

The effect of the credit risk on the profitability of those banks listed on Tehran Stock Exchange

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Abstract

This study aims to examine the relation between the effects of credit risk on the profitability of the stock exchange-listed banks. The issue of credit risk and non-performing loans is one of the most important and sensitive issues in the banking industry which is named as the main cause of bank failures. In order to investigate the relationship between credit risk in this study, variable-current loans of doubtful debt provision and the ratio of bad debt provision have been used and their relation with banks' profitability variables including return on assets and return on equity have been assessed. The population of this research consists of the all accepted banks in Tehran stock exchange among which 8 banks have been finally selected as samples which were collected during a five-year-period from 2010 to 2014 by Novin Rahavard software and then they were analyzed using panel data regression and Eviews6 software. The results of the research indicated that the hypothesis was accepted. This means that credit risk has significant and negative impact on the profitability of banks. This means that any increase in credit risk would reduce the profitability of banks. According to the results, we recommend investors to take stock banks which have less credit risk because they have a higher performance resulting to higher profitability of their shares.

Key Words: credit risk, return on assets, return on equity.

Introduction

The issue of non-performing loans and the credit risk are so important and sensitive in banking industry that can be considered as the main causes of bank failures. In the recent years, following the economic crisis of 2008 in the United State of America, which originated in increased credit risk, the importance of credit risk has increased. Economic recession together with inflation in Iran's economy in recent years has left a negative impact on the banking system which has increased non-performing loans level about 16 percent of the loans that can be a serious wake-up call for banking industry. On the other hand, bearing the process of economic firms' privatization in mind, the issue of

corporate governance is very essential to achieve the goals of the country's economic prospects (Amiri, 2013).

Haughman(2011), points out that a healthy and profitable banking system, can resist better against economic shocks and play a more significant role in the strength and stability of financial systems. Therefore, it is clear that the affecting factors on the performance and profitability of banking system are interesting points for academic researchers, banking system managers, monetary supervisors and economic actors. (Atanasglu, Berismiz & Deliz, 2005).

Credit risk is referred as one of the most important factors which affects the profitability of banking system; many countries have faced credit crisis in the last two decades that has consequently resulted in the stopping or restructuring of a significant number of institutions operating in these countries (Esonza and Perasad, 2010). Moreover, one of the most important challenges facing banking system in recent years, has been the rise of the flow of non-performing loans which according to the bank-oriented monetary and liquidity of the banks has turned into the main national challenge (Borhani, 2010). Given the aforementioned literature, the purpose of this study is to investigate the relationship and the impact of the profitability of credit risk in the Stock Exchange banks. Furthermore, this research seeks an answer to the question that what the relationship is between credit risk and profitability of the banks.

Review of the literature

Shaval pour and Ashari(2013) investigate the effect of credit risk on the profitability of Iran's banks in order to measure credit risk out of non-performing loans to the total loans ratio and of the doubtful debts to the total loans and also the profitability of the ratios of the assets and shareholders' equity. Their research indicates that there is a meaningful relation between credit risk and banks' profitability.

Darabi and Molaei (1390) study the effects of variables including liquidity, inflation, and preservation of capital and GDP on Melat Bank's profitability during 1384-88 by using monthly data. According to the results of this study, although bank's liquidity and society liquidity level have

positive effects on bank's profitability, there is no meaningful relationship between Melat bank's profitability and the variables of GDP, inflation and bank capital level.

Ghasemi(2010) assesses the effect of non-performing loans on banks' profitability. Results show that such loans in firms' assets requires storage which itself leads to reduction in operating incomes and size of bank's assets.

Bagheri (2006) analyzes the effective factors on Iran's commercial banks' profitability. In this research, the indexes of banks' profitability, the ratio of pre-tax to assets and shareholders' equity on return have been considered. The factors affecting the profitability of commercial banks in this study have been classified into two groups of banks' internal factors (including asset mix, the composition of deposits, capital, liquidity and cost management) and external factors (including inflation, bank scale and virtual variables related to the government's policies).

Abuysany (2004) examines the strategies to increase profitability in banking system where banks' performance during the 98 years was studied; the results show that credit risk and assigned and short term loans have reverse effect on the profitability and there is a positive and significant relation between short term deposits and profitability.

Alashti (2015) examines the effect of risk credit management of financial performance of Jordan Commercial Banks during 2005 to 2013; the study sample includes 98 banks which use non-performing reserves for doubtful debts to total loans and total loans credit risk ratios loans to measure credit risk and also they use ROA and ROE. The results of this study show that there is a negative and meaningful relation between credit risk and banks' profitability.

By examining the effect of risk credit management on the performance of Nigeria's commercial Banks, respecting to credit risk and profitability indexes, using a regression model, Abiola(2014) shows that there is a negative and meaningful relation between risk credit and banks' performance.

Felamini, Mac Donald and Shoemaker (2009) examine the effective factors on banks' profitability of 41 countries. Their research evaluates 389 banks. The results indicate that credit risk and the size of banks are the most important factors affecting the profitability of banks.

Aborime (2008), in a study called the examination and effect of risk on profitability, says that banks' profitability depends on their ability in predicting, preventing and controlling faced risks; so during the allocation of resources, banks should also consider

the risk of different types of assets. Low quality assets and low levels of liquidity are the two main causes of banks' failures.

Kosmido(2008),using a linear regression model, examines the effect of credit risk on Greece banks' profitability. The study sample consists of 88 banks. In order to measure profitability and credit risk, the researcher chose return on assets indexes and the ratio of reserves for doubtful receivables. The results of this study indicate that there is a negative and meaningful relation between risk credit and banks' profitability. The result of this study is in agreement with the hypothesis that increased credit risk reduces the profitability of banks; therefore, banks can increase their profitability through effective monitoring and control of credit risk.

Atanasglu and Stikoraz(2006) examine banks' profitability during 1998 to 2002. Their results indicate that risk management trends have a considerable effect on banks' profitability. The review of domestic and foreign studies shows that there is a negative relation between credit risk and banks' profitability.

Research purposes

This research is to examine the relation between risk credit and stock exchange banks. Using the results of this study and by examining the credit risk in banks, one can figure out banks' performance; investors can also invest and purchase stocks with more awareness based on banks' credit risk value. Also, it can be possible to examine credit risk of banks by separating private banks from state ones.

Considering that credit risk is known as the most significant kind of risk and as one of the most important factors affecting the profitability of banks, the issues of non-performing loans and the credit risk are of the most sensitive and important topics in banking industry which can be called as the two main causes of banks' failures. This study emphasizes again that in order to increase banks' profitability; managers should control and supervise the credit risk in addition to improve their performance and profitability. According to the research theory discussed, hypothesis arises as follows:

The first hypothesis: there is a meaningful relationship between credit risk and return on assets.

The second hypothesis: there is a relationship between credit risk and rate of return on equity.

Dependent variables:

Two ratios of return on assets and shareholders' equity have been used. The ratio of return on assets (ROA) examines the relation of net profit and the amount of assets. This ratio indicates that for each £,

Asset Management has created a few riyals net profit. If this ratio is higher, it indicates that bank's management has had a more efficient use of assets. This is the best ratio for the assessment of management which evaluates the net income caused from the use of the bank's total assets. (Reymond pi nowo, 2006).

Equity (ROE) Return is also known as special equity with which bank's profits is calculated per equity IRR; the profit shall be divided on ROE after tax deduction. Return on assets ratio indicates that the company's profitability is linked to the size of its assets. (Reymond Pinowo, 2006).

Independent variables:

The ratio of non-performing loans to the total loans: it is one the the usual measures which are used in banking system to evaluate credit risk condition and the ratio of non-performing loans to total ones. According to Iran Central Bank's classification, non-performing debts of country banking system are classified into three classes. In the first class, the Past due receivables in the bank are calculated until 1 month after due date and in case of non-repayment of loans, they are placed in the second class that means between 6 and 18 months after the first due. In the third class which is doubtful receivables, due receivables after 18 months (c) of the first due is considered to be more sensitive. Typically, in reading non-performing loans, all loans are to be classified; Bank officials and the economic agents know doubtful receivables more dangerous for banking system. (Mehrabi, 2015)

The ratio of reserves for doubtful receivables: based on the existing standards when a bank's asset falls in non-performing class, the bank not only cannot consider that profit as its income, but also it will be required to leave its part of the income to cover losses caused by the incomplete claims reserves for bad debts as the doubtful demands. Taken savings can be "Public "(% of total demands, usually 1.5 percent of the total demands except those for specific provision) or "special" (according to the status of each asset). The amount to be stored should be in way that covers all possible losses; otherwise banks will face difficulty in future. According to the above description, another common criterion to assess credit risk in banking system is the ratio of reserves for doubtful debts to total loans. (Shavalpour & Ashari, (2014)

Control variables which are here to control external factors on the dependent variables and prevent errors are:

IR= the investments ratio: this is calculated by dividing the total amount of investments to bank's total assets.

LR= the Loans Ratio: it is calculated by dividing the total of loans to the totals of bank's assets.

BR = the Bonds Ratio: it is calculated by dividing the total of bonds to the total of bank's assets.

DTP= Deposits to Personnel: it is calculated by dividing the total of deposits to the number of bank's personnel's.

Research Method

As the purpose of this study is to investigate the relationship between credit risk and profitability of banks, according to the research classification based on its objective, this is an applied research. It is also based on correlation analysis according to its research method. This research is conducted within the framework of deductive - inductive reasoning. Thus, library studies and theoretical research, articles and sites in the form of deductive and inductive methods of collecting data have been carried out to confirm or reject the research hypotheses.

Population and sample

The population of this research includes all of the listed banks in Tehran stock exchange which have been collected by Rahavard Novin software during a five-year-period from 2010 to 2014. In this study, in order to have a proper representative sample of the target population, systematic elimination method is used. The selection process is as follows:

1. The selected companies shall be among banks, financial and credit institutions.
2. By the end of 2014, they shall be active in stock exchange.

Research population includes 11 active banks in the exchange selected as sample whose names are: Pasargad, Parsian, Sina, Eqtsad novin-Karafarin-Saderat-Tejarat- Melat.

Analysis Method and Hypothesis Testing

For the research analysis, statistical methods such as descriptive statistics, correlation (correlation coefficient, coefficient of determination) are used; its coefficient test and regression analysis, correlation analysis and multiple correlation coefficient tests and meaningful equality test are conducted. In the descriptive statistics, analysis of data using indicators such as the mean and median and standard deviation measures are carried out. To test the hypothesis of the study, combined data regression model is used. In order to choose from combined regression models and panel data model, F Limer test is used. This means that if the F Limer test panel data is chosen, it is done. But if panel data method is chosen, it is necessary that Hausman test be also done. Hausman test is used to determine a

fixed effects model against the random effects model.

The underlined data will be classified and summarized after collection and then research variables will be processed by replacing in determined models to test the hypothesis through Eviews software so research results are obtained and the relations are discovered. Due to the nature of the investigation panel (combination of cross-sectional data series time), the model is a multivariate panel model as follows.

The following model for testing the first hypothesis (the relationship between credit risk and rate of return on assets) is used:

$$ROA_{it} = \alpha_{it} + \delta_1 LLP_{it} + \delta_2 NPL_{it} + \delta_3 IR_{it} + \delta_4 LR_{it} + \delta_5 BR_{it} + \delta_6 DTP_{it} + \epsilon_{it}$$

The following model to test the second hypothesis (the relationship between credit risk and rate of return on equity) is used:

$$ROE_{it} = \alpha_{it} + \delta_1 LLP_{it} + \delta_2 NPL_{it} + \delta_3 IR_{it} + \delta_4 LR_{it} + \delta_5 BR_{it} + \delta_6 DTP_{it} + \epsilon_{it}$$

In the above model, i and t represent bank and time periods respectively.

In this study, the model estimation is based on the "panel data model". In this method, a series of cross-sectional units (such as companies) have been undertaken over several years. With the help of this method which has been used recently, increasing the number of observations is pleasant. Given that the observed integrations leads to higher variability, to lower multicollinearity among the explanatory variables, to more freedom and higher efficiency of the estimators, panel studies have some advantages comparing with cross-sectional studies.

Generally, the following model represents a model with panel data:

$$Y_{it} = \alpha_{it} + \sum_{k=1}^k \beta_{kit} X_{kit} + \epsilon_{it}$$

In which i= 1,2,..., n represents sectional units(like companies) and t= 1,2,..., T represents time. Y_{it} shows the dependent variable for i sectional unit in t year and X_{kit} shows k independent variable for i sectional unit in t year. ϵ_{it} is the error term which is assumed to have 0 mean ($E[\epsilon_{it}] = 0$) and constant variance ($E[\epsilon_{it}^2] = \sigma_{\epsilon}^2$).

β_{kit} is among model parameters which measures the independent variable reactions to k changes of this independent variable in the i section and measures t. There are various methods to estimate the model according to panel data such as constant effects method and random effects which can be used.

Research findings

Since one of the regression model assumptions is the normality of data distribution, the normality of study variables distribution is examined via Jarque-Bera test.

Table 1 Normality Tests of errors

Hypothesis	Jarque-Bera statistics	Jarque-Bera statistics possibility
First	1.153769	0.561646
Second	0.517496	0.772018

The above table results represent the normality of error in both hypotheses.

Also, in order to ensure research findings and to prove the significant relationships of the variables included in the regression, stationary test has been taken and constant root of study variables was calculated. This test was done using Eviews software and Levin, Lin and Chu, Fisher - Dickey Fuller, and Fisher- Phyllis , Perron. Test results are shown in Table 2.

H: constant root: the underlined variable is unviable.

H1: non -existence of constant root: the underlined variable is viable.

Table 2. Variables stationary test results

Fisher,fill ips, Brown	Fishe r Dicke y Fuller	Levi n, lin and cho	tests	
				Va ria ble s
25.5918	25.94 77	- 22.39 64	Coefficient	RO A
0.0292	0.026 3	0.000 0	Meaningfu Inness	
18.3766	25.72 94	- 3.190 08	Coefficient	RO E
0.1902	0.011 7	0.000 7	Meaningfu Inness	
31.4108	28.15	-	Coefficient	

	04	11.67 07		NP L
0.0017	0.005 3	0.000 0	Meaningfulness	
49.8764	38.14 80	- 8.864 96	Coefficient	LL P
0.0000	0.000 5	0.000 0	Meaningfulness	
25.1176	25.60 41	- 10.42 94	Coefficient	IR
0.0334	0.029 1	0.000 0	Meaningfulness	
14.0594	28.11 71	- 2.122 53	Coefficient	LR
0.4453	0.005 3	0.016 9	Meaningfulness	
19.2591	25.39 24	4.363 77	Coefficient	BR
0.1553	0.041 9	0.000 0	Meaningfulness	
28.0167	22.94 38	- 5.249 91	Coefficient	DT P
0.0115	0.037 2	0.000 0	meaningfulness	

Panel data is used to test the hypothesis of this study. In this method, in order to choose from combined models and constant effect model, a special test called Chow is used. Chow test is the equity test of coefficients in linear regression.

To test the hypothesis, the fixed time effects model is firstly estimated and then structural test changes are used to examine the meaningful difference. The test for the presence of fixed effects can be

hypothesized as follows:

H0: non-existence of fixed effects=pool model

H1: existence of fixed effects= fixed effects model

Test results are shown in table 3. If the meaningfulness is under 5%, H0 is rejected; it means that fixed effects model is used as the superior model.

Table3. Chow test results

hypothesis	Cross sectional section	statistics	Freedom degree	meaningfulness	superior model
First hypothesis	f statistics	9.136561	(7,26)	0.0000	Fixed effects
	Chi-Square	49.648932	7	0.0000	Fixed effects
Second hypothesis	f statistics	3.021736	(7,26)	0.0184	Fixed effects
	Chi-Square	23811322	7	0.0012	Fixed effects

As can be seen, Chow test results indicate the fixed effects model for the first and second hypothesis. Now, fixed effects model should be tested against the random effects model. Hausman test is used for this purpose. To check the presence of random effects, Hausman test is set as below.

H0: there is a correlation between individual effects and explanatory variables: random effects

model

H1: there is a correlation between individual effects and explanatory variables: fixed effects model

The results of this test are given in Table 4. As can be considered, depending on the level of the achieved significance, H_0 is rejected and fixed effects model is selected as the superior model.

Table4. Hausman test results

Hypotheses	Statistics	Freedom degree	meaningfulness	Top model
First hypothesis	15,715838	6	0.0154	Fixed effects
Second hypothesis	17,612409	6	0.0073	Fixed effects

The statistical method used in this research is regression method with panel data. To estimate the regression model, ordinary least squares method (OLS) and generalized least squares estimation method (EGLS) are used. Hypotheses were tested through the results of econometric models and regression. To examine the meaningfulness of the independent variables coefficients, t-student statistics is used at 95% level.

$$ROA_{it} = \alpha_{it} + \delta_1 LLP_{it} + \delta_2 NPL_{it} + \delta_3 IR_{it} + \delta_4 LR_{it} + \delta_5 BR_{it} + \delta_6 DTP_{it} + \epsilon_{it}$$

Ho: there isn't any meaningful relation among NPL,LLP, with ROA

H1: there is a meaningful relation among NPL,LLP, with ROA

The results of testing this hypothesis using generalized least squares estimation (EGLS) are shown in Table 5. The results show that the variables used in the model justify 84% behavior of the dependent variable. As can be seen in the aforementioned table, the value of F statistics strongly rejects the hypothesis which indicates that explanatory variables generally have no effect on dependent variable. In other words, at least one explanatory variable has a significant effect on the dependent variable and regression equation is meaningful

Table 5. First hypothesis results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.052440	0.019077	2.748837	0.0096
NPL	-0.042582	0.020691	-2.058048	0.0446
LLP	-0.395801	0.121203	-3.265597	0.0025
IR	0.120892	0.062673	1.928929	0.0547
LR	0.010410	0.014558	0.715073	0.4809
BR	0.023974	0.045506	0.526840	0.6028
DTP	2.87E-07	5.89E-08	4.871868	0.0000
R-squared	0.862090	Adjusted R-squared	0.843135	
F-statistic	50.75651	Prob(F-statistic)	0.000000	
Durbin-Watson stat	1.949958			

As can be seen in the above table, the ratio of non-performing loans and the ratio of doubtful debts provision have negative and significant relation with return on assets; therefore, the hypothesis is accepted and there is a meaningful relation between credit risk and return on assets.

The second hypothesis

There is a meaningful relation between credit risk and shareholders' equity on return.

$$ROE_{it} = \alpha_{it} + \delta_1 LLP_{it} + \delta_2 NPL_{it} + \delta_3 IR_{it} + \delta_4 LR_{it} + \delta_5 BR_{it} + \delta_6 DTP_{it} + \epsilon_{it}$$

H0: there isn't any meaningful relation between NPL and LLP with RoE

H1: there is a meaningful relation between NPL and LLP with RoE

The results of testing this hypothesis using ordinary least squares (OLS) are presented in Table 6.

The results show that the variables used in model justify the behavior of the dependent variable at 54%. As can be seen in the aforementioned table, F value statistics rejects the hypothesis which indicates that all of the explanatory variables have no effect on dependent variable. In other words, at least one explanatory variable has a significant effect on the dependent variable and regression equation is meaningful.

As can be seen in the following table, the variable of non-performing loans and ratio of doubtful debt provision have a negative and meaningful relation with shareholders' return on equity; thus, the hypothesis is accepted and there is a meaningful relation between credit risk and equity on return.

Table 6. The second hypothesis results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.474027	0.253560	1.869485	0.0729
NPL	-0.099534	0.045395	-2.192620	0.0058
LLP	-0.119955	0.048285	-2.484312	0.0009
IR	0.183000	0.868703	0.210659	0.8348
LR	0.029487	0.014587	2.021457	0.0032
BR	0.585477	0.979056	0.598001	0.5550
DTP	2.89E-06	1.09E-06	2.662132	0.0131
R-squared	0.588700	Adjusted R-squared	0.543050	
F-statistic	5.634185	Prob(F-statistic)	0.000092	
Durbin-Watson stat	1.856868			

Conclusion and Suggestions:

The main objective of this study is to answer the question whether the credit risk has any relation with company profit or not? And if there is a relation, to what extent, it is significant and statistically

meaningful? In this research, in order to investigate the relation of credit risk with the variables of non-performing loans and the ratio of doubtful debts provision are used and their relation with banks' profitability variable have been assessed. Based on the regression models noted before, Hausman test results show that the fixed effects model is significantly better than the random effects.

Hausman test shows a significant result that the fixed effects model is superior to random effects model meaning that the research hypotheses are tested.

The first hypothesis suggests that non-performing loans variable and ratio of doubtful debts provision have a meaningful and negative correlation with the rate of return on their assets; therefore, the hypothesis is confirmed and there is a significant relationship between credit risk and rate of return on assets. The results of this hypothesis corresponds with the study results of Bagheri(2006), Shavalpour and Ash'ari(2013), Baratali Abuysany (2004) as well as the study results of Alshty(2015), Kusmydov (2008) and Atanasglu deniz and Estikoarez(2006).

The second hypothesis test also shows that the ratio of non-performing loans and ratio of bad debt provision have a meaningful and negative relation with shareholders' equity on return; therefore, the hypothesis is accepted and there is a meaningful relation between credit risk and shareholders' equity on return. Thus, this hypothesis corresponds with the study results of Bagheri(2006), Darabi and Molae (2011), Shavalpour & Ashari(2013), Baratali Aboisani(2004) and also study results by Aburime(2008), Kosmido(2008) and Abiola(2014).

The results of research hypothesis tests show the acceptance of hypotheses. That means credit risk has a meaningful and negative effect on banks' profitability. It means that increase in credit risk will reduce banks' profitability.

According to the study findings and considering that credit risk is called as the most significant kind of risk in banking system and is one of the most important factors on banks' profitability, according to the first hypothesis for increasing banks' profitability, banking system managers need to improve their performance and profitability, and to control and monitor of their assets.

Also, according to the results from the second hypothesis which shows a negative and meaningful relation between credit risk and shareholders' equity on return, it is suggested that investors consider their credit risk and select the one which has less credit during taking decisions about investing in stock exchange, because these banks have higher

performance which means higher profitability for their shares.

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