on the reduction of inflation rate in the economy of Iran.

Moreover, Abounoori et al. (2013) have examined the relationship between inflation rate and the interest rate of bank deposits in Iranian banking system. In their study, they have used co-integration model and error correction model (ECM) and discriminated between long and short-run fluctuations showing that in the long-run there is a positive meaningful relationship between nominal interest rate and inflation rate. In the other words, the inflation rate is the reason of the same in the fluctuations of nominal interest rates or the interest rates of deposits. Moreover, in a Case Study of Tehran Sepah Banks, it has shown that there is an inverse relationship between interest rate and the different kinds of deposits having a direct relationship to the national income growth.

Nazarpour and Rezaei (2013) found that there is a lower risk in Islamic non-participatory contracts (exchanging contract) in comparison with participatory contracts within their study. However, these contracts are risky and they encounter Islamic Banking at risk of credits. The banks are unable to recognize the amount of credit risks and to determine the possibility of losses of non- repayment of bank credits. As a result, they are unable to allocate optimal capital and their profitability will be encountered with disastrous risks.

Boyd and Abujalal (2012), in their research entitled fisher effect, a paradox: Theory and practice, among 74 countries in 24 years, using panel data have concluded that Fisher's paradox is practically confirmed.

Teker et al. (2012) examined the long –run relationship between interest and inflation rates in Turkish economy. According to the

results, there is a co-integration relationship in both of regimes. So it shows that an increase in interest rate leads to increase of the inflation rate.

Fisher's hypothesis has been investigated in Turkish economy under shift regimes with the time-varying parameters method based on quarterly data, from first chapter (1987) to third chapter (2010) by Arisoy (2013). Based on the findings, a poor format of Fisher's hypotheses is confirmed in Turkish economy.

4. METHODOLOGY

ARDL method has been used due to two main reasons. First, the instability of almost the time-series data in macroeconomic, inefficiency of traditional methods in estimating the economic models as well as the hesitations in econometrics of unit root test in stationary detection and non-stationary detection paves the way of using ARDL.

Second, as Dehmordeh and Shokri (2010) proposed methods, generally, as Engle-Granger method - having small samples- because of disregarding the short-run dynamic reflections among variables does not have the required reliability. Due to the fact that the obtained results of the stated method are not unbiased, as a result hypothesis testing using the normal statistics of tests such as t will not be reliable. Then, using patterns having short-run dynamics and leading to high efficiency are more applicable.

Thus, in order to consider the long - run relationship among variables ARDL will be used. The important advantage of ARDL method among co-integration is that it is a practical method without regarding the variables which are I (1) or I (0). In other words, in this method there is no need to divide the variables to correlated variables of grades one and zero. Moreover, the economic analysis on both short and long-runs can be done by this method.

Besides, as Houshmand et al. (2008) explained Pesaran and Shin (1997) have proved that if co-integration vector is obtained using the least ordinary least squares (OLS) based on ARDL which its lags have been stipulated correctly, the estimator of the least OLS not only will have a normal distribution but also in small samples it will have a less steep and will be more efficient. The other advantage of the aforementioned method is to achieve the consistent estimates of the long - run coefficient, regardless of the I (1) and I (0) variables and to use OLS method, ignoring the short - run dynamic reflections existed among variables which cannot provide unbiased estimates in the long - run for small - volume samples. Banerjee and Inder (1993), using Monte Carlo's Simulation, have indicated that there would be a significant estimated bias in the small samples; therefore, a pattern should be estimated that has a short – run dynamic in itself. As a result, the patterns of coefficient should be estimated more accurately.

At the present research, which is investigating the impact of macroeconomic variables on determining the bank credit rates, the econometrics models are based on Kashyap and Stein (1995) as well as Shirinbakhsh and Jabary (2010) model.

$$BC_{it} = \alpha_0 + \alpha_1 INF_t + \alpha_2 UN_t + \alpha_3 PGDP_t + \alpha_4 K_{it} + u_{it} \tag{1}$$

$$BC_{it} = \sum_{i=1}^{p} \alpha_i BC_{t-i} + \sum_{j=0}^{m} \beta_j INF_{t-j} + \sum_{k=0}^{n} \gamma_k UN_{t-k}$$
$$+ \sum_{h=0}^{H} \delta_h LPGDP_{t-h} + \sum_{l=0}^{L} \varepsilon_l K_{t-l} + u_t \tag{2}$$

BC: The weighted average of the bank credit rates which is the added value ratio of economy units to GDP as the weight interest rate of different economy rates available in Islamic Republic of Iran.

INF: Inflation rate, calculated according to the retail price index (Consumer price index, CPI).

UN: Job vacancy rate

PGDP: Real per capita gross domestic product

K: Auxiliary variables vector such as legal reserve rate major effective on dependent variable.

U: Regression error term.

In stationary test of variables Dicky Fuller's unit root test has been used. Based on the test, if the calculated absolute for the considered series is greater than the critic value table, then there is a null hypothesis on the unit root test is rejected for some series and the variable will be static. Thus, the H_0 and H_1 for unit root test is stated as the following:

H_0: Is not static series (it has unit root)

H_1: Is the static series (the static level).

The unit root test of the used variables in the research, generalizing Dickey – Fuller's method and Schwarz Bayesian criterion as well as considering length 3 automatic interruptions have been applied to get to the results. The results have been illustrated in Table 1.

As it is shown in Table 1, the variables the used model concluded in the form of I (0) and I (1). Therefore, Johanson-Juselius co-integration test was not applicable for this model. Thus, in order to examine the long–run relationship among variables, ARDL model should be used.

In ARDL three steps are required in order to estimate the model. In the first step by using the collected statistic data the short - run dynamic model is estimated. In the second step, for the existence of co-integration test (long–run relationship) among the variables of the model, the total estimation of dependent coefficient of variable as an independent variable entered with a time lag into the model is subtracted by 1, then it is divided by the total of standard deviation of these coefficients. If the calculated amount of absolute value is greater than the calculated critic value in Banerjee, Dolado, and Mestre's model, then the null hypothesis showing the lack of co-integration among variables is rejected and the existence of the long–run relationship among model variables are proved. By proving the existence of a long–run relationship among variables in the second step, long–run relationship among variables will be estimated. In the third step, ECM is calculated. The existence of co – integration among the total of the variables of a model is the basis of the ECM. This model links the short – run fluctuations of variables to the long-run equilibrium values i.e., the relative of the short-run imbalances of dependent variable is adjusted in the

long-run and moves towards the long-run equilibrium. Microfit Software offers the ECM applicable to the selected model.

5. MODEL ESTIMATION

Table 2 shows the results of estimated short-run dynamics, the effect of independent variables on the bank credit rates as the dependent variable.

Based on the results of the estimated short - run dynamic model, the variables of dependent and inflation rate variable entered into the model with a 1 year time lag and the other variables entered with the fixed format. According to these results, the coefficient of the unemployment variable is negative confirming the aforementioned hypothesis. During recession and unemployment in an economy leading to the reduction of the interest rate (bank credit rates) forcing governments to follow the expansionary monetary policy along with the other appropriate policies. Consequently, the negative impact of unemployment on interest rate is a fact. However, the coefficient is statistically insignificant i.e., the impact of unemployment in determining bank credit rate is statistically zero. In spite of theoretically justifiable, due to the ineffectiveness of unemployment variable in determining the bank credit rate which can be a doctrine by the Central Bank. This means that due to the only special attention of government policies and The Central Bank of the Islamic Republic of Iran on inflation control in the time of recession, active policies are not done through monetary policies in order to cut down the unemployment rate. This can be proved by studying the impact factor of inflation rate in determining bank credit rate. Therefore, due to the fact that unemployment is not only an economic

Table 1: Dickey-Fuller's unit root test of variables

Variables	Critic value	Test statistics	Probability	Results
Bank credit rate (DBC)	−3.65*	−3.96	0.005	I (1)
Job vacancy rate (D (UN))	−3.65*	−6.52	0	I (1)
Inflation rate (INF)	−2.96**	−2.98	0.04	I (0)
GDP (LGDP)	−3.22***	−3.39	0.07	I (0)
Legal reserve rate (D (RRR))	−3.65*	−6.67	0	I (0)

Findings based on the use of Eviews 9 Software, *, **, *** shows the meaningfulness level in 1%, 5% and 10% respectively

Table 2: Results of estimated short-run dynamics, ARDL (1, 0, 1, 0, 0)

Variables	Coefficient	Standard derivation	T statistics	Probabilities
BC (−1)	0.61	0.158	3.85	0
UN	−0.22	0.3	−0.7	0.8
INF	0.13	0.03	0.4	0.7
INF (−1)	0.083	0.043	1.93	0.07
LPGDP	2.14	1.17	1.82	0.09
RRR	0.13	0.03	4.33	0

Microfit Software 4.1. Research estimated and calculated. R^2=0.84, F (6, 24) = 21.46, P (F) = 0.000, D.W=1.81, ARDL: Auto regressive distributed lag

problem, but also is it a social problem i.e., the government and Central Bank of Islamic Republic of Iran should decide on appropriate policies.

Besides, impact factor of inflation rate on bank credit rate is found to be positive in the short - run. However, this has not been statistically proved in this study. The effect of the inflation rate on the bank credit rate was positive on dependent variable in a 1 year time lag confirming the theory and other studies done by Abounoori et al. (2013). The coefficient is 0.08 i.e., in an average for 1% increase in Iran's inflation rate, the bank credit rate have normally increased 0/08%. This variable is significant at the 10% in a meaning level. Therefore, it ecan be concluded that changes in inflation rate in a year later with a probability of 90% will alter the bank credit rate aligned with its changes. During the raise of price level, supplying real money is decreased. In Keynesian analysis framework, reducing the supply of real monetary (excess demand of money) creates disorders in the economy. According to Walrasian balance, in order to create equilibrium in an economy, the occurrences of excess demand of money in market raises the excessive supply of worthy documents leading to the decrease of the price of worthy documents, consequently increasing the market interest rate Therefore, it is theoretically expected that by increasing the price rate, it leads to increase of interest rate. Thus, theoretically, there is a positive cause and effect relationship from inflation rate toward the nominal interest rate.

The real per capita GDP as a production capacity, changes the economic power, the welfare level of the country and bank credit rates towards the positive direction and in the present time GDP as a factor in an economy capacity develops through encouraging and promoting investments. Moreover, increasing the real per capita GDP has a positive and direct relationship with the total aggregate supply of an economy. Thus, increasing GDP enhances the national income and improves the transaction demand and interest rate (bank credit rate). The amount of this coefficient has been estimated 2.14 in the short –run, i.e., by increasing 1% in GDP in short – run, the bank credit rate increases more than 2%. On the other hand, the effect of this relationship is in accordance with economic theories and it has an economic justification, on the other hand, by increasing interest rate (bank credit rate) it increases the expenses of investment and consequently hinders economic growth. Thus, in order to encourage the economic growth along with the expansionary policies the government and the Central Bank can control the bank credit rate and speed up the economic growth. The stated coefficient in 10% is meaningful and with the assurance of 90% it can be said that GDP has effects on the bank credit rate.

The short-run impact factor of legal reserve rate on banks credit rates is positive and its amount is% 0.13. That is, increasing 1% of legal reserve rate increases the bank credit rate about %0.13 which corresponds with the theoretical basis. Thus, banks have to reserve parts of the existed debts and in particular the individuals' deposits in the Central bank. Central bank by increasing the amount of legal reserve rate contracts the amount of the granting credits and by reducing its amount expanses the granting rate.

This model coefficient of determination is (0.84). The F- statistic model shows that the whole model is meaningful. Durbin–Watson statistic proves the absence of positive or negative Autocorrelation among the residuals. Also, the statistics of the model states that there is no problem in serial correlation, model correction, normal distribution, and the variance homogeneity.

Furthermore, we are going to extract the long-run estimates of these variables in order to investigate the effects of long-run variables on bank credit rates. To estimate the long-run relationship among the variables, the following two-step approach is used. In the first step, the existence of a long-run relationship among the variables is examined. If there is a long-run relationship, then the correlated coefficient of long-run variables are estimated. The tests of presence or absence of long-run relationship is done through the following hypothesis test (Noferesti, 2012).

$H_0 : \sum_{i=1}^{p} \varnothing_i - 1 \geq 0$, there is not an integration relationship among the long-run variables:

$H_1 : \sum_{i=1}^{p} \varnothing_i - 1 < 0$, there is an integration relationship among the long-run variables:

Null hypothesis indicates the absence of co-integration in the long-run relationship. The sum of coefficients with dependent variable lags must be less than a unity as long as the short-run dynamic relationship leans to the long-run equilibrium. In order to perform the test, 1 should be subtracted from the sum of the coefficients with dependent variable lag and divided by the sum of the standard deviations of the coefficients then T-statistic related to the above null hypothesis test is calculated as follows:

$$ t = \frac{\sum_{i=1}^{p} \varnothing_i - 1}{\sum_{i=1}^{p} S_{\varnothing_i}} \tag{3} $$

T amount for the model is calculated as follows:

$$ t = \frac{0/61 - 1}{0/1} = -3/9 $$

Thus, according to Tashkini's idea if the calculated absolute of T in any model is larger than of Banerjee, Dolado and Master's critical values, the null hypothesis is rejected and the long-run relationship is accepted (2005). Considering the presented critical value of Banerjee, Dolado and Master matching the research data which is −2.9, a long-run relationship among the variables of the model is accepted. Therefore, it is possible to estimate the long-run relationship among independent and dependent variables. The following Table 3 shows the results of long-run estimates.

The results of the long-run model indicate that the effect of the unemployment rate variable on the bank credit rates is meaningless. The reasons of meaningless can be stated as short- run justification. The sign of the impact coefficient of the unemployment rate on the bank credit rates in the long-run as well as short-run, is negative and it is theoretically confirmed. The impact of inflation rate variables, the real per capita GDP, and the legal reserve rate on

Table 3: The results of long run estimation of the model of the bank credit rate as a dependent variable (1, 0, 1, 0, 0) ARDL

Variability	Coefficient	Standard deviation	T statistics	Possibilities
UN	−0.11	1.8	−0.06	0.95
INF	0.5	0.26	1.89	0.06
LPGDP	1.09	0.51	2.12	0.03
RRR	0.089	0.04	2.25	0.005
C	38.55	44.01	0.8759	0.565

Microfit Software 4.1 research findings, ARDL: Auto regressive distributed lag

the bank credit rates is positive and statistically is meaningful at the maximum level of 10%. Impact factor of all of the variables in the long and short-run are achieved in according to the theoretical expectations. In the long – run, 1% increase in inflation rate leads to a raise of 0.5% in interest rate (bank credit rate). The results confirm Fisher's theory in Iran. Studies show that in many countries, in the long- run, there is a positive relationship between nominal interest rate and the inflation rate i.e., the nominal interest rate is almost a reflection of inflation. The positive relationship between nominal interest rates and the expected inflation is Irving Fisher's classical theory.

The real per capita GDP in the long–run as in the short-run has positive, strong and significant effects on the bank credit rates. The coefficient in the long-run is 1.09 and it means that by 1% increase in real per capita GDP, bank credit rates increases 1.09%. This coefficient is statistically meaningful at a level of 5%.

The legal reserve rate in the long-run as a short-run has a positive and meaningful impact on the bank credit rates. The concluded coefficient supports the theory and its amount is approximately 0.09 i.e., by 1% increase in the legal reserve rate, the bank credit rates will increase 0.1%. The coefficient in 1 level is meaningful.

5.1. ECM
The existence of a co-integration among a set of the variables of a model provides a basis for using the ECM. The model links the short – run fluctuation of the variables to long-run equilibrium amount i.e. the ratio of the imbalances of the short-run dependent variable towards the long-run equilibrium. The Microfit Software presents the ECM corresponding to the selected model. The estimation of this model consists of two steps:

The long-run relationship test uses the lag interruption as an ECM as the following estimation:

$$ \Delta Y_t = a + b \Delta X_t + c U_{t-1} + e_t \tag{4} $$

The impact of error correction i.e., c impact concluded from the aforementioned equation assigned as minus shows the speed of the error correction and leans towards the long-run balance.

Having tested the existence of long - run relationship and estimating the long-run relationship among the variables, the relationship 4–3 calculated and presented in the Table 4.

Table 4: The results of ECM estimation

Variables	Coefficient	Standard deviation	T statistics	Probabilities
dUN	−0.22	0.3	−0.7	0.8
dINF	0.013	0.03	0.4	0.7
dLPGDP	2.14	1.17	1.82	0.09
dRRR	0.13	0.03	4.33	0
dC	7.42	8.92	0.83	0.413
ECM(−1)	−0.19	0.104	−1.82	0.08

ECM: Error correction model

Table 4 shows the justification of coefficient variables. The concept of error correction coefficient (ECM [−1]) indicates the speed of error correction and leaning towards the long-run equilibrium. This coefficient links the speed of the short-run variable fluctuations to the long-run equilibrium amount i.e., the short-run imbalances of dependent variable decreases 19% annually and moves to the long-run equilibrium.

6. CONCLUSIONS

The present study tried to have a research on the effects of the macroeconomic variables on the determination of bank credit rate. According to research findings, while the sign of the estimated coefficient for the variable is negative and concords with the theory, the variable of unemployment rate, neither in short run nor in long - run, does not have effects on the bank credit rates. However, the impact coefficient in both long and short-run is statistically meaningless. According to the theoretical basis, the effect of the inflation rate variable in the short - run of the current year is positive on the bank credit rates but statistically meaningless. However, the bank credit rates (interest rate) with a year of time lag are positively and significantly affected.

Besides, the real per capita GDP, the most important macroeconomic indicator, which the differences of the other variables depend on its differences, so there is a strong positive effect on both short and long-run bank credit rates in the country. The sign of the variable is based on the stated theory and on the 10% level is meaningfully calculated. Increasing the real per capita GDP leads to the increase of the bank credit rates through the impact on the money market by increasing the money demand.

The impact coefficient of the legal reserve rate is statistically significant and positive in both short and long-run on the bank credit rates i.e., the Central Bank uses the legal reserve rate actively in economy.

The concept of error correction coefficient (ECM [−1]) indicates the speed of error correction and the lean of the long-run equilibrium and it is − 0.19. This coefficient links the speed of the short-run variable fluctuations to the long-run equilibrium amount i.e., the short-run imbalances of dependent variable decreases 19% annually and moves to the long-run equilibrium.

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