INVESTIGATION OF THE FACTORS CONTRIBUTING TO CREDIT RISK OF CUSTOMERS OF BANK MLLAT (CASE STUDY)

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ABSTRACT

An efficient banking system is the requirement of the economic development of a country and promotion of the banking system leading to its equipment and allocation in the form of financial facilities is the most important duty of commercial banks. Therefore, in banks, at the time of deciding over financial facilities, comprehensive assessment of the applicant is of great importance for minimization of the risk of avoiding pay back. For this purpose, necessary investigations of the information of a random sample consisting of 382 customers of one of the branches of Western Azerbaijan' Bank Mellat during years 2010-12 who received financial facilities is performed. In this work, 16 variables which have a meaningful effect on credit risk and separation of good and bad customers were selected and final model was fitted with it. To test this relationship, the econometric technique using logistic regression model was applied and coefficients were estimated using SPSS 21. Meaningfulness and sign of coefficients of independent variables of model reveals the confirmation of economic theories in the field of factors determining credit risk.

Keywords: Credit Risk, Bank, Customer, Logistic Regression

INTRODUCTION

The prerequisite of economic success and development is having an active and healthy financial system and this system is considered a mediator or platform which relates excess of financial resources with excess of financial usage. The manner of supplying financial resources for economic activities and depositing and attracting resources through various ways is one of the most important issues of the economy of each country. In this regard, the role of financial markets in the process of attracting deposits, equipping resources and directing them toward producing activities is significant since in competitive environments, not only keeping available resources, but also attracting new resources doesn't seem a simple matter and in this way, only those companies are successful that can improve their competitive power in accordance with customer needs and since banking system is one of the important parts of each country, it has a challenging mission (Hashem, 2009).

Banking is one of the most important economic activities. By organizing and directing receptions and payments, banks can facilitate commercial transactions, develop markets and economy. Moreover, by equipping deposits and directing them toward producing and commercial institutions, they can provide useful and valuable services (George, 1987).

Collecting all types of deposits and allocating them to supplying financial needs of economic activities, is one of the major operations of country banking. By their credit operations, these financial institutions transfer the resources from people who are not intended to take part in economic activities to those who need capital for economic activities and cause the development of national productions and this in turn leads to employment improvement (same). Banks as financial institutions, after completion of all or a part of the required resources of the person expects the return of the supplied resources or facilities as well as expected interest in a certain period (same).

In the field of financial activities, risk is considered as a key effective factor for performance of financial institutions and banks. In fact, recognition and determination of the risk in various economic and financial parts, have vital role in their survival and permanence. Now, in various parts of financial services, credit

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risk is the major cause of banks bankruptcy so that monetary crises of banks of various countries confirms the necessity of attending financial risks especially credit risks. Banking system of the country faces the considerable growth of expired debts and statistics show that the growth rate is increasing (Vali, 2002).

Evaluating and measuring credit risk among the risks bank faces with in its extensive field of activities, has a significant position. Reduction and control of risk as am effective factor in improving the process of crediting and consequently, performance of banks, has a pivotal contribution to the persistence of providing facilities, profitability and survival of banks and financial institutions (Rashdian, 2011).

Due to importance of the issue and on the other hand, utilization of factors affecting credit risk as one of the most important resources of information in decision making about providing companies facilities, the necessity of considering and investigation of credit risk is being felt more. The purpose of this work is to recognize factors affecting credit risk in applying facilities by customers. However, this research methodology can be used for similar works in another bank.

Banks always face this challenge that they have to evaluate factors affecting credit risk. The most important risk for the banks is credit risk. If customer fails to pay back debts on time, facilities turn into delayed demands and this leads to interruption in country. Despite of the importance of this issue, unfortunately, in our country, crediting based on scoring, classifying and determining the maximum credits according to risk index is not taken into account and indices are determined based on the opinion of expert committee and credit committee. Having an effective risk model not only facilitates decision making about credits and taking collaterals, but also causes that banking system have an effective pattern for capital allocation for various parts of economy (Roein, 2006).

In studying factors affecting customers' credit risk, taking some factors into consideration seems necessary including factors such as income, capital, sex, educational level and so on.

Therefore, reasons of carrying out this work in the field of credit risk can be classified as follows:

1) Today, the only reason for banks' bankruptcy is credit risk. If the customer fails to pay back debts on time, these facilities will become delayed demands and lead to interruption in national banking system and economy (Roein, 2006).

2) Measuring credit risk together with predicting losses of not paying bank the credits, making a logical relationship between risk and efficiency, allows us to optimize the credit portfolio and determine the economic capital of banks for reducing investment expenditures and keeping competitive power as well as a relative benefit for banks and financial institutions.

3) In Iran, on one hand, banks activity is based on Islamic contracts and consequently, a border cannot be considered between money and capital markets. On the other hand, according to national economic structure, operations of capital market and other non-bank networks didn't develop considerably and therefore, a significant portion of investments is done by banks. As a result, banks are important in performing these works.

Research Goals

Research Main Goal

The main purpose of this work is to investigate the factors affecting credit risk of Bank Mellat customers. *Research Secondary Goals*

- 1. Studying the effect of income level on credit risk of customers in studied branches
- 2. Investigation of the effect of capital level on credit risk of customers in these branches
- 3. Determination of the probability of failure to pay back of facilities by customers in studied branches

4. Investigation of the effect of age, educational level and sex on credit risk of customers in these branches

Research questions

- 1. Does wealth affect credit risk of customers?
- 2. Does income level affect credit risk of customers?
- 3. Is there a relationship between interest rate and credit risk?
- 4. Is there a relationship between demographic variables and credit risk of customers?
- 5. Is there a relationship between customer job and credit risk?

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- 6. Is there a relationship between collateral of customer and credit risk?
- 7. Does credit history affect credit risk of customers?
- 8. Is there a relationship between loan type and customer credit risk?
- 9. Is there a relationship between number of sponsors and customer credit risk?
- 10. Is there a relationship between loan value and customer credit risk?
- 11. Is there a relationship between loan pay back period and customer credit risk?
- 12. Is there a relationship between employment history and customer credit risk?

13. Is there a relationship between returned cheque and customer credit risk?

Research Hypotheses

- 1. There is a meaningful relationship between demographic variables and customer credit risk.
- 2. There is a meaningful relationship between customer job and credit risk.
- 3. There is a meaningful relationship between customer collateral and credit risk.
- 4. There is a meaningful relationship between customer credit history and credit risk.
- 5. There is a meaningful relationship between customer income and credit risk.
- 6. There is a meaningful relationship between customer wealth and credit risk.
- 7. There is a meaningful relationship between interest rate and credit risk.
- 8. There is a meaningful relationship between returned cheque status and credit risk.
- 9. There is a meaningful relationship between loan payback period and credit risk.
- 10. There is a meaningful relationship between loan value and credit risk.
- 11. There is a meaningful relationship between employment history and credit risk.
- 12. There is a meaningful relationship between number of sponsors and credit risk.
- 13. There is a meaningful relationship between loan type and credit risk.

MATERIALS AND METHODS

This research is an applied one and will be used for actualization of the theory of credit risk in Bank Mellat. The research methodology is descriptive.

Research Variables

In this work, bank customers' credit risk is the dependent variable and independent ones are as follows: *Indices for Real Persons:*

- 1. Applicant income
- 2. Educational level
- 3. Age
- 4. Sex
- 5. Capital
- 6. Collateral
- 7. Interest rate
- 8. Credit history
- 9. Applicant job status
- 10. Contract type
- 11. Employment history
- 12. Payback period
- 13. Marital status
- 14. Number of sponsors
- 15. Loan value
- 16. Returned cheque status

Statistical Population and Sample

In this research, investigated population includes all customers who received facilities during years 2010-12 from Western Azerbaijan bank Mellat. In this work, we used random sampling. Ro determine sample volume, we applied Cochran formula and we assume 382 as the volume of our sample.

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Data Collection Method

The method of collecting data is library and field methods. Initially, using resources available in libraries, various papers of valid journals and available documents, required information for credit risk are collected and then, through questionnaire design and distribution among customers of credit division of the bank, require data was collected.

Data Collection Tool

Information required for this research are collected in two forms. First, through interview with experts, factors contributing to credit risk are recognized and then, by means of questionnaire and SPSS21 software will be used in the form of real person customers.

Data Analysis Method

In this paper, the purpose of analyzing data is to determine which factors affect credit risk. To achieve this goal, statistical and regression methods such as logistic and parametric scoring via SPSS21 are used. *Nomenclature*

Credit risk: a risk in which a party doesn't act according to commitments including failure in supplying products and services or paying back the loan or on time returning the amount which has been taken (Brian, 2000).

Customer: in Webster dictionary, customer is defined as follows: someone who purchases product or service. This is a general and simple definition of customer which represents the transaction between two people, a person and an organization or two organizations in which someone sells a product or service and the other one purchases it (Lesley and Faure, 1992).

Bank: bank is a commercial administration which collects money from people and credits industries, debtors and tradesmen. For the money which is paid to tradesmen and industries, bank gets an interest from them and in turn, gives an interest to those who deposit their money in bank (Garshasbi, 2009).

RESULTS AND DISCUSSION

Test of 1st Hypothesis:

H₀: there is no relationship between age and credit risk of customers.

H₁: there is a relationship between age and credit risk of customers.

In this relationship, to discover the relationship between hypotheses variables, k^2 test is used. Values calculated for statistic of k^2 is 51.743 whose meaningfulness level is as much as 0.000 less than research alpha (0.05). Therefore, it can be said with 95% certainty that there is a meaningful relationship between age and credit risk of customers.

Test of 2^{nd} Hypothesis

H₀: there is no relationship between sex and credit risk of customers.

H₁: there is a relationship between sex and credit risk of customers.

Value calculated for statistic of k^2 is 34.08 whose meaningfulness level is as much as 0.000 less than research alpha (0.05). Therefore, it can be said with 95% certainty that there is a meaningful relationship between sex and credit risk of customers.

Test of 3rd Hypothesis

H₀: there is no relationship between educational level and credit risk of customers.

H₁: there is a relationship between educational level and credit risk of customers.

Value calculated for statistic of k^2 is 87.908 whose meaningfulness level is as much as 0.000 less than research alpha (0.05). Therefore, it can be said with 95% certainty that there is a meaningful relationship between educational level and credit risk of customers.

Test of 4th Hypothesis

H₀: there is no relationship between job and credit risk of customers.

H₁: there is a relationship between job and credit risk of customers.

Value calculated for statistic of k^2 is 64.995 whose meaningfulness level is as much as 0.000 less than research alpha (0.05). Therefore, it can be said with 95% certainty that there is a meaningful relationship between job and credit risk of customers.

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Test of 5th *Hypothesis*

H₀: there is no relationship between marital status and credit risk of customers.

H₁: there is a relationship between marital status and credit risk of customers.

Value calculated for statistic of k^2 is 34.234 whose meaningfulness level is as much as 0.000 less than research alpha (0.05). Therefore, it can be said with 95% certainty that there is a meaningful relationship between marital status and credit risk of customers.

Test of 6th Hypothesis

H₀: there is no relationship between income level and credit risk of customers.

H₁: there is a relationship between income level and credit risk of customers.

Value calculated for statistic of k^2 is 28.880 whose meaningfulness level is as much as 0.000 less than research alpha (0.05). Therefore, it can be said with 95% certainty that there is a meaningful relationship between income level and credit risk of customers.

Test of 7th Hypothesis

H₀: there is no relationship between collateral type and credit risk of customers.

H₁: there is a relationship between collateral type and credit risk of customers.

Value calculated for statistic of k^2 is 0.703 whose meaningfulness level is as much as 0.402 higher than research alpha (0.05). Therefore, it can be said with 95% certainty that there is no meaningful relationship between collateral type and credit risk of customers.

Test of 8th Hypothesis

H₀: there is no relationship between payback period and credit risk of customers.

H₁: there is a relationship between payback period and credit risk of customers.

Value calculated for statistic of k^2 is 56.682 whose meaningfulness level is as much as 0.000 less than research alpha (0.05). Therefore, null hypothesis is rejected and it can be said with 95% certainty that there is a meaningful relationship between payback period and credit risk of customers.

Test of 9th Hypothesis

H₀: there is no relationship between credit history and credit risk of customers.

H₁: there is a relationship between credit history and credit risk of customers.

Value calculated for statistic of k^2 is 256.876 whose meaningfulness level is as much as 0.000 less than research alpha (0.05). Therefore, it can be said with 95% certainty that there is a meaningful relationship between credit history and credit risk of customers.

Test of 10th Hypothesis

H₀: there is no relationship between capital level and credit risk of customers.

H₁: there is a relationship between capital level and credit risk of customers.

Value calculated for statistic of k^2 is 27.529 whose meaningfulness level is as much as 0.000 less than research alpha (0.05). Therefore, it can be said with 95% certainty that there is a meaningful relationship between capital level and credit risk of customers.

Test of 11th Hypothesis

H₀: there is no relationship between returned cheque status and credit risk of customers.

H₁: there is a relationship between returned cheque status and credit risk of customers.

Value calculated for statistic of k^2 is 255.076 whose meaningfulness level is as much as 0.000 less than research alpha (0.05). Therefore, it can be said with 95% certainty that there is a meaningful relationship between returned cheque status and credit risk of customers.

Test of 12th Hypothesis

H₀: there is no relationship between employment history and credit risk of customers.

H₁: there is a relationship between employment history and credit risk of customers.

Value calculated for statistic of k^2 is 30.902 whose meaningfulness level is as much as 0.000 less than research alpha (0.05). Therefore, it can be said with 95% certainty that there is a meaningful relationship between employment history and credit risk of customers.

Test of 13th Hypothesis

H₀: there is no relationship between loan type and credit risk of customers.

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H₁: there is a relationship between loan type and credit risk of customers.

Value calculated for statistic of k^2 is 89.624 whose meaningfulness level is as much as 0.000 less than research alpha (0.05). Therefore, it can be said with 95% certainty that there is a meaningful relationship between loan type and credit risk of customers.

Test of 14th Hypothesis

 H_0 : there is no relationship between amount of facilities and credit risk of customers. (Average of loan for good and bad customers is not the same)

H₁: there is a relationship between amount of facilities and credit risk of customers.

To perform this test, according to the variables of this hypothesis, t-test is used for comparison of two independent populations. According to calculated values, the meaningfulness level is as much as 0.000 less than research alpha (0.05). Therefore, it can be said with 95% certainty that the average of loan for two groups is not the same.

Test of 15th Hypothesis

H₀: there is no relationship between number of sponsors and credit risk of customers.

H₁: there is a relationship between number of sponsors and credit risk of customers.

Value calculated for statistic of k^2 is 42.864 whose meaningfulness level is as much as 0.000 less than research alpha (0.05). Therefore, it can be said with 95% certainty that there is a meaningful relationship between number of sponsors and credit risk of customers.

Estimation and Analysis of Logistic Regression

In this section, we estimate and investigate the model of logistic regression for each of the variables. Initially, logistic regression model including two coefficients (one constant and other variable) is introduced. To analyze the presented model, first, the assumption of equality to zero for each coefficient is tested for the parent statistic. This assumption is rejected for meaningfulness level less than research alpha.

Here, we include all variables in model and fit the multivariate logistic model to it. Then, like previous section, we test the meaningfulness of each variable coefficient using parent test.

After that, to test that whether presented model is appropriate for data, we use Hosmer - Lemeshow Goodness-of-Fit Statistic. In this test, for meaningfulness level more than 0.05, model goodness will be approved. It must be noted that both statistics have Xi distribution as much as 2 and their meaningfulness level is derived from this distribution. After four steps, we obtain the optimal model.

According to Forward Wald method, other variables don't have the required conditions to be included in model.

Finally, we introduce the mathematical model of logistic regression. According to meaningfulness level obtained in Hosmer – Lemeshow test, it can be claimed that this model is very reliable in estimating the good customer.

Now, using obtained models, we perform prediction. Since in Hosmer – Lemeshow test, meaningfulness level is as much as 0.000 and all coefficients of research alpha are meaningful, moreover, the model has the prediction power as much as 94.5% which is an acceptable level, furthermore, since in other models, either Hosmer – Lemeshow test or regression coefficients are meaningless, therefore, model 4 represented below is selected as the appropriate model.

$$p = \frac{e^{(-8.403+1.583age+2.051\,credit\,history+3.083returned\,cheque-1.432\,employment\,history)}}{1+e^{(-8.403+1.583age+2.051\,credit\,history+3.083returned\,cheque-1.432\,employment\,history)}}$$

Conclusion

According to obtained results, there is a meaningful statistical relationship based on the variables for determination of the credit risk of bank customers. The only irrelevant variable was collateral type.

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