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The relationship between credit risk and money volume in economy of the Iran

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Abstract: Financial policies are the leverages that countries use them for accessing to the macroeconomic goals. In economy of Iran that Central Bank does not use all main tools of money policies and determining the money volume is not fully available for Central Bank, banking credit volume is one of the most important tools that Central Bank can use it for performing the money and credit policies based on its goals. The main objective of this study is the relationship between credit risk and money volume in economy of the Iran by time series data during the period of 1991 to 2012. Dependent variable is money volume (liquidity) and independent variable is outstanding receivable as credit risk and other variables of the research contain inflations, GDP, currency rate, and interest rate. The results of research based on using econometric methods contain time series stationary test and estimating with VAR method indicate that outstanding receivable as credit risk has negative and significant effect on liquidity volume. In fact, the increase the outstanding receivable causes that presenting facilities faces to problems and liquidity volume decreases in the country.

Key words: Credit risk; Money volume; VAR method

1. Introduction

Correct relationship between financial system and production system in any country considers as the most important factors of economic growth and development. Banks will be responsible as the major part of financial system to play major role in financing the sectors of production, commercial, consumer, and even governmental. Production in one society causes to increase in money volume and vice versa and with the increase in production, demand for banking facilities will be increased and economic prosperity will be increased. Now, if the investors' motivation to activity and the amount of their income reduces, they will not be able to pay their assets; therefore, outstanding receivable will be increased and somehow it causes to increase the credit risk of the country. In Iran, due to the country economic structure and some reasons like: lack of capital market development and other non-bank networks, financing the real economic sectors is banks branches responsibility of the country. Unfortunately, this sector has not been that much successful in approaching to its mission. Now, continuing the activities and survival of the country's banks is more because of government support. Besides the above-mentioned, it is essential to note that the growing trend of outstanding receivable has been one of the most important challenges facing of the country's banking system in recent years. Oriented monetary and financial markets and having the bulk of liquidity of the country has become the national challenge. Currently, most of the banks of Iran face to imprisonment resources as outstanding receivable which with regard to growing trend of differing facilities by day to day, the power of accredited banks and finally, their earning money will be reduced. However, the ratio of outstanding receivable to facilities in some banks has increased in several times of acceptable limited amount (2%). According to the posed issues, it is obvious that determining and study the effective factors on credit risk of banks and credit institutions is very important; because, it can avoid happening damages of defaulted loans and banking crisis subsequently. The aim of this research is to study the relationship between money volume and credit risk of banks in economy of Iran.

2. The importance of credit risk in banks

Banking system is one of the main components of economic system that its correct performance can help to growth the economic system. Without the doubt, one of the consequences of money activities of banks and credit institutions is creation of outstanding receivable which creates considerable effects in economic system. This issue in addition of reducing bank profitability leads to slow the rotation of liquidity in the economy and the recession. One of the problems that the banking system of the countries faces to is increasing outstanding receivable to total given facilities in banking network of the country which indicates decreasing the quality of assets of banking network and subsequently is the considerable financial instability in the future. Whatever the amount of these types of assets is less, it indicates the ability of keeping available resources

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by banks. Presenting financial facilities considers as one of the important activities in banking system of the country. For giving facilities, it is important to determine the degree of credit and the power of repayment the principle and interest of facilities receiver to estimate realistically from the possibility of avoid paying facilities by customers in order consider actions and require decisions to prevent or dealt with the potential losses. Credit risk is the oldest and biggest danger which is in trades and fuel risk of credit granted by the failure to pay the debts of the borrowers happens, is one of the biggest management dangers until now. Credit risk is the probability of non-performance of the bank's customer commitment. The facilities those principles and interests are not paid completely and or they are along with delay, is the source of credit risk for banks. One of the most important challenges facing the banking system of the country in recent years has been the growing trend of outstanding receivable. Oriented monetary and financial markets and having the bulk of liquidity of the country has become the national challenge. Currently, most of the banks of Iran face to imprisonment resources as outstanding receivable which with regard to growing trend of differing facilities by day to day, the power of accredited banks and finally, their earning money will be reduced. However, the ratio of outstanding receivable to facilities in some banks has increased in several times of acceptable limited amount (2%). According to the posed issues, it is obvious that determining and study the effective factors on credit risk of banks and credit institutions is very important; because, it can avoid happening damages of defaulted loans and banking crisis subsequently.

3. The method of research

Present research is functional research and it is the correlation type and in which, effective variables on money volume (liquidity) have been studied based on VAR econometric method by time series data during period of 1991 to 2012. The variables used in this research contain outstanding receivable volume (credit risk), money volume or liquidity, interest rate, currency rate, inflation and GDP. Spatial domain of this research is the economy of Iran.

4. The stationary of research variables

Since, most of the economic time series are non-stationary; the possibility of outbreak the spurious regression in econometric estimations is very high. Because, if the variables of time series are not stationary, they might gain high R^2 even in the situation that there are no any relationship among variables. Therefore, before doing any analysis, some tests should be done about the stationary of variables and the degree of their integration. Unit root test is one of the most common tests which nowadays are used to determine the stationary of one process of time series.

Therefore, in this study, first of all the stationary of variables is determined in the model by Dicky-Fuller test (ADF). According to the table 1, all variables of the research have been stationary with one difference.

Table 1: The stationary of research variables with one difference based on Dicky-Fuller test

Variable	Symbol	Statistic	Critical Values	Prob.
Exchange rate	ER	-4.901745	-2.986225	0.0006
Gross Domestic Product	GDP	-5.083684	-3.622033	0.0024
Money	M	-3.045220	-2.986225	0.0443
Outstanding Claims	Mo	-24.97040	-3.065585	0.0001
Inflation	P	-5.469102	-2.998064	0.0002
Rate of Interest	R	-3.12456	-2.52346	0.0352

5. The estimation of long term relationship among variables

After studying the stationary of variables, now it has been dealt with to estimate long term relationship and extract the co integration vectors. To obtain long-term relationship, with using of two statistics of special amount (λMax) and effect test (λ Trace) can determine the obtained of co integration and the numbers of co integration equations among variables. According to the Johansen-Joselius method, to obtain the co integration vectors, the matrix rating II should be determined. Determining the rate is done by their estimation and related characteristic root. The results of those tests are presented in table 2.

Table 2: Determine the numbers of co integration vectors

Rank		Trace Test (Trace)			Maximum Eigen Value Test (Max)		
H_0	H_1	Statistic	Critical Values (Sig. 5%)	Prob.	Statistic	Critical Values (Sig. 5%)	Prob.
r=0	r=1	152.14	88.8	0.001	80.08	38.34	0.001
r<1	r=2	94.05	63.87	0.001	39.04	32.12	0.006
r<2	r=3	51.01	42.91	0.001	25.01	25.71	0.060
r<3	r=4	28.99	25.87	0.030			
r<4	r=5	8.4	12.51	0.340			

According to the obtained results of table 2, for determining the numbers of co integration equations, it starts in order of zero hypothesis test, the absence of co integration vector (r=0) and it moves toward r=k-1 until to reach to the situation which cannot reject the hypothesis of the obtained of maximum r co integration vector in contrast the numbers of more co integration vectors. This situation happened when effect test statistic and or especial amount test presented from critical amount and or on the other words, the probability is more than 0/05 in the significant level of 5% and the hypothesis of H0 is confirmed.

With this explanation and with regard to table in above and based on effect test (λTrace), the presence of maximum four co integration vectors is confirmed. This means that there are maximum four long term relationships among variables of model based on effect test (r=4). However, the presence of maximum 2 co integration vectors has been confirmed based on maximum especial amount test (r=2). Because, in the significant level of 5%, the amount of statistical test is smaller than critical amount and therefore, the hypothesis of H0 based on the presence of 2 co integration vectors is confirmed and the hypothesis of H1 based on the presence of more than 2 co integration vectors is rejected.

According to this issue that in effect test, the presence of 4 co integration vectors is confirmed but in maximum especial amount test, the presence of maximum 2 co integration vectors is confirmed, therefore, for determining co integration vector can investigate the estimated vectors and observes that which vectors are justified more.

Since, in maximum especial amount test, for determining co integration vectors, maximum likelihood method is used, therefore, it has less variance than effect test, therefore, in this study, the results of maximum especial amount is used to determine the numbers of co integration vectors. Two co integration vectors are used to estimate the function. With considering two co integration vectors and or on the other words, the presence of two dynamic linear combinations of variables of the studied model, in this section of study, the normality act of vectors is done. The obtained co integration vectors and normalized vectors are presented in table 3.

Table 3: Normalized co integration vectors

Model Variables	First Co integration Vector	Second Co integration Vector
Money	1.00	0.00
Interest Rate	0.00	1.00
outstanding claims	-5.56	37.48
Standard deviation	0.82	5.53
t Statistic	-6.77285	6.78291
Inflation	-68.24	464.37
Standard deviation	12.09	81.46
t Statistic	- 5.64195	5.70073
Gross Domestic Product	43.32	288.68-
Standard deviation	51.78	7.69
t Statistic	5.57563	- 5.63539
Exchange rate	-1.531885	0.000888
Standard deviation	.48689	0.00051
t Statistic	-3.14626	1.74475
intercept	-11643.92	-1747.76

6. Short term results of the model

Before estimating the VAR model, selecting the numbers of optimal lags is required. In this purpose, Akaike and Schwarz indexes are used. The results are as follow table 4.

Table 4: Selecting the numbers of optimal lags

Lag	HQ	SC	AIC	FPE	LR	LogL
0	119.694	119.959	119.665	3.76e+44	NA	-1011.154
1	90.8889*	92.7429*	90.6843*	1.33E+32*	332.161*	-728.817

The number of optimal lag is equal to 1 by Akaike and Schwarz. According to the obtained results, most of the calculated coefficients with regard to t statistical in significant level of 5% have enough significant statistics. It is essential to note that research data are inserted as logarithmic in the model. Therefore, the analysis can be based on tension. According to the obtained results, liquidity tension to change in each of model variables is shown.

Also, due to the obtained results in estimating error correction vector model, most of the coefficients are significant and all variables are in accordance with expected sign.

Table 5: The estimation of short term relationship among variables

	M	ER	P	GDP	R	MO
M(-1)	1.093192	10.52427	0.003057	60.96892	0.023921	6.85956
Standard deviation	(0.25429)	(4.76908)	(0.00128)	(19.1098)	(0.00804)	(3.53092)
t Statistic	[4.29894]	[2.21606]	[2.33657]	[3.19547]	[2.49249]	[1.94160]
	M	ER	P	GDP	R	MO
ER(-1)	-0.044621	0.041968	-0.08881	1.868757	0.04222	-15.19506
Standard deviation	(0.01731)	(0.01900)	(0.05104)	(1.07363)	(0.02164)	(7.5012)
t Statistic	[-.31312]	[.15770]	[-1.7447]	[1.74778]	[1.95220]	[-2.02536]
	M	ER	P	GDP	R	MO
P(-1)	-0.409888	87.73506	1.151038	-16.95586	0.062799	7.226081
Standard deviation	(0.18599)	(38.4780)	(0.07356)	(8.9682)	(0.02398)	(3.9453)
t Statistic	[-.19905]	[2.28132]	[15.6482]	[-1.89741]	[2.59671]	[1.83461]
	M	ER	P	GDP	R	MO
GDP(-1)	0.044973	-0.060646	-2.48E-05	0.258364	-5.88E-05	-32.02207
Standard deviation	(0.02072)	(0.03108)	(1.11711)	(0.13157)	(1.97315)	(16.50515)
t Statistic	[1. 3967]	[-1.93962]	[-2.22261]	[1.90240]	[-2.9855]	[-1.94383]
	M	ER	P	GDP	R	MO
R(-1)	- 23.5267	29.85763	1.531885	-35.46798	0.294625	1016113
Standard deviation	(13.6744)	(14.1469)	(0.48726)	(151.568)	(0.1361)	(543375.9)
t Statistic	[-1.7260]	[2.11729]	[3.14626]	[-2.3468]	[2.13171]	[1.87303]
	M	ER	P	GDP	R	MO
MO(-1)	-0.091457	3.63E-09	1.85E-11	-1.11E-07	2.38E-11	0.999980
Standard deviation	(0.05321)	(1.50622)	(0.92964)	(0.35350)	(0.90151)	(1.96035)
t Statistic	[-1.7181]	[2.4131]	[1.9972]	[-3.1463]	[2.64256]	[50501.0]
	M	ER	P	GDP	R	MO
C	-177.3181	-21061.34	30.62089	4604.188	27.60535	7.5010
Standard deviation	(554.094)	(10077.19)	(15.3869)	(2182.07)	(10.2985)	(0.2261)
t Statistic	[-0.32944]	[-2.09527]	[1.99269]	[2.11401]	[2.68537]	[33.1622]
R^2	0.9537	0.7245	0.9892	0.9123	0.8297	0.9512
Adjusted R^2	0.9259	0.5592	0.983	0.959	0.7276	0.9421

7. The results of first model are as follow

The determine coefficient shows well explanation power of model and it is in amount of 95%. In the estimated first model with VAR, it has been dealt with the effect if research variables on liquidity that inflation and outstanding receivable, currency rate and interest rate causes to decrease liquidity in the country and production causes to increase the liquidity and the positive and significant effect on liquidity has been shown.

In second model, determine coefficient is the explanation power of model in amount of 72%. According to the estimation coefficient, negative effect of production on currency rate has been shown and the variables of inflation, outstanding receivable and liquidity and interest rate has shown positive and significant effect on currency rate and it causes to increase the currency rate.

In the third model, determine coefficient is the explanation power of model in amount of 98%. In the third model, it has been dealt with the effect of variables on inflation in the country that outstanding receivable, liquidity and interest rate have had positive effect on inflation and they cause to increase inflation in the country and production and currency rate have had negative effect on inflation and they cause to decrease inflation in the country.

In the fourth model, determine coefficient is the explanation power in amount of 98%. It has been dealt with the effect of variables on GDP that liquidity and currency rate have shown positive effect on production in the country. Inflation and outstanding receivable and interest rate have had negative effect on production and on the other words, the increase in these variables causes to decrease in production in the country.

In the fifth model, determine coefficient is the explanation power in amount of 82%. It has been dealt with the effect of variables on interest rate that outstanding receivable, liquidity, inflation, and currency rate have had positive effect on interest rate and production has had negative effect on interest rate.

8. Conclusion

The results of research show that the main variable of the research, outstanding receivable as credit risk has had negative and significant effect on dependent variable of liquidity volume. This means that the increase in credit risk and increase the outstanding receivable causes to decrease production and banking resources, it causes the presenting facilities to face to the problems and even stop them and also decreasing the giving loan causes to reduce the liquidity volume. In fact, one of the country industry problems is lack of liquidity and it can be caused by increase the outstanding receivable as credit risk in banking system. On the other hands, the results of research show that inflation reduces the liquidity in the country. This effect is also because of the direct effect of inflation on decreasing

the money value and also because of its indirect reason which people exchange their liquidity to different types of assets due to the hot money causes of inflation.

Also, the results indicate that GDP has positive and significant effect on money volume (liquidity) in the country and this shows increase in production leads to increase saving and consequently it causes to increase the amount of giving loan and liquidity. The results also show that the increase in currency rate leads to increase the production and exports and consequently, it leads to increase the significant liquidity in the country. However, this effect is as shock way, it can reduce liquidity with changing from Rial to Dollar. The results show that the increase interest rate decreases the liquidity. This means that the increase interest rate collect the liquidity of the society and due to the increase the interest rate, presenting facilities and production face to serious problems which can finally reduce the money volume. The obtained results show in adjusted model, all coefficients have expected signs and they are in accordance to theoretical studies.

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