What Determines the Supply of Loans: A Case Study of Iranian Banks, 1984-1994

Seyed-Nezamaddin Makiyan

Department of Economics, University of Yazd, Iran

August, 1999

Abstract

This paper concerns with the dynamics of loans in Iranian banks which operate under *Shari'ah* principles. During the period of 1984 to 1994 the banking system experienced a significant increase in the supply of loans. One of the key questions is whether there is a causal relationship between the supply of loans and the rate of return to banks. To this end, a model is examined which connects the supply of loans with the rate of return, total deposits and the rate of inflation. The regression analysis in which the quarterly data for the period under study are used indicates that the supply of loans is not significantly related to the rate of return to banks in the short run. However, it is positively related to total deposits and the rate of inflation.

Indirect causality, which shows the causal relationship in the long run, indicates that the supply of loans is weakly-caused by the variables of total deposits, rate of return to banks and inflation. Total deposits are also weakly caused by the supply of loans, rate of return to banks and inflation. These two things mean that both the supply of loans and of total deposits are weakly caused by the rate of return and the rate of inflation. This indicates that these two variables (rate of return and rate of inflation) are weakly exogenous for the variables of the supply of loans and of total deposits. It denotes that changes in the rate of return and the rate of inflation generate changes in the levels of the supply of loans and of total deposits in the long term.

Keywords: Islamic banking, Loan, rate of return, inflation, total deposits, causality, Exogenous.

1. Introduction

This paper concerns with the dynamic of loans in the Iranian Banking system which operates under *Shari'ah* principles. It involves a case study that explains and analyses the operations of loans in Iranian banks. The analysis covers the period from 1363-1373 HS (1984-1994) at a national level. The data period begins in the first quarter of 1984 and runs to the fourth quarter of 1994.

The paper evaluates the performance of lending activities after the basis of bank operations had been transformed by the introduction of Islamic principles. The method which is employed to analyse the data is a regression analysis. To this end, a model is developed to connect the supply of loans with the rate of return to banks, total deposits and the rate of inflation. In this paper certain problems that have restrained or could restrain the efficiency of the system will be explained.

2. Analysis the Supply of Loans in the Iranian Banking System

The banking system consists of the Central Bank (the Bank Markazi), six commercial banks and four specialised banks.[1] By law, all banks are nationalised. They operate under government direction. The objectives and functions of the banking system were declared to be those of a monetary system based on morality and justice and to systematise the issue of money and credit for a healthy and progressive economy. Credit must be used to promote the creation of a just and equitable society, eliminate poverty, and attain self-sufficiency. It must also be used in activities conducive to the attainment of the economic goals, policies and plans of the

[1] Commercial banks include the banks: Melli, Sepah, Saderat, Tejarat, Mellat, and Refah-e Kargaran. The specialised banks are: Banks Keshavarzi (the Agricultural Bank), Maskan (the Housing Bank), San'at-va-Ma'dan (the Industrial and Mining Bank) and Touse'ah-e Saderat (the Export Development Bank)

government. Moreover, the conventional functions of the banking system, such as the maintenance of the value of the currency, equilibrium in the balance of payments, facilitation of exchanges, payments, receipts, etc. were incorporated in the law on interest-free banking. The law specified the types of contracts that must constitute the basis for the liability and asset sides of banks.

As part of the implementation of interest-free banking in Iran, the Bank Markazi established the 'minimum and maximum expected profit' in various economic sectors, and also each mode of financing for lending operations of banks. These rates were from 4% to 24% depending on the year and the type of contract between banks and clients. The following table illustrates the ranges of the expected rates of return from various economic sectors to banks.

Table 1: Sectoral expected rates of return to banks (in per cent)[2]

Source: the Bank Markazi

Year/Sector	1984-1989	1990	1991	1992	1993-1994
Agricultural	4-8	6-9	6-9	9 (minimum)	12-16
Industrial and mining	6-12	11-13	11-13	13 (minimum)	16-18
Housing	8-12	12-14	12-16	12-16	12-16
Trade	8-12	17-19	17-19	17-24	18-24
Services	10-12	17-19	17-19	17-24	18-24
Export	8(minimum)	-	-	-	18 (minimum)

As Table 1 shows, the lowest expected rate of return was associated with the agricultural sector and the highest rate was related to the trade sector. Table 1 states that the average expected rate of return to banks on their loans was about 14% a year. Table 1 needs to be supplemented by Tables 2-4 (see Appendix), showing the

[2] In relation to the housing sector during these years, some preferential minimum expected rates of return extended by banks to academic staff, victims of the war and governmental staff, these ranged from 4% to 7%

minimum and maximum expected rates of return for each mode of financing as determined by the Bank Markazi.

As Tables 2-4 (in Appendix) show, the low expected rates of return in the agricultural sector were set at 4-8% and the high expected rates of return were charged in the service sector at 10-12% annually for 1984-1989. Beginning in 1990, these rates were raised to 6-9% in the agricultural sector and 18-19% for the service sector. From 1992 the rates for the trade and service sectors were allowed to be relatively market-determined, reaching a maximum of 24%. However, these expected rates of return on bank loans were generally less than the inflation rates (set out in Table 5).

In order to compare the average expected rate of return to banks supplying loans to clients with the average rate of inflation, see Table 5 which shows the rates of inflation during the period of investigation.

Table 5: Rates of inflation in Iran based on the year 1990 (in per cent)

Source: the Bank Markazi

Year	1084	-1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Inflation Rate	10.4	6.9	23.7	27.7	28.9	17.4	9.0	20.7	24.4	22.9	35.2

As Table 5 indicates, the average rate of inflation during 1984-1994 was around 20% per year. It should be noted that the official rate of inflation was lower than the actual rate, mainly due to the subsidy of foodstuffs by the government. Nevertheless, this indicates that borrowers on average benefited by approximately 6% from bank loans. In other words, borrowers were unduly subsidised by depositors. This means that the market rates of return were not considered in banking operations.

The expected rates of return on loans have since 1984 been heavily influenced by regulation rather than market information, though the latter could lead to a more appropriate allocation of resources. This influential has resulted in a

situation whereby borrowers have benefited from obtaining loans from banks because the rates of return on loans were lower than the rate of inflation. In other words, the market rates of return were not considered in connection with loans in the Iranian banking system. Expected rates of return on loans should ultimately be market driven. The above description of rates of return on loans shows that lending operations of banks were in accordance with the needs of the economy and not related to the rates of return to banks.

To see whether the descriptive discussion of rates of return on loans is confirmed by a regression analysis, a model for the supply of loans is examined. In pursuit of this goal, the loan supply performance of Iranian banks is regressed against the average rate of return,[3] total deposits and the rate of inflation during the period considered. According to the theory of banking, it is expected that the supply of loans has a positive relationship with rates of return and the size of total deposits in banks, and a negative relationship with the rate of inflation. This means that with an increase in the rates of return on loans and the size of deposits, the supply of loans will increase. On the other hand, with an increase in the rate of inflation, the supply of loans will decrease.[4] Thus, the behavioural assumptions require that β_1, $\beta_2 > 0$ and $\beta_3 < 0$. According to the above, the equation for the regression model is as follows:

$$SL_t = \beta_0 + \beta_1 R_{2t} + \beta_2 TD_t + \beta_3 I_t + \varepsilon_t \qquad (1)$$

[3] In clarifying the average rate of return on loans, the weighted average method is implemented. In short, for the weighted average method each item in the series is multiplied by a weight relevant to its importance, then the total is divided by the sum of the weights. In this analysis, the average rate of return on six modes of financing, i.e. *mudarabah*, civil partnership, mark-up, leasing, *salaf* and *ju'alah*, is calculated and applied as a proxy to the other modes of financing.

[4] It is clear that the relationships between the supply of loans, as the dependent variable, the rates of return and the size of deposits, as the explanatory variables, are positive. However, there is a negative relationship between the supply of loans and the rate of inflation. This is because in an inflationary situation the real rate of return to banks decreases. Therefore, banks are reluctant to offer loans in this situation. On the other hand, one of the policies which is usually applied in an inflationary situation is 'contractionary credit policy'. This means the reduction of loans and credit to the economy from the banking system.

Where

SL_t= Supply of loans as the dependent variable

R_{2t} = Average rate of return on loans as the independent variable

TD_t = Total deposits in banks as the independent variable

I_t = Rate of inflation as the independent variable

β_i = Parameter to be estimated

ε_t = Stationary disturbance term

Since the data is a time series, the first step is to test the variables for their order of integration. Thus, the DF and ADF tests are implemented to investigate the order of stationary of the variables. The results are as follows:[5]

Tables 6-10: Tests for order of integration

Variable	DF(Dickey-Fuller)	Critical Value
D(SLOAN)	-3.792*	Critical Value 1% (-4.19) & 5%(-3.519)
D(ARRLOAN)	-6.403**	Critical Value 1% (-2.618) & 5%(-1.949)
D(TOTALDEP)	-15.54**	Critical Value 1% (-2.618) & 5%(-1.949)
D(INFLATION)	-2.137*	Critical Value 1% (-2.618) & 5%(-1.949)

3 lags	Augmented Dickey-Fuller Unit Root Test on D(SLOAN)		
ADF Test Statistic	-3.531589	1% Critical Value	-3.6067
		5% Critical Value	-2.9378
		10% Critical Value	-2.6069

4 lags	Augmented Dickey-Fuller Unit Root Test on D(ARRLOAN)		
ADF Test Statistic	-2.572649	1% Critical Value	-2.6243
		5% Critical Value	-1.9498
		10% Critical Value	-1.6204

4 lags	Augmented Dickey-Fuller Unit Root Test on D(TOTALDEP)		
ADF Test Statistic	-6.692900	1% Critical Value	-2.6243
		5% Critical Value	-1.9498
		10% Critical Value	-1.6204

4 lags	Augmented Dickey-Fuller Unit Root Test on D(INFLATION)		
ADF Test Statistic	-2.354870	1% Critical Value	-2.6243
		5% Critical Value	-1.9498
		10% Critical Value	-1.6204

[5] The unit root tests are implemented with the 'trend and constant' option for the series of the supply of loans and with the 'none' option for the other variables in the equation

The above results show that all the series, i.e. the supply of loans, average rate of return on loans, total deposits and the rate of inflation are integrated of order one, or I(1). In other words, the variables are stationary in first-difference processes.[6] This provides the prerequisite assumption for the cointegration test which indicates that the variables included in the test are integrated of the same order.

The next step is to determine if the variables are actually cointegrated. To this end, the Johansen methodology is applied for the cointegration test. This is because if more than two variables are included in an equation, there may be more than one cointegration vector. The Johansen test can identify more than one vector of cointegration. Moreover, the result of the cointegration test does not change with the selection of any other variables as the dependent variable. In other words, if we find the variables are cointegrated, the residuals from the cointegration relationship stand stationary according to whichever variable is selected as the dependent variable. This means that the cointegration does not depend upon which variable of the equation is normalised.[7]

The ranks - which determine the number of possible cointegrating vectors - obtained from implementing various lag lengths are shown in Table 11.[8] The maximal eigenvalue (E) and trace test (T) statistics enable us to determine the rank of the stochastic matrix. They suggest the following ranks for the model:

Table 11: Rank of stochastic matrix for the supply of loans

Lag	1	2	3	4	5	6
E	2	2	2	1	3	3
T	2	2	2	1	3	4

[6] The tests for order of integration of the variables (unit root tests) have passed the LM test for autocorrelation in the residuals.

[7] There is one problem, however, with the Johansen approach: the lag length in the VAR system. This approach recommends taking the longest lags feasible with the data set and then working them down by reducing the number of lags in order to find the possible cointegrating vectors. The criteria by which to select the lag length in order to find an appropriate cointegrating vector are: firstly, the signs of the coefficients in the cointegrating vectors, and secondly, the nature of the autocorrelation of the residuals obtained from such vectors. The final criterion is whether the residuals of these vectors are normally distributed.

[8] The cointegration test is applied using the 'PcFiml' package. It should be noted that constant, trend and seasonal variables have been examined in this test. The result shows that only the constant variable is significant. Thus, it is included in the VAR.

The number of cointegration vectors at a given lag length should be less than the total number of variables in the equation. In our case the maximum number of cointegration vectors is three. Moreover, considering the criteria for selecting a suitable cointegrating vector among the competing vectors generated from the various lag lengths leads us to select vector 1 at lag 3 as the best lag length. The maximal eigenvalue and trace tests for the selected lag length are recorded in the table below:

Table 12: The maximal eigenvalue and trace test statistics of the selected lag length (3)

Eigenvalue	H_0: rank = p	λ_{max}	95%	λ_{trace}	95%
0.693267	p = 0	48.45**	28.1	89.87**	53.1
0.460999	p <= 1	25.34*	22.0	41.41**	34.9
0.275303	p <= 2	13.2	15.7	16.07	20.0
0.067664	p <= 3	2.873	9.2	2.873	9.2

The above table states that there are two cointegration vectors at the 5% significant level. To explain further, if we are interested in the hypothesis that the variables are not cointegrated (p = 0) against the alternative of one or more cointegration vectors (p > 0), the $\lambda_{trace}(0)$ statistic can be applied. The above result indicates that the $\lambda_{trace}(0)$ value (89.87) is greater than the 95% critical value of the $\lambda_{trace}(0)$ statistic (53.1). Therefore, it is possible to reject the null hypothesis of no cointegration vectors and accept the alternative of one or more cointegration vectors. Next, the $\lambda_{trace}(1)$ statistic can be used to test the null hypothesis of (p = 1) against the alternative of two cointegration vectors. This null hypothesis can also be rejected in favour of accepting two or more cointegration vectors. This is because the $\lambda_{trace}(1)$ value (41.41) is larger than the 95% critical value of $\lambda_{trace}(1)$ statistic (34.9). Finally, since the $\lambda_{trace}(2)$ statistic (16.07) is less than the 95% critical value of $\lambda_{trace}(2)$ statistic (20.0), the null hypothesis of two cointegration vectors against

the alternative of three cointegration vectors cannot be rejected. This indicates no more than two cointegration vectors between the variables.[9]

In our case we have found that the properties of the residuals of vector 1 at lag 3 are consistent with the criteria (see footnote 6). An analysis of the table of 'standardised β eigenvectors' indicates that the sign of coefficients of the first vector confirms the expectation. This means that the long-run relationship between the variables in the first vector is in agreement with the theory (the principles of equation 1). The long-run relationship of the chosen vector is as follows:[10]

$$SLOAN = -5950 + 294.1 \times ARRLOAN + 1.278 \times TOTALDEP - 88.41 \times INFLATION$$

The cointegrated vector, which shows the existence of long-run relationships between the variables, indicates that the variables do not drift too far apart from each other over time. This indicates that any deviation from the long-run equilibrium is temporary in nature.

Having found an appropriate cointegrating vector, the next stage is to perform the relevant short-run dynamics model. Engle and Granger demonstrated that once the variables are found to be cointegrated, there is always a corresponding error-correction representation between them. Thus, the ECM is the consequent of the selected vector which is compatible with the theory and mentioned criteria. This short-run dynamics model may be generated by the following error-correction form:

---

[9] Although the literature tends to favour the trace test, it is appropriate to also explain the result of the max. test (maximal eigenvalue). Similarly to the trace test, the λ_{max} statistic suggests two cointegration vectors. Since the $\lambda_{max}(0,1)$ value (48.45) is greater than the 95% critical value (28.1) the null hypothesis of no cointegrating vectors, i.e. (p = 0) against the alternative (p = 1), is clearly rejected. The second row of Table 12 indicates that the amount of $\lambda_{max}(1, 2)$ which is (25.34) also exceeds the critical value 95% (22.0). Therefore, the test of the null of (p = 1) against the alternative (p = 2) is also rejected. Finally, the third row of the table indicates that the null hypothesis of (p = 2) against the alternative (p = 3) cannot be rejected. This is because the value of $\lambda_{max}(2,3)$ statistic (13.2) is less than the critical value of 95% (15.7). These results convince us that we must consider two vectors for the cointegration relationship between the variables at lag 3.

[10] The test for vector error autocorrelation indicates that there is no serial correlation in the errors of the selected vector (prob =0.2008). Moreover, the normality test shows that the residuals of the vector are normally distributed (prob =0.0623). The graphical examination of the recursive eigenvalue also displays constancy over time.

$$\Delta SL_t = \beta_0 + \beta_1 \Delta R_{2t} + \beta_2 \Delta TD_t + \beta_3 \Delta I_t + \sum_{i=1}^{n} \alpha_i \Delta SL_{t-i} + \sum_{i=1}^{m} \lambda_i \Delta R_{2t-i} + \sum_{i=1}^{j} \gamma_i \Delta TD_{t-i} + \sum_{i=1}^{k} \eta_i \Delta I_{t-i} + \beta_4 EC(-1) + \varepsilon_t \quad (2)$$

The above relation between the changes in the variables and deviation from the long-run equilibrium is known as ECM. In the above model, the error term with one lag (past period disequilibrium) which can be obtained from the cointegration relationship is used as an explanatory variable in the right-hand side of the ECM as an adjustment. The reason for this is that the short-run dynamics must be influenced by the deviation from the long-run equilibrium. This relates the movement of variables in any period to the previous period's deviation from the long-run equilibrium.

Now, using the (one-period) lagged error term from the cointegration relationship between the variables, the error-correction equation can be estimated.[11] If the ECM equation for the supply of loans is estimated, it produces the following result:

Table 13: Estimation of the supply of loans

LS // Dependent Variable is D(SLOAN)
Sample (adjusted): 1985:2 1994:4
Included observations: 39 after adjusting endpoints

Variable	Coefficient	Std.Error	t.Statistic	Prob.
D(ARRLOAN)	17.32096	35.94046	0.481935	0.6331
D(TOTALDEP)	0.228957	0.054697	4.185879	0.0002
D(INFLATION)	33.43566	16.12821	2.073116	0.0463
D(SLOAN(-1))	0.297459	0.082382	3.610730	0.0010
D(SLOAN(-4))	0.532199	0.125212	4.250384	0.0002
D(ARRLOAN(-4))	-70.16207	33.18655	-2.114172	0.0424
EC(-1)	-0.309308	0.085869	-3.602068	0.0011
R-squared	0.948358			
Adjusted R-squared	0.938675			
Durbin-Watson stat.	1.911871			
F-statistic	97.94190			
Prob (F-statistic)	0.000000			

[11] It is worth noting that the inclusion of certain lags in the ECM and in subsequent equations is based on the general-to-specific methodology. This states that the maximum possible number of lags (6) of all relevant variables must be included in the equations and then worked down by eliminating those that are statistically insignificant.

This result shows that the sign and probability of the coefficient of the error term are as expected. In other words, the coefficient of the error term (EC(-1)) taken from the long-run relationship between the variables of the supply of loans as the dependent variable and the independent variables (i.e. the average rate of return on loans, total deposits and the rate of inflation) is negative and significantly different from zero. This means that the movements of the variables in the equation towards the long-run equilibrium respond to the magnitude of the disequilibrium. The speed of adjustment (the coefficient of the error term) in the above ECM equation is 0.30. This indicates a relatively rapid adjustment towards long-run equilibrium. The adjusted R^2 - the level of variability of the supply of loans explained by the ECM model - is equal to 0.93, which is high.

The same method should be used to estimate all the other variables in the selected cointegration vector. In this way, it is possible to investigate causality through the statistical significance of the error-correction term. Thus, following the above ECM equation, we should perform another three ECM-causality equations to find the exogeneity or endogeneity of the variables. These equations are implemented and the results are summarised as follows:

Table 14: Summaries of the ECM equations for causality findings for the supply of loans

DV	ΔSL	ΔR_2	ΔTD	ΔI	EC(-1)	Adj.R^2	LM
ΔR_2	1	0	0	0	2.93E-05 (0.43)	0.04	0.096 [0.75]
ΔTD	4	2	1,5,6	0	-1.482 (-4.34)	0.91	1.31 [0.25]
ΔI	0	0	0	1	0.0001 (1.14)	0.58	0.32 [0.57]

In the above table, the figures in columns 2-5 represent the number of the lag length(s) of the variables at the head of the column that appeared in the ECM

equations for causality findings.[12] The term EC(-1) is the lagged error-correction term. The t-statistics of the error-correction terms are given in parentheses below them. The sixth column of the table shows the adjusted R-squared. The last column is related to the LM test (which is a χ^2 test with 1 degree of freedom). The figures in the square brackets are the probabilities of the LM tests.[13]

We can now explain the results obtained from the four ECM equations in terms of the causal relationships that they exhibit. The evidence on direct causality can be observed from the variables which are shown in the ECM for the supply of loans (Table 13), and the subsequent ECM equations for causality findings (Table 14). Direct causality indicates the impact on the dependent variable of lagged changes of the variables in the equations in the short-run. The above results show that the supply of loans is negatively caused by the rate of return. The rate of return is also caused by the supply of loans. They indicate a two-way pattern of causality. The variable of total deposits is caused by the supply of loans and the rate of return, but it does not cause either of them. The rate of inflation is not directly caused by any of the other variables.

The error-correction term can also show the exogeneity or endogeneity of a variable and its long-run causality in terms of the indirect causal relationship between the variables; the 'causal' variable in this framework is described in the literature as being weakly exogenous. The ECM for the supply of loans shows that the error-correction term has a negative sign and is significantly different from zero. This means that the supply of loans is weakly-caused by the other variables. The subsequent equations which are summarised in the table for causality findings (Table 14) indicate that only the error-correction term for the variable of total deposits is negative and significant. This indicates that total deposits are also

---

[12] For example, for the variable of average rate of return on loans as the dependent variable, apart from the inclusion of the changes in all the other variables, only lag 1 of the variable of the supply of loans is incorporated in the equation

[13] It should be noted that the coefficients of the lags of all the variables in the final equations for causality findings were significantly different from zero at the 5% level

weakly-caused by the other variables, i.e. the supply of loans, the rate of return and the rate of inflation. These causal relationships indicate that both the supply of loans and total deposits are caused by the variables of the rate of return and the rate of inflation. Thus, the variables of the rate of return and the rate of inflation are 'weakly exogenous' for the supply of loans and also total deposits in the long-run. To put it another way, it is changes in these two variables that generate changes in the levels of the supply of loans and of total deposits.

Finally, diagnostic checks can determine the suitability of the ECM model for the supply of loans. If the model passes the tests for the residuals, such as the LM, normality and the ARCH tests, then we can rely on the interpretation of the result of the estimated model. These tests are implemented and the results are as follows:

Table 15: Test for autocorrelation in the residuals

Serial Correlation LM Test: 4 lags			
F-statistic	0.986409	Probability	0.431001
Obs*R-squared	4.745737	Probability	0.314395

Figure 1: Test for normality in the residuals

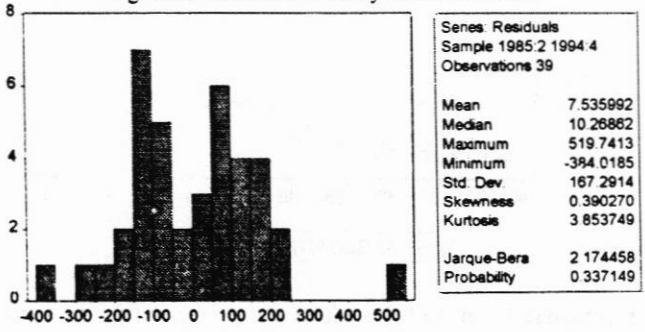


Table 16: Test for *heteroskedasticity* in the residuals

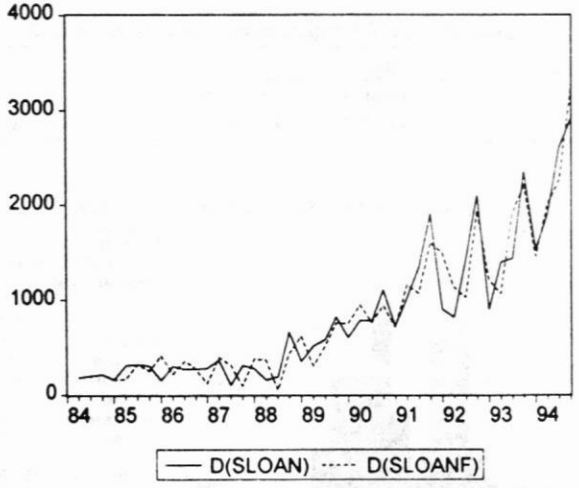
ARCH Test: 4 lags			
F-statistic	0.924221	Probability	0.462919
Obs*R-squared	3.839847	Probability	0.428114

The above results show that the equation for the supply of loans passed the diagnostic tests for the residuals. Thus, the estimated model can be written as follows:

$$\Delta SL_t = 17.32 \times \Delta R_{2t} + 0.22 \times \Delta TD_t + 33.43 \times \Delta I_t + 0.29 \times \Delta SL_{t-1} + 0.53 \times \Delta SL_{t-4} - 0.70 \times \Delta R_{2t-4} - 0.30 \times EC(-1)$$
$$(0.48) \quad (4.18) \quad (2.07) \quad (3.61) \quad (4.25) \quad (-2.11) \quad (-3.60)$$

The following graph also shows that the changes in the supply of loans are closely predictable by the changes in the independent variables. The actual and fitted values of the dependent variable come close to one another, particularly after 1991 when banks were allowed relative freedom to determine the rates of return on loans based on market information for the trade and service sectors.

Figure 2: Actual and fitted values of the changes in the supply of loans



From the result of the ECM equation implemented for the supply of loans, it can be seen that the changes in the average rate of return on loans (D(ARRLOAN)) is not significant. This means that the supply of loans in this case has no relationship to the rates of return. The other explanatory variables, i.e. the changes in total deposits (D(TOTALDEP)), the changes in the rate of inflation (D(INFLATION)), and the changes in the time lags of variables, are significant.

However, the sign of the variable of changes in the inflation rate (D(INFLATION)) is positive which is opposed to the theory.

The above may be interpreted as follows: firstly, the rate of return in the ECM equation for the supply of loans is not significant. This means that the supply of loans in the Iranian banking system is not determined by the rates of return on loans. This is because the banking system in Iran aimed to provide low-cost credits and facilities for carrying out of certain objectives held by the government. Banks must follow the rules established by the Central Bank and the Council on Money and Credit. These two organisations determine the extent of credits, maximum and minimum rates of return on loans, the priorities of the economic sectors in order to obtain loans, etc. As a result, the rates of return to banks have not generally been based on market information. The exception was the rates of return demanded from the service and trade sectors, with regard to which, banks have been relatively free since 1992. In short, the banking system has been considered as a direct instrument of the government in order to supply cheap loans and to carry out a range of selected credit policies. The provision of cheap loans for major projects, such as the housing of civil staff, labourers, war victims; low-cost loans for the agricultural and co-operative sectors; interest-free loans (*qard-al-hasanah*) for the needy, etc. are examples of such obligations on the banking system. Apart from the above, the rates of return on loans have usually been below the rate of inflation. The banking system does not have and has not had any independent right to claim an appropriate rate of return on loans which should be at least equal to the rate of inflation. The absence of private banks which would have created competition between banks and would thus have led to an improvement in the situation is a further reason for the absence of a relationship between the supply of loans and the rate of return. Thus, it is expected that the estimation of the ECM equation for changes in the supply of loans shows that changes in the rate of return are not significant. This means that the capital-users have benefited unduly from obtaining loans from banks. The low-cost and preferential loan policy cannot separate the economic activities which are

profitable from those investments which are not. In other words, rates of return have not provided resource allocation signals for banks. It may be said that this non-market oriented approach in Iranian banks for rates of return helps borrowers at the expense of depositors, banks and the economy in general.

Secondly, the supply of loans should remain in step with total deposits. This is confirmed by the sign of relevant coefficients in the selected cointegration vector, i.e. the positive relationship between the supply of loans and total deposits. It is obvious that the more deposits a bank has, the better it is able to extend its lending activities, which in turn increases the level of deposits.

Finally, as regards the rate of inflation, according to the theory, the supply of loans should have a negative relationship with the rate of inflation. However, the result of the ECM model shows that there is a positive relationship, not compatible with the theory, between the changes in the supply of loans and the changes in the rate of inflation. This may arise from the fact that since the Revolution, monetary and credit policies have been dictated in practice by the financial requirements of the economy. For example, the obligation of banks to finance major projects as an alternative to the use of government funds, loans for the reconstruction of cities which were demolished by the war or earthquakes, loans for war victims and the weaker units of the economy such as the agricultural and co-operative sectors put pressure on banks to offer such loans against their will. These loans yield rates of return considerably lower than the rate of inflation. In fact, as long as depositors are subsidising these investments, it is advantageous for the government to encourage the offer of such loans. The justification of the authorities is the long-term social benefits of such investments. Another reason for the positive sign in the coefficient of the variable of the changes in the inflation rate is that as inflation has gone up, the purchasing power of people and also of the government has decreased. Thus, the government has increased the money supply in order to maintain its purchasing power. Consequently, the supply of money has increased which in turn has

increased the supply of loans. The increase in the supply of loans, however, has been much less than that of the increase in the money supply.

In short, given the financial needs of the economy, the constraints imposed by the government on banks to grant low-cost loans and the inflationary situation of the Iranian economy, it is not unexpected that the rate of return on loans is insignificant, and that there is a positive relationship between the changes in the supply of loans and the changes in the rate of inflation in the result of the ECM equation.

3. Concluding Remarks

This paper explained that the supply of loans was largely dependent on the needs of the economy and the pressure of the government on the banking system. The granting of loans has not been encouraged by their rates of return. In fact, in a situation where rates of return on loans have been lower than the rate of inflation, it was beneficial for borrowers to obtain loans from banks. The related model which connects the supply of loans to the rates of return, total deposits and rate of inflation was examined in this paper. The result of the ECM equation shows that the changes in the supply of loans in the Iranian banking system are not related to the changes in the rates of return on loans. The evidence on indirect causality observed from the error-correction model shows that weakly exogenous variables are those of the rate of return and the rate of inflation for both the supply of loans and of total deposits. This indicates that changes in the rate of return and the rate of inflation generate changes in the levels of the supply of loans and of total deposits. Moreover, the positive sign of the variable of inflation in the ECM denotes that the supply of loans does not follow the theory, according to the market mechanism point of view, and is related rather to the financial needs of the economy.

The general conclusion of the analysis of the supply of loans in Iran indicates that, banks must be allowed to be reasonably free in their asset acquisition and in lending activities in terms of the market determination of rates of return. This also

leads to the payment of a suitable return to depositors. A further step for the improvement of banks could be to allow the establishment of private financial institutions and investment companies, even in partnership with foreign shareholders. This can provide an environment of competition between the banks and these institutions, leading to the improvement of banking services and also helping market forces to be reflected in both loans and deposits.

References:

Baillie, R. T. and T. Bollerslev (1994), "Cointegration, Fractional Cointegration and Exchange Rate Dynamics", *Journal of Finance*, Vol. 49, pp. 737 -745.

Berger, A. N. (1995), "The Profit-structure Relationship in Banking, Tests of Market-Power and Efficient-structure Hypothesis", *Journal of Money, Credit and Banking*, Vol. 27.

Cheung, Y. W. and K. S. Lai (1993), "Finite Sample Sizes of Johansen's Likelihood Ratio Tests for Cointegration", *Oxford Bulletin of Economics and Statistics*, Vol. 55, pp. 313-328.

Crowder, W. J. and D. L. Hoffman (1996), "The Long-Run Relationship Between Nominal Interest Rates and Inflation: the Fisher Equation Revisited", *Journal of Money, Credit and Banking*, Vol. 28, No. 1, pp. 103-118.

Dickey, D.A. and W. A. Fuller (1979), "Distribution of the Estimators for Autoregressive Time Series with a Unit Root", *Journal of the American Statistical Association*, Vol. 74, pp. 427-431.

Enders, Walter (1995), *Applied Econometric Time Series*, New York, John Wiley & Sons.

Engle, Robert F. and Granger, C. W. J. (1987), "Cointegration and Error Correction Representation, Estimation and Testing", in *Econometrica*, Vol. 55, No. 2, pp. 251-276.

Gonzalo, J. (1994), "Five Alternative Methods of Estimating Long-Run Equilibrium Relationships", *Journal of Econometrics*, Vol. 60, pp. 203-233.

Hall, S. G. (1989), "Maximum Likelihood Estimation of Cointegrating Vectors: An Example of Johansen's Procedure", *Oxford Bulletin of Economics and Statistics*, Vol. 51, pp. 213-218.

Haug, A. A. (1996), "Tests for Cointegration: A Montecarlo Comparison", *Journal of Econometrics*, Vol. 71, pp. 89-115.

Hendry, David F. (1995), *Dynamic Econometrics*, Oxford, Oxford University Press.

Johansen, S. (1988), "Statistical Analysis of Co-integrating Vectors", *Journal of Economic Dynamics and Control*, Vol. 12, pp. 231-254.

Johansen, S. (1991), "Estimation and Hypothesis Testing of Cointegrating Vectors in Gaussian Vector Autoregressive Models", *Econometrica*, Vol. 59, pp. 1551-80.

Johansen, S. (1992), "Determination of Cointegrating Rank in the Presence of a Linear Trend", *Oxford Bulletin of Economics and Statistics*, Vol. 54, pp. 383-97.

Johansen, S. and K. Juselius (1992), "Some Structural Hypotheses in a Multivariate Cointegration Analysis of Purchasing Power Parity and Uncovered Interest Parity for the UK", *Journal of Econometrics*, Vol. 53, pp. 211-244.

Maddalla, G. S. (1992) *Introduction to Econometrics*, 2nd edn., London, Prentice Hall International.

Murinde, V., K. Naser and R. S. O. Wallace (1995) "Is it Prudent for Islamic Banks to Make Investment Decisions Without the Interest Rate Instrument?" *Research in Accounting in Emerging Economies*, Vol. 3, pp. 123-148.

Osterwald-Lenum, M. (1992), "A Note With Quartiles of the Asymptotic Distribution of the ML Cointegration Rank Test Statistics", *Oxford Bulletin of Economics and Statistics*, Vol. 54, pp. 461-472.

Phillips, P.C.B. and P. Perron (1988), "Testing For a Unit Root in Time Series Regression", *Biometrika*, Vol. 75, pp. 335-346.

Shirazi, Habib (ed.) (1990), *Islamic Banking*, London, Butterworths.

Toda, H. Y. and C. B. Phillips (1993), "Vector Autoregression and Causality", *Econometrica*, Vol. 61, pp. 1367-1993.

Appendix:

Table 2: Expected rates of return from transactions for 1984-1989 (in per cent)

Source: the Bank Markazi

Mode of Finance	Production Sector				Trade and Service Sectors	
	Agricultural	Industrial	Mining	Housing	Services	Commercial
Mudarabah						
Minimum expected rate of return:						
Import and domestic trade						12
Export						8
Agricultural						8
Civil Partnership (*Musharakah*)						
Minimum expected rate of return:						
Import and domestic trade	6	8	8		12	12
Export						8
Housing:						
Civil servants				7		
War victims				4		
Other				10		
Mass production of housing:						
Civil servants' co-operative				7		
Labourers' co-operative				10		
Other				12		
Mark-up						
Instalment sales of machinery:						
Minimum expected rate of return	6	8	8		10	
Maximum expected rate of return	8	10	10		12	
Instalment sales of raw material:						
Minimum expected rate of return	4	8	8			
Maximum expected rate of return	8	12	12			
Instalment sales of housing:						
Civil servants				7		
Labourers				8		
War victims				4		
Other				10		
Lease-purchase						
Minimum expected rate of return	6	8	8		10	
Maximum expected rate of return	8	10	10		12	
Salaf						
Minimum expected rate of return	4	8	8			
Maximum expected rate of return	8	12	12			
Ju'alah						
Minimum expected rate of return	6	8	8	10	10	
Maximum expected rate of return	8	10	10	12	12	

Table 3: Expected rates of return from transactions for 1990-1991 (in per cent)
Source: the Bank Markazi

Mode of Finance	Production Sector		Housing		Trade and Service Sectors		
	Industrial	Mining	Private and co-operative	Mass Production	Services	Commercial	Other
Mudarabah							
Minimum expected rate of return						19	
Civil Partnership (*Musharakah*)							
Minimum expected rate of return	13	12	12	14	18	18	14
Mark-up							
Instalment sales of machinery:							
Minimum expected rate of return	11	11			18		14
Maximum expected rate of return	12	12			19		
Instalment sales of raw material:							
Minimum expected rate of return	13	12					
Instalment sales of housing:							
Civil servants			7				
Labourers			8				
War victims			4				
Other			12				
Lease-purchase							
Minimum expected rate of return	13	12	12		18		14
Maximum expected rate of return					19		
Salaf							
Minimum expected rate of return	13	12					
Ju'alah							
Minimum expected rate of return	13	12	12		18	18	14
Maximum expected rate of return					19	19	

Table 4: Expected rates of return from transactions for 1992-1994 (in per cent)
Source: the Bank Markazi

Mode of Finance	Production Sector		Housing		Trade and Service Sectors		
	Industrial	Mining	Private and co-operative	Mass Production	Services	Commercial	Other
Mudarabah							
Minimum expected rate of return						24	
Civil Partnership (*Musharakah*)							
Minimum expected rate of return	16	16		24	24	24	
Mark-up							
Instalment sales of machinery:							
Minimum expected rate of return	13	13			18		
Maximum expected rate of return					19		
Instalment sales of raw material:							
Minimum expected rate of return	13	13					
Lease-purchase							
Minimum expected rate of return	13	13	16		18		
Maximum expected rate of return					19		
Salaf							
Minimum expected rate of return	17	17					
Ju'alah							
Minimum expected rate of return	16	16	16		22	22	
Maximum expected rate of return	17	17			24	24	
Debt-Purchasing							
Minimum expected rate of return						24	